

# Instructional Units and Programs

*School of*

## *Accountancy*

*College of Business*

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**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA) in Accounting; BS, BA in Accounting Information Systems; Master of Accounting (MAcc); participates in Master of Business Administration (MBA)

**Undergraduate options:** The *BS or BA in Accounting* requires selection of one of the following options: Accounting, Agribusiness, Business Information Systems, Economics, Finance, Human Resource Management, Management, Marketing, Personal Financial Planning, or Production. Many of these options qualify for a minor. A dual major in Accounting and Economics is available. **Graduate specializations:** MAcc—Professional Accountancy, Taxation, Personal Financial Planning, Information Systems, and Finance. MBAs with specializations in Accounting and Personal Financial Planning are offered in the College of Business (see MBA—Accounting and MBA—Personal Financial Planning programs).

**Undergraduate minors offered:** Accounting and Personal Financial Planning

## *Undergraduate Programs*

### *Mission*

The mission of the School of Accountancy at Utah State University is excellence in accounting education through teaching, research, and service. The school endeavors to provide high-quality accounting preparation for professional careers to on-campus and extension students, to intellectually contribute to the field of accounting through the dissemination of meaningful research, and to render service. The school is dedicated to fostering economic and social progress, and to developing students into responsible and ethical citizens committed to active roles in their profession and service to society with a quest for lifelong learning.

### *Objectives*

The objective of the School of Accountancy is to provide high quality accounting preparation for professional careers in industry, public accounting, and other organizations. The undergraduate programs are devoted to providing basic conceptual accounting, information systems, and business knowledge, along with general education, as a well-rounded foundation for career development. The fostering of high-quality student organizations is fundamental to the career-development process for on-campus programs.

The accounting curriculum is designed to help students prepare to meet changes in social, economic, and technological development. Academic course requirements for the bachelor's

degrees include general education coursework, as well as supporting courses in mathematics, economics, business information systems, business communications, business administration, accountancy, and information technology. The programs provide an opportunity to choose from a number of elective courses to broaden educational backgrounds and enhance employment opportunities.

### Career Opportunities

Practice in the profession of accounting has become more complex, with computerized information and accounting systems becoming an integral part of the various accounting and business functions. University training is essential to prepare for high-level accounting careers in business, government, and public accounting.

Graduates of the accounting and accounting information systems programs find employment in a variety of industrial companies, nonbusiness and government agencies, and both large and small public accounting and business advisor firms. Graduates hold all levels of positions within organizations, including supervisors, managers, partners, controllers, financial vice presidents, and chief executive officers. Nonbusiness units and government agencies, such as the Utah State Auditors Office, the Federal Bureau of Investigation, and the Internal Revenue Service, provide jobs in many varied accounting functions. Accounting information systems graduates are prepared to pursue careers in electronic commerce, information technology, auditing, business systems consulting, information risk assessment, web assurance, and many other emerging areas.

### Requirements

**College of Business Requirements.** All students majoring in accounting must satisfy the College of Business requirements, provided on pages 83-84. Academic advising about these requirements is available in the College of Business Student Service Center, Business 308.

**General Instructions for all Accounting Majors.** Since some accounting courses are not offered every semester and many have prerequisites, students should plan their program at least a year ahead.

**Accounting and Accounting Information Systems Major Requirements.** For a bachelor's degree in accounting or accounting information systems, students must complete at least 120 credits, including at least 24 credits in accounting and at least 90 credits in nonaccounting courses (Acct 1000 and 3250 are considered nonaccounting). At least 51 credits must be from courses outside the College of Business (see page 84). All accounting and accounting information systems majors are required to complete the University Studies requirements (see pages 56-63), the College of Business Advanced Standing requirements (see page 84), and BIS 3450 or 3500 or CS 3500 (BIS 3450 or 3500 is required for a BIS minor); BA 3400, 3500, 3700; Econ 3400; MHR 3110, 4880 or 4890, Acct 3110, 3120, 3250, 3310, 4500, 4510. In addition, accounting majors must complete Acct 3410 and select one of the option areas below. Accounting information systems majors must complete Acct 5600; BIS 3330, 3450, 4330, and 5700.

### Option Areas for Accounting Majors

(Those marked with an "\*" qualify for a minor.)

**Accounting.** Select 6 additional accounting credits from the following: Acct 4900, 5100, 5210, 5220, 5400, and 5650. Acct 5210, 5220, and 5400 (or their equivalents) must be completed either prior to or as part of an MAcc or MBA-Accounting degree. Acct 6040 may be taken at the graduate level, instead of Acct 5210 and 5220. However, Acct 6210 and 6220 are recommended.

**\*Agribusiness.** Select 12 additional credits in economics and accounting from the following: Econ 3030, 3050, 4030, plus one additional course from economics or accounting.

**\*Business Information Systems.** Select 12 additional credits in business information systems and computer science from the following: BIS 2300, 3100, and 3330; plus one course selected from CS 1700, 3410, or 3510.

**\*Economics.** Select 12 additional credits in economics and/or accounting from the following: Econ 4010 or 5010 and Econ 4020 or 5000, plus two additional courses from economics or accounting. If the two additional courses are selected from economics, requirements for a dual major in accounting and economics may be met (see *Dual Major* below).

**\*Finance.** Select 12 additional credits in business administration and/or accounting from the following: BA 4450, 4460, and two courses from: BA 4300, 4410, 4420, 4430. (One additional accounting course may be substituted for one of the two BA courses listed in this group.)

**\*Human Resource Management.** Select 12 additional credits from the following: MHR 3710 and 4630 (required), plus two additional courses chosen from MHR 3720, 3810, 3820, 5640; Econ 5670 or 5680; Phil 3520 or MHR 4730; BIS 4350; or other classes as determined through MHR advisement.

**\*Management.** Select 12 additional credits from the following: MHR 3710 and 3820 (required), plus two additional courses chosen from MHR 3720, 3810, 4730, 5640; Phil 3520 or MHR 4730; BIS 4350; Econ 5670 or 5680; or other classes as determined through MHR advisement.

**\*Marketing.** Complete 12 additional credits in business administration and accounting as follows: BA 4510, 4530, 4540, 4550. (One additional accounting course may be substituted for BA 4530 or 4540.)

**Personal Financial Planning.** This option will *not* appear on student transcripts, and will *not* qualify as a minor for students majoring in accounting or accounting information systems. Complete 12 additional credits in personal financial planning and business administration as follows: PFP 5060, 5070, 5080; BA 3460 or 4460.

**\*Production.** Select 12 additional credits in business administration and accounting from the following: BA 4720, and three courses from BA 3080, 4750, 4790, 5730 (one additional accounting course may be substituted for one of the BA courses listed in this group).

### Dual Major

**Accounting and Economics Dual Major.** Select 12 credits in economics in addition to the courses required for an accounting major from the following: Econ 4010 or 5010; Econ 4020 or 5000; and 6 credits of upper-division Economics electives.

### **Accounting Minor**

Students with a major in an area other than accounting or accounting information systems may qualify for an accounting minor by completing the following 6 courses (18 credits): Acct 2010, 2020, 3110, 3120, 3310, and 3410 or 4500. A 2.5 grade point average must be achieved for accounting courses taken.

### **Personal Financial Planning Minor**

Students with a major in an area other than accounting may qualify for a personal financial planning minor by completing, with at least a 2.5 grade point average, the following 5 courses (15 credits): Acct 3410, PFP 5060, 5070, 5080, and BA 3460 or 4460. These courses are registered with the Certified Financial Planner (CFP)® Board of Standards. Students completing these courses will qualify to sit for the comprehensive CFP® Examination.

### **Second Bachelor's Degree in Accounting or Accounting Information Systems**

Students seeking a second bachelor's degree in accounting or accounting information systems must be approved by the School of Accountancy, must achieve an accounting and overall grade point average of 2.5, and must complete the course of study listed above for an accounting or accounting information systems major. Students working toward a second bachelor's degree may substitute Acct 6010 for Acct 2010 and 2020.

### **Honors Degree Option**

Academically able students who would like to experience the major in greater depth are encouraged to pursue Department Honors. Honors students will have the opportunity of working one-on-one with professors in selected classes. They will do original, independent work, taking them beyond the basics and allowing them to enjoy the benefits of close supervision and mentorship. Their senior project will provide an opportunity to collaborate with a faculty member on a problem which is significant personally and in accounting. Participating in Department Honors may enhance students' chances of obtaining fellowships and admission to graduate school, and gains them membership in the USU Honors Program. For further information about Department Honors, contact the College of Business Honors Advisor, Professor Dwight Israelsen, Business 608, tel. (435) 797-2298; contact the Honors Office, Merrill Library 374; or visit the Honors website at <http://www.usu.edu/honors>.

### **Beta Alpha Psi**

The Delta Omega Chapter of Beta Alpha Psi, the national honorary and professional accounting fraternity, provides many professional accounting experiences for qualifying accounting students throughout their academic program.

### **Institute of Management Accountants**

The student chapter of the Institute of Management Accountants (IMA) provides professional experiences in the area of management accounting. This organization is especially for students interested in careers in industry, not-for-profit organizations, governmental organizations, and accounting and business entrepreneurship.

## **Graduate Programs**

The graduate programs provide greater breadth and depth in accounting, taxation, information systems, and management to develop a high level of understanding, skill, and leadership capability to enter professional accountancy and related business careers. The Master of Accounting (MAcc) and the Master of Business Administration-Accounting Specialization (MBA-Accounting), offered by the College of Business, qualify graduates to sit for the Certified Public Accountant examination.

### **Admission Requirements**

See general admission requirements, pages 72-73. In addition, candidates are selected based on the combined consideration of their score on the Graduate Management Admissions Test (GMAT) and their grade point average from the previous 60 semester credits (90 quarter credits) completed. Generally, 200 times the GPA plus the GMAT score must total 1,150 or more. Additionally, for MAcc Programs, the minimum acceptable GMAT score is at the 40th percentile (about 500) and the minimum GPA is 3.0. In addition, scores for each section of the GMAT must be at least at the 40th percentile. For information about admission to the MBA—Accounting Specialization Program, see Admission Requirements for the MBA Program, page 160. Letters of recommendation, professional experience, professional certification, and leadership are also considered in admission decisions for all accounting graduate programs. Students may apply for admission to the graduate programs during their senior year of baccalaureate study. USU accounting students may take graduate courses during their last semester of undergraduate study, provided prerequisite courses have been completed, they have applied for admission and have been provisionally admitted into a graduate program, and a split registration form is approved by the dean of the School of Graduate Studies. (See *Split Form Policy*, page 74.)

Students with an undergraduate degree in accounting which meets the USU undergraduate accounting program requirements have completed all of the preparatory work for graduate study. Students with less than the equivalent of the undergraduate program are expected to make up the deficiencies. The director of Accounting Graduate Programs will assist in necessary program scheduling. Students are encouraged to satisfy undergraduate deficiencies by taking equivalent graduate business administration, management and human resources, and economics core courses when possible.

Graduate students are expected to maintain an overall GPA of 3.0 to remain in the program.

Complete information relative to the details of the program and course scheduling is available from the School of Accountancy.

### **Graduate Degree Programs**

**MAcc requirements for students who have an undergraduate accounting major or equivalent (30 credits)**

**Program of Study.** Students matriculated in the Master of Accounting degree must complete an approved program of study consisting of at least 30 credits. This program must include completion of the Foundation Requirements, the MAcc Core Require-

ments, and one of the Areas of Specialization Requirements. At least 15 credits must be earned in approved Accounting courses numbered above 6010. At least 9 credits must be earned in approved courses outside of Accounting. Details for each requirement type are provided in the following paragraphs.

**Foundation Requirements.** Students who have not completed undergraduate coursework in Corporate Income Taxation (Acct 5400 or equivalent) must include Acct 6400 in their MAcc program of study. Students who have not completed undergraduate coursework in both Accounting for Business Combinations (Acct 5210 or equivalent) and Accounting for Government and Non-profit Entities (Acct 5220 or equivalent) must include the 6000-level offering of the omitted course in their MAcc program of study. If a student has taken neither course, he or she may register for Acct 6040.

**MAcc Core Requirements.** The core courses required for this degree include: Acct 6510, 6550; PFP 6560; and BIS 6150.

### Master of Accounting Specializations

In addition to meeting the Foundation Requirements and MAcc Core Requirements, students complete requirements for one of the following specializations:

**Professional Accountancy Specialization.** Required courses for this specialization are: Acct 6350, 6500, and 6610.

**Taxation Specialization.** Required courses for this specialization are: Acct 6410, 6420, 6440, and 6460.

**Personal Financial Planning Specialization.** Students must complete Acct 6410 or 6960; PFP 6060, 6070, and 6080. In addition, students must complete, or have previously completed, the equivalent of BA 3460 or 4460 (neither of these courses count as part of the 30-credit MAcc degree requirement). This specialization satisfies the requirements to sit for the national Certified Financial Planner (CFP) examination.

**Information Systems Specialization.** Students must complete Acct 6500, 6610, and an additional 9 credits of approved systems-related courses.

**Finance Specialization.** Complete Acct 6350, 6610, plus 9 credits selected from approved finance-related courses.

### Accelerated Program for Nonaccounting Undergraduate Majors

**MAcc for nonaccounting undergraduate majors (39 to 60 credits).** This program requires the successful completion of the Integrative Pre-MBA Core (Acct 6160, 18 credits), which is offered summer semester only, plus an additional 39 credits. Students with undergraduate degrees in business subjects (other than accounting) need not take the Integrative Pre-MBA Core and therefore may earn the MAcc in 39 credits. The 39 credits include: Acct 3110, 3120, 3310, 6030, 6040, the MAcc Core Requirements, one of the MAcc areas of specialization, and at least 9 credits of nonaccounting coursework.

### MBA—Accounting Specialization

Students admitted to the MBA Program may earn an Accounting Specialization by completing the MBA Advanced Required Courses, 18 credits (see MBA program description, page 152), and at least 12 credits in accounting from those listed below. All of the accounting courses listed below (or their equivalents) must have been previously completed or completed as part of the MBA program. The required accounting courses are: Acct 3110, 3120, 3310, 3410, 6210, 6220, 6400, 6510; and Acct 6410 or 6610 or 6960. Students may substitute Acct 6030 for both Acct 3410 and 6400. Students may also substitute Acct 6040 for both Acct 6210 and 6220. At least nine credits must be taken in accounting courses numbered above 6010.

### MBA—Personal Financial Planning Specialization

Students admitted to the MBA Program may earn a Personal Financial Planning Specialization by completing the MBA Advanced Required Courses, 18 credits (see MBA program description, page 161), and the following: PFP 6060, 6070, 6080; Acct 3410 or 6400; and BA 3460 or 4460. This specialization satisfies requirements to sit for the national Certified Financial Planner (CFP) examination.

### Financial Assistance

Financial assistance is available in the form of President's Fellowships, Graduate School Fellowships, graduate assistantships, and special School of Accountancy scholarships. Applications for assistance should be made after the application for admission to the School of Graduate Studies is filed, but before March 1 of each year. Application forms are available from the School of Accountancy, and the awards are normally announced by April 15.

### Professional Organizations and Activities

Graduate students are encouraged to participate in professional organizations, such as the USU chapters of Beta Alpha Psi (National Honors Fraternity for Financial Information Professionals), the Institute of Management Accountants, and the Financial Planning Student Association. The Federation of Schools of Accountancy, the American Institute of Certified Public Accountants, the Utah Association of Certified Public Accountants, and other professional organizations sponsor professional activities for accounting graduate students.

## Accounting Courses (Acct)

**Acct 1000. Business Orientation.** Orients freshmen and transfer students to College of Business programs, academic and student services, professional organizations, and career possibilities. Also taught as BA 1000, BIS 1000, Econ 1000, and MHR 1000. (0.5 cr) (F,Sp)

**Acct 1050. Accounting Essentials.** Overview of accounting concepts, with special emphasis on practical applications. Taught only as a special extension course as requested. (3 cr)

**Acct 1500. Accounting Software for Personal Applications.** Instruction in the use of contemporary accounting and tax software designed for personal applications. (1-3 cr) ©

**Acct 2010. Survey of Accounting I.** Survey of uses of accounting information by investors and creditors for decision making. Emphasis on basic accounting principles used to prepare, analyze, and interpret financial statements. Prerequisites: Completion of 20 credits of college work and 2.2 GPA. (3 cr) (F,Sp,Su) ©

**Acct 2020. Survey of Accounting II.** Survey of uses of accounting information by managers for decision making, including planning, budgeting, and controlling operations. Emphasizes accumulation, analysis, and control of product and service costs. Prerequisite: Acct 2010. (3 cr) (F,Sp,Su) ©

**Acct 2250. Introductory Internship.** Introductory-level experience in a career-related position approved by the Cooperative Education Office. One credit for every 75 hours of internship experience, with a maximum of 9 credits. A maximum of 12 credits of 2250 and 4250 combined can be counted toward the minimum degree requirements for the College of Business. (1-9 cr) (F,Sp,Su) ©

**Acct 2500. Accounting Software for Small Business Applications.** Instruction in the use of contemporary accounting software designed for small business applications. (1-3 cr) ©

**Acct 2600. Accounting for Small Business and Entrepreneurial Ventures.** Accounting and reporting issues for small business and start-up enterprises. Topics include payroll, profit planning, government regulation, cash management, inventory control, tax issues, the accounting system, and other relevant concerns. (1-3 cr) ©

**Acct 3110. Intermediate Financial Accounting and Reporting I.** Study of accounting principles, theory, and practice relating to financial reporting of assets. Prerequisite: Acct 2020 or 6010 or 6160. (3 cr) (F,Sp,Su) ©

**Acct 3120. Intermediate Financial Accounting and Reporting II.** Study of accounting principles, theory, and practice relating to liabilities, equities, and other contemporary issues. Prerequisite: Acct 3110. (3 cr) (F,Sp,Su) ©

**Acct 3250. Discussions With Business Leaders.** Students attend Partners in Business Program seminar sessions to examine new methods for improving performance in organizations. Repeatable to a maximum of 1.5 credits. (0.5 cr) (F,Sp) ©

**Acct 3310. Strategic Cost Management.** Contemporary theory and applications in the accumulation, analysis, and interpretation of accounting information for internal decision-making and control. Prerequisite: Acct 2020. (3 cr) (F,Sp,Su) ©

**Acct 3410. Income Taxation I.** Emphasis on Federal income taxation of individuals. Introduction to tax research methods and taxation of corporations and partnerships. Prerequisite: Acct 2010. (3 cr) (F,Sp,Su)

**Acct 4250. Advanced Internship.** Advanced or middle-level internship experience in a career-related position approved by the Cooperative Education Office. One credit for every 75 hours of internship experience, with a maximum of 9 credits. (1-9 cr) (F,Sp,Su) ©

**Acct 4500. Accounting Information Systems.** Theoretical concepts underlying accounting systems' computerized support of business processes. Topics include accounting systems development, controls, security, and audit. Prerequisites: Acct 3110 and BIS 2450. (3 cr) (F,Sp,Su)

**Acct 4510 (CI). Auditing Principles and Techniques.** Fundamental principles and techniques of auditing and reporting of audits presented in the context of the audit logic sequence. Integrative applications emphasizing audits of organizational resources, processes, and systems. Also addresses ethics, legal environment, auditing standards, and fraud. (3 cr) (F,Sp)

**Acct 4900. Independent Research and Readings.** Selected reading and research individually assigned, handled, and directed. Problems of mutual interest to students and the instructor are investigated and reported. (1-3 cr) (F,Sp,Su) ©

**Acct 4950H. Senior Honors Thesis/Project.** Creative project that will then be written up, and presented, as a Senior Thesis as required for an Honors Plan. (3 cr) (Sp)

**Acct 5050. Management Accounting Issues and Problems.** Contemporary problems in management accounting, integrating issues in accounting, economics, finance, information systems, and management. Prerequisite: Senior-level accounting major or consent of instructor. (3 cr) (Sp)

**Acct 5100 (d6100).<sup>1</sup> Government Contract Administration.** Provides basic information and description of the general environment and content of government contracts (primarily U.S. government contracts). Emphasis on the administration of and accounting for these contracts. (3 cr) (Sp)

**Acct 5210 (d6210). Accounting and Reporting for Business Combinations and International Issues.** Study of accounting principles and theory relating to business combinations, foreign currency transactions, foreign affiliates, and segment and SEC reporting. Prerequisite: Acct 3120. (3 cr) (F,Su)

**Acct 5220 (d6220). Accounting for Government, Nonprofit, and Other Entities and Issues.** Study of accounting principles and theory relating to government and nonprofit organizations, partnerships, estates and trusts, and business insolvency. Prerequisite: Acct 3120. (3 cr) (Sp,Su)

**Acct 5400 (d6400). Income Taxation II.** Federal income taxation of partnerships, corporations, S-corporations, estates and trusts, and gifts. Prerequisite: Acct 3410. (3 cr) (F,Sp)

**Acct 5600 (d6600). Information Systems Security and Audit.** Study of computer security issues, including Internet security and systems auditing methodologies. (3 cr)

**Acct 5650 (d6650). Accounting Topics and Issues.** Selected contemporary accounting topics and issues, including the study of accounting for specialized industries. (1-3 cr) ©

**Acct 6010. Financial and Managerial Accounting.** Introduction to financial and managerial accounting at the graduate level. Prerequisite: Bachelor's degree or admission to graduate school. (3 cr) (F)

**Acct 6020. Managerial Accounting and Control Systems.** Study of contemporary issues and practices in managerial and cost accounting, computerized accounting information systems, internal control, and auditing. Prerequisites: Acct 2010 and 2020, or Acct 6010 or 6160. (3 cr) (F)

**Acct 6030. Federal Income Taxation.** Study of federal income taxation of individuals, corporations, partnerships, estates, and trusts. Prerequisite: Acct 2010 or 6010 or 6160. (3 cr) (F)

**Acct 6040. Advanced Financial Accounting.** Study of accounting theory and practice relating to business combinations, international operations and transactions, SEC reporting, and government and not-for-profit organizations. Prerequisite: Acct 3110. (3 cr) (Sp)

**Acct 6100 (d5100). Government Contract Administration.** Provides basic information and description of the general environment and content of government con-

tracts (primarily U.S. government contracts). Emphasis on the administration of and accounting for these contracts. (3 cr) (Sp)

**Acct 6160. Integrative Pre-MBA Core.** Integrates financial reporting, analysis, and markets; domestic and global economic and legal environments; creation and distribution of goods and services; and human behavior in organizations. Upon completion, students without undergraduate degrees in business are prepared to enter advanced MBA core. Also taught as BA 6160, BIS 6160, Econ 6160, and MHR 6160. (18 cr) (Su)

**Acct 6180. Intra-session MBA Workshop.** Intensive workshops designed to enhance the MBA experience. (0.5-1 cr) ®

**Acct 6210 (d5210). Accounting and Reporting for Business Combinations and International Issues.** Study of accounting principles and theory relating to business combinations, foreign currency transactions, foreign affiliates, and segment and SEC reporting. Prerequisite: Acct 3120. (3 cr) (F,Su)

**Acct 6220 (d5220). Accounting for Government, Nonprofit, and Other Entities and Issues.** Study of accounting principles and theory relating to government and nonprofit organizations, partnerships, estates and trusts, and business insolvency. Prerequisite: Acct 3120. (3 cr) (Sp,Su)

**Acct 6250. Internship in Accounting.** Graduate-level internship experience in accounting functions within industry, government, and public accounting firms. Repeatable to maximum of 6 credits. (1-6 cr) (F,Sp,Su) ®

**Acct 6350. Accounting Strategies for Achieving Profit Goals.** Action-oriented case studies to demonstrate management accounting techniques to achieve profit goals and business strategies in a variety of organizations. International accounting and ethical issues are addressed. Prerequisites: Acct 2010 and 2020, or Acct 6010 or 6160. (3 cr) (F,Sp)

**Acct 6400 (d5400). Income Taxation II.** Federal income taxation of partnerships, corporations, S-corporations, estates and trusts, and gifts. Prerequisite: Acct 3410. (3 cr) (F,Sp)

**Acct 6410. Tax Research and Procedures.** Methods of researching tax problems, case studies in tax administration, civil procedures and penalties, professional responsibility, and tax ethics for the tax practitioner. Prerequisites: Acct 3410 and 5400; or Acct 6030. (3 cr) (F)

**Acct 6420. Taxation of Corporations and Shareholders.** Concepts and principles governing the taxation of corporations and shareholders. Effect of taxes on corporation formation, capital structure, distributions, liquidations, and reorganizations. Prerequisites: Acct 3410 and 5400; or Acct 6030. (3 cr) (Su)

**Acct 6440. Taxation of Partnerships, Estates, and Trusts.** Concepts and principles governing the taxation of partnerships and partners and estates, trusts, and beneficiaries. Uses of partnerships and trusts in tax planning. Prerequisites: Acct 3410 and 5400; or Acct 6030. (3 cr) (F)

**Acct 6460. Tax Topics.** Topics of current interest to tax professionals. Prerequisites: Acctg 3410 and 5400; or Acct 6030. (3 cr) (Su)

**Acct 6500. Advanced Accounting Information Systems.** Contemporary issues in accounting information systems, including emerging information technologies, systems evaluation and selection, and computer-based audit and security. Prerequisite: Acct 4500 or 6020. (3 cr) (Sp,Su)

**Acct 6510. Financial Auditing.** Application of generally accepted auditing standards to accounting systems. Some study of auditing theory and current issues, and an introduction to statistical auditing. Prerequisite: Acct 4510 or 6020. (3 cr) (F,Sp)

**Acct 6520. Environmental Accounting.** Covers current topics, such as environmental liabilities, capital budgeting considerations, life-cycle cost analysis, total cost assessment, "spiritual" costs, ethics, and environmental reporting. Case approach. Taught as a web-assisted, independent study course. (3 cr)

**Acct 6530. Environmental Auditing.** A survey of environmental auditing, with emphasis on the audit process and types of audit applications. Includes international, regulatory, and ISO 14000 examinations. Taught as a web-assisted, independent study course. (3 cr)

**Acct 6550. Professional Accounting Cases and Problems.** Cases and problems relating to professional accounting practice and theory. Prerequisites: Acct 3120; Acct 5210/6210 and 5220/6220, or Acct 6040; Acct 3410 and 5400, or Acct 6030. (3 cr) (Sp,Su)

**Acct 6600 (d5600). Information Systems Security and Audit.** Study of computer security issues, including Internet security and systems auditing methodologies. (3 cr)

**Acct 6610. Accounting Theory and Research.** Analytical approach to understanding the financial reporting environment. Integration of accounting theory and practical research methodology in the resolution of financial reporting problems. Prerequisite: Acct 3120 (may be taken concurrently). (3 cr) (Sp,Su)

**Acct 6650 (d5650). Accounting Topics and Issues.** Selected contemporary accounting topics and issues, including the study of accounting for specialized industries. (1-3 cr) ®

**Acct 6900. Independent Reading and Research.** Independent work in accounting areas: theory, cost, auditing, taxation, and other areas with accounting faculty approval. (1-3 cr) (F,Sp,Su) ®

**Acct 6960. Professional Paper.** A paper of professional quality prepared by the student. Designed to demonstrate the ability to complete a major business-related project and to effectively present the results. (1-3 cr) (F,Sp,Su)

**Acct 6990. Continuing Graduate Advisement.** Continuing enrollment at the University required after completing coursework. (1-3 cr) ®

## *Personal Financial Planning Courses (PFP)*

**PFP 1050. Introduction to Personal Financial Planning.** Introduction to concepts of financial planning for individuals. Taught only as a special extension course as requested. (1-3 cr)

**PFP 5060 (d6060). Personal Financial Planning and Advising.** Fundamental concepts and principles of personal financial planning for individuals. (3 cr) (F)

**PFP 5070 (d6070). Retirement Planning.** Concepts and principles of retirement planning, including retirement and benefit plans, deferred compensation, and investments. (3 cr) (Sp)

**PFP 5080 (d6080). Estate Planning.** Concepts and principles of estate planning for individuals, including goal identification, data gathering, forms of property ownership, documents, probate, and transfer taxes. (3 cr) (Sp)

**PFP 5090 (d6090). Personal Financial Plans.** Capstone course in personal financial planning. Knowledge from other financial planning courses used to prepare comprehensive personal financial plans. Prerequisites (may be taken concurrently): Acct 3410; BA 3460 or 4460; PFP 5060/6060, 5070/6070, 5080/6080. (3 cr) (Sp)

**PFP 5560 (d6560). Business Law and Professional Responsibilities.** Examines the ethical and legal responsibilities of business professionals. Includes the application of law to business organizations, contracts, government regulation of business, and the uniform commercial code. (3 cr) (Sp)

**PFP 6060 (d5060). Personal Financial Planning and Advising.** Fundamental concepts and principles of personal financial planning for individuals. (3 cr) (F)

**PFP 6070 (d5070). Retirement Planning.** Concepts and principles of retirement planning, including retirement and benefit plans, deferred compensation, and investments. (3 cr) (Sp)

**PFP 6080 (d5080). Estate Planning.** Concepts and principles of estate planning for individuals, including goal identification, data gathering, forms of property ownership, documents, probate, and transfer taxes. (3 cr) (Sp)

**PFP 6090 (d5090). Personal Financial Plans.** Capstone course in personal financial planning. Knowledge from other financial planning courses used to prepare comprehensive personal financial plans. Prerequisites (may be taken concurrently): Acct 3410; BA 3460 or 4460; PFP 6060/5060, 6070/5070, 6080/5080. (3 cr) (Sp)

**PFP 6560 (d5560). Business Law and Professional Responsibilities.** Examines the ethical and legal responsibilities of business professionals. Includes the application of law to business organizations, contracts, government regulation of business, and the uniform commercial code. (3 cr) (Sp)

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

Department of

# Aerospace Studies

College of Humanities, Arts and Social Sciences

**Head: Professor** *Lt. Colonel Jeffery S. Bateman*  
Office in Military Science 107, (435) 797-8723

**Assistant Professors** *Major Paul Ermer*, Unit Admissions Officer; *Captain Michael L. Sampson*, Commandant of Cadets; **Information Manager** *Tech. Sergeant Harold R. Stolp*; **Director of Personnel** *Staff Sergeant Rebecca A. Swedin*

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## Undergraduate Programs

### Objectives

Air Force ROTC provides educational experiences that develop skills and attitudes vital to the career of an Air Force officer. The purpose of the course is to give an understanding of the mission and the global responsibilities of the United States Air Force. The academic phase develops background in national and international affairs to help understand and evaluate world events.

In addition, the curriculum includes experiences designed to stimulate and develop an interest in the Air Force (e.g., orientation flights and visits to Air Force bases); opportunities to apply the principles of leadership, human relations, management, and staff work in practical situations; and other related experiences.

### Requirements

**Physical Fitness and Medical.** All students must meet the physical fitness and medical standards for general military service.

**Age Limitations.** To qualify as a pilot or navigator, students must be able to finish the aerospace studies program and graduate from the University before age 29 years. Other students must complete the military program and graduate from the University prior to reaching the age of 30. Age waivers are available up to age 35.

**Academic Requirements.** Successful completion of the four-, three-, two-, or one-year Air Force ROTC program is required to be commissioned as a Second Lieutenant in the U.S. Air Force. Aerospace Studies classes are taken in addition to the classes required for a bachelor's degree. In some cases, ROTC classes may be taken in conjunction with a master's degree program. The program taken is based on the number of years remaining until graduation (e.g., a transfer student with two years remaining until graduation would enroll in the two-year program). The courses, along with the normal schedule for taking them for each of the programs, are listed below:

**Four-Year Program.** *First year:* AS 1010, 1110, 1020, 1120. *Second year:* AS 2010, 2110, 2020, 2120. *Third year:* AS 3400, 3010, 3110, 3020, 3120. *Fourth year:* AS 4010, 4110, 4020, 4120.

**Three-Year Program.** *First year:* AS 1010, 1110, 2010, 2110, 1020, 1120, 2020, 2120. *Second year:* AS 3400, 3010, 3110, 3020, 3120. *Third year:* AS 4010, 4110, 4020, 4120.

**Two-Year Program.** *First year:* AS 3500, 3010, 3110, 3020, 3120. *Second year:* AS 4010, 4110, 4020, 4120.

**One-Year Program.** AS 3500, 4010, 4110, 4020, 4120.

**Summer Training.** AS 3500 is a prerequisite for cadets entering the Air Force ROTC two-year program. Training will be given at an Air Force base and will last five weeks. Up to 5 university credits may be granted for this training.

All cadets in the three- and four-year programs will attend a four-week summer training camp. Attendance at this camp is usually between the sophomore and junior year at a selected Air Force base. Up to 4 credits may be granted for this training.

**Leadership Laboratory.** A Leadership Laboratory period is required each week during the fall and spring semesters for each year of aerospace studies. Interested students should check the current *Schedule of Classes* for the Leadership Laboratory schedule.

**Minor.** A minor in Aerospace Studies may be awarded upon completion of commissioning requirements.

**Veterans.** A veteran may apply for the Air Force ROTC program if he or she can complete the program prior to reaching age 30, with a year for year waiver up to age 35 for each year of active duty service. (The waiver does not apply to the maximum age at graduation to enter flight training of 29.) The general military course (first two years) may be waived for prior military service. However, veterans must successfully complete AS 3400 prior to entering the two-year program.

### ***Scholarships and Financial Aid***

**Scholarships.** Air Force ROTC scholarships are available on a competitive basis. These scholarships pay all or part of tuition and fees, a textbook allowance, and a monthly nontaxable stipend during the school year. High school seniors must apply for four-year scholarships prior to December of their senior year. In-college scholarships can be applied for while enrolled in Air Force ROTC.

**Uniforms and Texts.** All Air Force ROTC texts and uniforms are furnished at no expense to the student.

### ***Miscellaneous Information***

**Career Opportunities.** To meet the challenges, keep up with technological advancements, and explore the opportunities of the ever-broadening horizons in the aerospace age, officers possessing a variety of skills are required by the Air Force. Interested students should contact the Aerospace Studies Department for information on the Air Force career opportunities related to their academic major.

## ***Aerospace Studies Courses (AS)***

**AS 1010, AS 1020. Introduction to the Air Force Today.** Introduces the United States Air Force and Air Force Reserve Officer Training Corps. Air Force mission and organization, officership and professionalism, military customs and courtesies, officer opportunities, group leadership problems, and communication skills. Leadership Laboratory is mandatory for cadets. (1 cr) (F) (1 cr) (Sp)

**AS 1110, AS 1120. Leadership Laboratory I.** Air Force customs and courtesies, drill and ceremonies, military commands, environment of the Air Force officer, and officer opportunities. AS 1110 must be taken concurrently with AS 1010; AS 1120 must be taken concurrently with AS 1020. (1 cr) (F) (1 cr) (Sp)

**AS 2010, AS 2020. The Evolution of U.S. Aerospace Power.** Examines general aspects of air and space power through a historical perspective. Illustrates Air Force Core Values with historical examples and continues development of communications skills. Leadership Laboratory is mandatory for cadets. (1 cr) (F) (1 cr) (Sp)

**AS 2110, AS 2120. Leadership Laboratory II.** Air Force customs and courtesies, drill and ceremonies, military commands, environment of the Air Force officer, and officer opportunities. AS 2110 must be taken concurrently with AS 2010; AS 2120 must be taken concurrently with AS 2020. (1 cr) (F) (1 cr) (Sp)

**AS 3010, AS 3020. Air Force Leadership and Management.** Presents advanced leadership and management skills. Cadets given opportunity to practice these leadership skills and management techniques in a supervised environment. Leadership Laboratory is mandatory for cadets. (3 cr) (F) (3 cr) (Sp)

**AS 3060. Physical Fitness Training.** Early morning workout to build stamina. Organized to keep cadets in shape to pass the Physical Fitness Test (PFT). Team instructed. (2 cr) (F,Sp) ®

**AS 3110, AS 3120. Leadership Laboratory III.** Advanced leadership experiences to include the planning and controlling of cadet corps activities, and the preparation and presentation of briefings and other oral and written communications. AS 3110 must be taken concurrently with AS 3010; AS 3120 must be taken concurrently with AS 3020. (1 cr) (F) (1 cr) (Sp)

**AS 3400. Field Training (4 Weeks).** Students in the four-year program participate in four weeks of Field Training. Major areas of study include junior officer training, career orientation, survival training, base functions, Air Force environment, and physical training. (1-4 cr) (Su)

**AS 3500. Field Training (5 Weeks).** Students in the two-year program participate in five weeks of Field Training. Major areas of study include junior officer training, career orientation, survival training, base functions, Air Force environment, and physical training. (1-5 cr) (Su)

**AS 4010, AS 4020. National Security Affairs/Preparation for Active Duty.** Designed to give college seniors the foundation to understand military officer's role in American society. Overviews complex social and political issues facing the military profession. Leadership Laboratory is mandatory for cadets. (3 cr) (F) (3 cr) (Sp)

**AS 4110, AS 4120. Leadership Laboratory IV.** Advanced leadership experiences to include the planning and controlling of cadet corps activities, and the preparation and presentation of briefings and other oral and written communications. AS 4110 must be taken concurrently with AS 4010; AS 4120 must be taken concurrently with AS 4020. (1 cr) (F) (1 cr) (Sp)

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

*Department of*

# *Agricultural Systems Technology and Education*

*College of Agriculture*

**Head: Professor Gary S. Straquadine**, agricultural education/extension  
Office in Agricultural Systems Technology and Education 101C, (435) 797-2230

**Associate Head: Associate Professor Bruce E. Miller**, agricultural systems and mechanization

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**Professors** *Robert L. Gilliland*, extension; *Weldon S. Sleight*, teacher preparation; **Adjunct Professor** *Kevin C. Kesler*, 4-H and youth development programs; **Professor Emeritus** *Gilbert A. Long*, agricultural education; **Assistant Professors** *F. Richard Beard*, research and extension, agricultural engineering; *John D. Harrison*, agricultural waste management/extension specialist; *Daniel J. Hubert*, teacher education; *Rhonda L. Miller*, sustainable agriculture/agricultural systems; **Lecturers** *Evan P. Parker*, agricultural technology and machinery management; *Daryl L. Reece*, agricultural engineering and equipment repair; *Afifa Sabir*, education and outreach, Biotechnology Center

**Degrees offered:** Bachelor of Science (BS) in Agricultural Education; BS, Bachelor of Arts (BA), Master of Science (MS) in Agricultural Systems Technology

**Undergraduate emphases:** *BS*—Agricultural Systems Technology: Agribusiness and Agricultural Mechanization; **Graduate specializations:** *MS*—Agricultural Extension Education, Agricultural Mechanization, International Agricultural Extension, and Secondary/Postsecondary Agricultural Education

**One-year Certificate and Associate of Applied Science (AAS):** Agricultural Machinery Technology

## *Undergraduate Programs*

### *Objectives*

The programs offered in Agricultural Systems Technology and Education are for students who are preparing for positions as agricultural education teachers, as well as for positions in agricultural extension, agricultural mechanization, agribusiness, and agricultural production and management.

The facilities for these programs include laboratories with specially designed equipment for practical instruction in agricultural systems and mechanization, including computer application, agribusiness, agricultural buildings, engines, electricity, hydraulics, machinery, and repair welding.

### *Requirements*

**Departmental Admission Requirements.** Admission requirements for the Department of Agricultural Systems Technology and Education are the same as those described for the University on pages 48-51. Students in good standing may apply for admission to the department.

**Bachelor of Science in Agricultural Education.** Preparation in Agricultural Education includes technical agriculture, economics, and business. Students selecting the teaching option will also enroll in principles and techniques of teaching courses.

Students interested in teaching agricultural production and processing, agricultural mechanics, horticulture, or natural resources will be guided into areas of their major interest. Agricultural backgrounds or summer agricultural experiences are necessary for teacher certification.

An application for admission to teacher education should ordinarily be completed before the junior year (see College of Education requirements, page 86). Approval for admission to teacher education is a prerequisite to enrollment in education and psychology courses. A 2.75 GPA is required for admission to the teacher education program.

Requirements for the **Bachelor of Science in Agricultural Education** are listed briefly. For more detailed information on courses and the recommended sequence for taking them, see the major requirement sheet available from the Agricultural Systems Technology and Education Department.

The Agricultural Education major involves four teaching areas, which correspond with the Utah agricultural education program model design. Students must complete the University Studies requirements (see pages 56-63). In addition, students must complete the following courses in preparation for teacher licensure: InsT 5200; ScEd 3100, 3210, 4200, 4210, 5300; SpEd 4000; and ASTE 2710, 3240, 3300, 3620, 4150, 4300, 5500, 5600.

All students in the Agricultural Education major will complete a core of technical agricultural courses to include ASTE 1010, 3050, 3080; ADVS 1110; Biol 1110, 1210; Chem 1110; and Soil 3000. Students are required to designate a program emphasis for the following areas: Production and Processing; Agricultural Systems; Horticulture; and Natural Resources. Approximately 50 credits in a technical agriculture specialization are required in each of the four program area choices. All students who seek an agricultural education teaching position in Utah are encouraged to complete the biological science teaching endorsement, which includes an additional 19 credits.

**Bachelor of Science in Agricultural Systems Technology (AST).** This major has two emphases: *Agribusiness* and *Agricultural Mechanization*. Preparation in either emphasis includes technical agriculture, economics, and business. The agricultural mechanization emphasis requires additional courses in technical electives and communication skills development.

The Bachelor of Science in Agricultural Systems Technology, **Agribusiness Emphasis**, includes the following courses: ASTE 1010, 2200, 2830, 3030, 3050, 3080, 3090, 3100, 4100, 4900, 5260; Acct 2010; Chem 1110; Econ 1500, 3030, 3050; Math 1060; Soil 3000; Stat 2300, and 24 credits of departmental electives. Students will complete a minor in Business or Agribusiness. Additional requirements in Animal Science; Plant and Soil Sciences; and Forest, Range, and Wildlife Sciences must also be met. In addition, students must complete the University Studies Requirements.

Bachelor of Science in Agricultural Systems Technology, **Agricultural Mechanization Emphasis**, includes the following courses: ASTE 1010, 2200, 2830, 3030, 3050, 3080, 3090, 3100, 4100, 4900, 5260; Acct 2010; Chem 1110; Econ 1500, 3030; Math 1050; and Soil 3000. Students must also fulfill University Studies requirements and complete designated electives.

Bachelor of Science (Dual Major) in Agricultural Systems Technology and Agribusiness includes the following courses: ASTE 1010, 2200, 3030 (or 4100), 3050, 3090, 3200 (or 3080), 3600, 5260; Econ 1500, 1550, 3030, 3050, 4010, 4030, 5030, 5050, 5350; Acct 2010, 2020, Chem 1010; Math 1050, 1100; MHR 2990; Soil 4000; and Stat 2300. Students must also complete University Studies requirements.

The **Associate of Applied Science Degree in Agricultural Machinery Technology** includes a minimum of 6 credits of University Studies classes, 38 credits in Agricultural Mechanization, and 6-10 credits in business and related classes. Courses include: ASTE 1010, 1120, 1130, 1610, 1620, 1640, 2200, 2250, 2830, 2930, 3030, 3080, 3100, 3600, 3720, and 3730.

**Agricultural Machinery Technology Certificate.** This one-year agricultural program meets the needs of persons interested in employment opportunities with agricultural dealerships and companies in the areas of parts and service, as well as with farm suppliers, feed and fertilizer agencies, corporate farms and ranches, and other related industries. The vocationally oriented agricultural

technology program includes a cooperative occupational experience placement at the end of the first year of instruction.

Requirements for the one-year program include: ASTE 1010, 1120, 1130, 1610, 1620, 1640, 3030, 3080. See major requirement sheet available from the department for more information.

**Minor in Agricultural Systems Technology.** A minimum of 18 credits approved by a faculty advisor are required.

## Graduate Programs

### Admission Requirements

See general admission requirements, pages 72-73. Applications will be considered throughout the year. However, students who wish to be considered for financial aid must apply by February 1 for the coming academic year. No application will be considered until all required information arrives at the office of the School of Graduate Studies.

### Course Requirements

**Master of Science.** The MS program requires the completion of a minimum of 30 credits beyond the bachelor's degree. These credits must be approved by a supervisory committee. However, to optimize a student's academic experiences, 36 credits are recommended. A 10- to 15-credit core curriculum is required and includes courses in research/statistics and completion of either a Plan A thesis for 6 credits or a Plan C program with a minimum of 33 credits. Students are also expected to select and complete an area of specialization. To complete all requirements, students should expect to be enrolled for a minimum of two semesters.

The following four specializations are available for the MS in Agricultural Education:

The **Agricultural Extension and Education** specialization provides a program for individuals interested in cooperative extension work. The curriculum for the program includes coursework related to managing people; planning, implementing, and evaluating programs to promote technology transfer (adult education); understanding research techniques relevant to agricultural education; and the managing of fiscal affairs.

Electives are selected from each of the following departments: Agricultural Systems Technology and Education; Animal, Dairy and Veterinary Sciences; Economics; Biology; Plants, Soils, and Biometeorology; Forest, Range, and Wildlife Sciences; and Instructional Technology.

The **Agricultural Mechanization Systems** specialization allows for theoretical and applied study in the mechanical systems used in agricultural production, processing, and distribution. The curriculum for this program emphasizes coursework related to managing people; planning, implementing, and assessing systems used in the production and processing of agricultural products or services; and understanding research techniques used in agricultural systems technology. The remainder of the program is designed to be interdisciplinary, depending on student needs.

The **International Agricultural Extension** specialization was developed to prepare agriculturally educated people to perform administrative and supervisory roles in less-developed countries. The curriculum for this program includes coursework related to

managing people; planning, implementing, and evaluating programs to promote technology transfer; and managing fiscal affairs. Electives are selected from each of the following departments: Agricultural Systems Technology and Education; Animal, Dairy and Veterinary Sciences; Economics; Biology; Plants, Soils, and Biometeorology; and Instructional Technology.

### **Research**

The Utah Agricultural Experiment Station, a component of the College of Agriculture, supports graduate work in several areas of Agricultural Systems Technology and Education. Other state and federal agencies also support research in agricultural systems.

### **Financial Assistance**

Both departmental and formal grant support are available to graduate students and are awarded on a competitive basis. Students requesting financial support should apply to the department.

Research assistantships are available through faculty members who have ongoing projects with the Utah Agricultural Experiment Station or who hold special research grants from the University, private companies, or state-federal agencies. Acceptance to pursue graduate study does not guarantee the student financial assistance.

### **Requirement Changes**

Graduation requirements described in this catalog are subject to change. Students should check with their departments concerning possible changes.

## ***Agricultural Systems Technology and Education Courses (ASTE)***

**ASTE 1010. Introduction to Agricultural Systems Technology.** Introduction to problem solving related to the areas of agricultural power and machinery, soil and water conservation, structures and animal environments, electrical circuits, and emerging technologies. (3 cr) (F)

**ASTE 1120. Forage and Harvest Equipment.** Fundamentals and principles in operations, adjustments, and maintenance of technologies utilized in agricultural forage and combine harvesting. (3 cr) (F)

**ASTE 1130. Planting and Tillage Equipment.** Fundamentals and principles in operation, maintenance, and repair of planting and tillage equipment. Exploration of different systems and their applications. (3 cr) (Sp)

**ASTE 1610. Agricultural Machinery Engines.** Fundamental principles and components utilized in the power production for agricultural machinery. Diesel engines, as power plants, will be overhauled using a systems approach. (6 cr) (F)

**ASTE 1620. Agricultural Machinery Power Trains.** Fundamental principles and components utilized in agricultural machinery transmittal of power through drive trains. A systems approach to overhauling these components will be developed. (6 cr) (Sp)

**ASTE 1640. Agricultural Equipment and Parts Marketing and Communications.** Introduction to principles and operation of computer software systems related

to marketing and management within the agricultural machinery business industry. Emphasis on business communication principles for effective transfer of information and problem resolution. (3 cr) (F)

**ASTE 2200. Electricity in Agricultural Systems.** Fundamentals of electricity (AC) as used on farms and ranches. Residential and commercial agricultural applications of the National Electric code. Electrical supply and service, distribution, proper grounding, and installation of components. (3 cr) (Sp)

**ASTE 2250. Occupational Experience in Agriculture.** Supervised occupational experiences for technical vocational preparation. (1-6 cr) (F,Sp)

**ASTE 2710. Orientation to Agricultural Education.** Students examine the framework of agricultural education, with a special emphasis on the nature of the programs, career opportunities, and the qualifications and preparation requirements of future agricultural educators. Students will spend 25-30 hours observing instruction in secondary classrooms. (2 cr) (F) ®

**ASTE 2830. Agribusiness Sales and Marketing.** Basic principles of agribusiness sales and marketing. After completing a series of self-assessments relating to sales, learning, and personality preferences, students learn to complete each major step of the sales process. (3 cr) (F)

**ASTE 2900 (BSS). Humanity in the Food Web.** Provides broad overview of food systems in conjunction with detailed analysis of particular issues, such as different theories and supporting data on the domestication of plants and animals, the use of human labor, the development and operation of complex technologies, and the analysis of socioeconomic data on human population growth and well-being. (3 cr) (F,Sp)

**ASTE 2930. Individualized Projects in Agricultural Mechanics.** Basic skill preparation for employment in agricultural industry. (1-3 cr) (F,Sp) ®

**ASTE 3030. Metal Welding Processes and Technology in Agriculture.** Selection of ferrous and nonferrous welding techniques in agricultural applications. Welding, cold- and hot-working metal in agricultural construction and maintenance. (3 cr) (F)

**ASTE 3040 (QI). Fabrication Practices in Agricultural Buildings.** Selection and use of agricultural building materials, including concrete and masonry, lumber, plywood, finishes, and fasteners. Application of hand and power tools and procedures in agricultural construction. (2 cr) (Sp)

**ASTE 3050 (CI). Technical and Professional Communication Principles in Agriculture.** Technical communication principles and practices used in the agricultural industry. Emphasizes technical writing of reports and correspondence using electronic information retrieval and presentation. Prerequisite: Engl 2010. (3 cr) (F,Sp)

**ASTE 3080. Compact Power Units for Agricultural and Turfgrass Applications.** Operation and application of agricultural and turfgrass equipment powered by internal combustion engines having less than 40 horsepower. (3 cr) (Sp)

**ASTE 3090. Computer Applications in Agriculture.** Overview of computer systems and software currently used in agriculture. Emphasizes development of term project using spreadsheets. Word processing, file management, CAD, and computer ethics. Prerequisite: BIS 1400 or satisfactory completion of University computer and information literacy exam. (3 cr) (F,Sp)

**ASTE 3100. Leadership Applications in Agricultural Science, Management, and Development.** Study of leadership styles and their applications in development of agricultural programs for youth and adults. Emphasizes leadership and communication principles for effective community resource management in rural environments. Experiences provided in leadership styles, program planning, and meeting organization. (2 cr) (Sp)

**ASTE 3200. Irrigation Principles and Practices.** Introduction to planning principles for irrigation systems and farm water resource development. Layout of system components and coverage of practices common to the Intermountain West. (3 cr) (Sp)

**ASTE 3240 (CI). Teaching in Laboratory Settings.** Basic principles of teaching students in laboratory settings. Overview of major concepts, considerations, and practices used for developing and evaluating agriscience curricula. Prerequisite: ASTE 2710. (3 cr) (Sp) ®

**ASTE 3300. Clinical Experience I in Agricultural Education.** In-school clinical observation experience. Students involved in observing management and assisting in teaching. Designed to provide familiarity with agricultural education classroom. (1 cr) (Sp)

**ASTE 3500. Teaching Apprenticeship in Agricultural Education.** Each student serves as an apprentice to professional agricultural educator. Students complete competencies leading to early preparation for student teaching. (2 cr) (F,Sp,Su)

**ASTE 3600 (QI). Management of Agricultural Machinery Systems.** Management principles for evaluation and selection of agricultural complements for performance, optimization, economics, environmental impact, and long-term sustainable agricultural practices. Prerequisite: Math 1050 or Stat 1040. (3 cr) (Sp)

**ASTE 3620. Managing the FFA and SAE Programs.** Introduction to basic concerns, understandings, and practices needed to effectively advise an FFA chapter. Students learn appropriate philosophies and skills for operation of a comprehensive supervised agricultural experience program. (2 cr) (Sp,Su)

**ASTE 3710. Agricultural Machinery Hydraulic Systems and Diagnosis.** Fundamental principles and components overhaul of hydraulic systems as applied in agricultural machinery. Exploration of techniques for diagnosing malfunctions and related failures with a systems approach. (3 cr) (F)

**ASTE 3720. Agricultural DC Electrical Systems and Diagnosis.** Fundamental principles and components overhaul of DC electrical systems as applied in agricultural machinery. Exploration of techniques for diagnosing malfunctions and related failures with a systems approach. (3 cr) (F)

**ASTE 3730. Agricultural Machinery Auxiliary Systems and Diagnosis.** Application of theory, testing, diagnosis, and repairs of auxiliary systems, including air conditioning, fuel injection, analog, electronic monitoring, and GPS as utilized in agricultural equipment. Prerequisite: ASTE 3720 or approval of instructor. (3 cr) (Sp)

**ASTE 3900. Special Problems in Agricultural Systems Technology and Education.** Students conduct short-term investigation and/or literature analysis with critical review of contemporary issues in Agricultural Systems Technology. Formal contract with approved faculty. Activities culminate with a written report. (1-6 cr) (F,Sp,Su)

**ASTE 4100. Agricultural Structures and Environment.** Overview of agricultural structures and environmental considerations related to livestock, livestock waste management, and commodity storage. Planning, layout, construction materials, concrete masonry, ventilation, insulation, and energy. (3 cr) (Sp)

**ASTE 4150 (CI). Methods of Teaching Agriculture.** Introduction to basic practices of classroom teaching and program planning. Through participation in discussions, activities, and assignments, students refine their abilities to develop programs, diagnose the learner, prepare the instruction, and guide student learning. Prerequisites: ASTE 2710, 3240. (3 cr) (F) ®

**ASTE 4250. Occupational Experiences in Agriculture.** Supervised occupational experience for technical and professional preparation in teacher education and/or agricultural business. (1-6 cr) (F,Sp,Su)

**ASTE 4300. Clinical Experience II in Agricultural Education.** Continued in-school observation of agricultural education teaching. Requires student participation in teaching, management, and program development in agricultural education. (1 cr) (F)

**ASTE 4400. Advising Applied Technology Education Student Organizations.** Principles and practices for advising applied technology student organizations in secondary education. Examination of leadership organizations supporting applied tech-

nology education. Emphasis on program planning, leadership development, and evaluation. (1 cr) (Sp,Su)

**ASTE 4900. Senior Project Research and Creative Opportunity.** Returning student teachers work to strengthen their weaknesses in areas such as scaled drawing, cost estimating, machine shop practices, construction, and small engines. (1-6 cr) (F,Sp,Su)

**ASTE 5100 (d6100).<sup>1</sup> Electrical Controls and Motors for Agri-Industrial Applications.** Operation and application of electrical motors, electrical and electronic controls, and circuit and overload protection utilized in agricultural and industrial installations. (3 cr) (Sp)

**ASTE 5200. Assessment in Applied Technology Education.** Principles and practices in assessing performance and development of applied technology students. Emphasizes testing and evaluation techniques used in applied technology education. (3 cr) (Sp,Su)

**ASTE 5260 (CI) (d6260). Environmental Impacts of Agricultural Systems.** Investigation of relationship between agricultural practices and environmental quality, including control of agricultural nonpoint-source pollution. (3 cr) (F)

**ASTE 5500. Agricultural Education Secondary Curriculum Seminar.** Cooperative examination of considerations and processes for teaching secondary students. Reflection on the practice of teaching. Preparation for entry into the teaching profession. (2 cr) (Sp) ®

**ASTE 5600. Agricultural Education Student Teaching in Secondary Schools.** Students teach agriscience and technology courses in secondary and middle school settings under the guidance of clinical and Utah State University supervisors. (8 cr) (Sp)

**ASTE 6000. Methods of Equipment Testing, Diagnosis, and Repair.** Investigation and demonstration of methods and procedures for testing, troubleshooting, and diagnosis of tractors, power units, and all types of agricultural equipment. (3 cr) (F)

**ASTE 6070. Program and Curriculum Development in Applied Technology Education.** Program planning for locally applied curriculum design to meet student interests and community needs for applied technology teachers. (3 cr) (F,Sp,Su)

**ASTE 6100 (d5100). Electrical Controls and Motors for Agri-Industrial Applications.** Operation and application of electrical motors, electrical and electronic controls, and circuit and overload protection utilized in agricultural and industrial installations. (3 cr) (Sp)

**ASTE 6110. Applied Technology Education Program Planning and Evaluation.** Program planning and evaluation. Study of strategies used in applied technology. Demonstration of manpower surveys and job analysis for curriculum development. (3 cr) (F)

**ASTE 6130. Electrical and Hydraulic Component Testing, Diagnosis, and Repair.** Involves supervision and demonstration of procedures for testing, diagnosis, and repair of all types of electrical and hydraulic components on modern agricultural equipment. (3 cr) (F)

**ASTE 6140. Agricultural Development and Evaluation.** Principles and strategies for developing, implementing, and evaluating agricultural technology and educational programs for U.S. and international organizations. (3 cr) (Sp)

**ASTE 6170. Supervision and Administration of International Extension Programs.** Investigation and analysis of theories and practices of supervision and administration as applied to international extension-education programs and rural development/agricultural extension operations. (3 cr) (F)

**ASTE 6240. Strategies for Teaching Adults.** Features contemporary strategies and guided practice for teaching adults in group and individualized learning settings. (3 cr) (F,Sp,Su)

**ASTE 6250. Special Problems in Agricultural Systems Technology.** A consideration of needs and special types of service in FFA, young farmers, and adult programs for applied technology teachers. (1-5 cr) (F,Sp,Su) ®

**ASTE 6260 (d5260). Environmental Impacts of Agricultural Systems.** Investigation of relationship between agricultural practices and environmental quality, including control of agricultural nonpoint-source pollution. (3 cr) (F)

**ASTE 6300. Foundations of Adult Education and Program Evaluation.** Addresses the context and providers of adult education. In addition, adult learning theories and participation models are examined. (3 cr) (F)

**ASTE 6400. Food, Land and People Workshop.** Designed for practicing K-12 teachers. Offers in-service development for infusing agriculture and the concepts of Food, Land and People into existing curriculum standards and objectives. Presentation of Agriculture in the Classroom instructional units, as well as hands-on methods and materials. (0.5-3 cr) (F,Sp,Su) ®

**ASTE 6510. Principles and Practices of Extension Education.** History, philosophy, and organizational structure of U.S. and international extension organizations, including programming models, teaching strategies, and accountability. (2 cr) (Sp)

**ASTE 6600. Analysis of Machinery Management and Decision Making Processes.** Involves the record keeping and analysis procedures for profitable decision making and machinery management related to modern production agriculture practices. (3 cr) (Sp)

**ASTE 6700. Research Methods in Agricultural Systems.** Introduction to research techniques used in agricultural systems. Includes research design, data gathering, and statistical analysis and interpretation. (3 cr) (Sp)

**ASTE 6750. Agricultural Safety and Health: Issues and Decisions.** Review of agricultural safety and health issues. Public and private concerns addressed through problem identification, data gathering, resolution, and evaluation. (3 cr) (Sp)

**ASTE 6970. Research and Thesis.** (1-9 cr) (F,Sp,Su) ®

**ASTE 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

*Department of*

# *Animal, Dairy and Veterinary Sciences*

*College of Agriculture*

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Office in Agricultural Science 230, (435) 797-2162

**Associate Head: Professor Thomas D. Bunch**, cytogenetics, embryo biology  
Office in Agricultural Science 220, (435) 797-2148

**Graduate Programs Coordinator: Research Assistant Professor Jeffrey L. Walters**, dairy cattle breeding, statistics  
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**Degrees offered:** Bachelor of Science (BS) and Bachelor of Arts (BA) in Animal Science, Dairy Science, Bioveterinary Science; Master of Science (MS) in Animal Science, Bioveterinary Science, Dairy Science; Doctor of Philosophy (PhD) in Animal Science and Bioveterinary Science; MS and PhD degrees in Toxicology and Molecular Biology are available through the Interdepartmental Toxicology and Molecular Biology programs

**Certificate Program:** Dairy Herdsman

## *Undergraduate Programs*

### *Objectives*

Bachelor's degree students majoring in animal or dairy sciences may choose a program from two career emphasis areas: **Science** or **Animal (Dairy) Industries**. The curricula in the animal and dairy sciences are designed to prepare students for a broad base of rewarding careers in the dynamic disciplines of animal ag-

riculture. Teaching and research facilities, flocks, and herds are available for "hands-on" practical laboratory experiences, along with faculty-mentored research projects. An assigned faculty advisor helps students develop, arrange, and expedite their personal undergraduate program.

Preveterinary bachelor's degree programs are intended to prepare students for admission to professional veterinary medical schools and/or graduate study in the biomedical sciences. A

preveterinary bachelor's degree is considered a nonterminal degree. Preveterinary students may earn a bachelor's degree in bioveterinary science, or in the science emphasis of animal science or dairy science with a preveterinary option.

Instruction in the ADVS Department also encompasses a diversified co-curricular program including allied clubs, intercollegiate livestock judging and rodeo teams, and involvement with their respective professional societies.

### **Animal and Dairy Sciences**

**Science Emphasis.** Designed for students desiring education beyond the bachelor's degree, this emphasis is a preparatory course of study for students who have a career interest in the following areas: animal research in genetics; reproductive biology, nutrition (public or private sector); biotechnology; teaching; and advanced degrees (MS, PhD, and veterinary school). The science emphasis requires an especially close student-advisor relationship, as post-graduate training is considered essential for professional success in these disciplines.

**Animal (Dairy) Industries Emphasis.** This emphasis is designed to prepare students who earn a bachelor's degree for the broadest range of career opportunities in animal agriculture. The Animal Industries Emphasis stresses both traditional skills in the areas of basic and applied animal sciences and related learning experiences in the other agricultural sciences, as well as in the areas of business administration, economics, and management. Students can select either an advanced research project or an internship experience in the animal industries as an integral component of their program of study during the junior or senior year. Graduates from this emphasis may seek career opportunities in production animal agriculture in farm or ranch management, in state or federal government agricultural agencies, and in fields that support or interact with animal agriculture, such as corporate agribusiness, wholesale and retail marketing and sales, economics, accounting, agricultural real estate sales and appraisal, financing and credit operations, public policy, agricultural media and communications, insurance, commodity trading, animal product processing, agricultural cooperatives, and producer/commodity associations.

### **Preveterinary Program**

Preveterinary students take courses required by veterinary schools. Classes should be planned to assure meeting the current requirements for the veterinary schools to which the student plans to apply for admission. In most cases, preveterinary preparation requires a major portion of three academic years. Students accepted into veterinary school prior to completion of their BS degree may transfer credits back to USU for completion of their BS degree in bioveterinary science.

Utah participates in WICHE (Western Interstate Commission for Higher Education) which provides state subsidization of Utah resident (5 years or longer at the time of application) students entering any veterinary school that is a WICHE-participating school. At present this includes Colorado State University, Washington State University, Oregon State University, and University of California at Davis. Students may also apply to other veterinary schools as out-of-state applicants.

### **Vocational Subbaccalaureate Program**

**Dairy Herdsman Certificate.** Students completing the required courses and experience in the Dairy Herdsman's curriculum usually find employment with a commercial or family dairy. Some enter dairy-related businesses. Students desiring to continue

their dairy education may complete a BS degree in three additional years with proper planning and suitable academic performance.

### **Requirements**

**Departmental Admission Requirements.** Undergraduate admission requirements for the animal science and dairy science programs are the same as those described for the University. Students in good standing may apply for admission to the department. New freshmen admitted to USU in good standing qualify for admission to the bioveterinary science major. Students with less than 60 semester credits transferring from other institutions need a 2.2 transfer GPA, and students with less than 60 semester credits transferring from other USU majors need a 2.0 GPA for admission to the bioveterinary science major. All students with 60 or more semester credits need a 2.75 total GPA to be admitted to advanced standing in bioveterinary science.

**Departmental Standards.** The following minimum requirements apply to all students working toward any bachelor's degree offered by the ADVS department. Bachelor's degree candidates must comply with these requirements in order to graduate: (1) courses required for the major may be repeated only once to improve a grade, and (2) courses required for the major may not be taken for pass-fail credit. In addition to these requirements, animal science and dairy science bachelor's degree candidates must attain a grade point average of 2.25 in the ADVS courses specified as requirements in their respective emphasis curricula to graduate. Bioveterinary science degree candidates must attain an overall GPA of 3.0 to graduate.

### **Graduation Requirements**

Courses required and recommended for meeting BS degree graduation requirements in the various options available in the department are as follows:

#### **Animal/Dairy Science: Science Emphasis**

The following courses are required for students pursuing a bachelor's degree in the animal science or dairy science Science Emphasis: ADVS 1110, 1910, 2200, two 2000-level species production practices courses (A), 2130 (D), 3000, 3500, 3510, 4200, 4250 or 4800, 4560, 4910, 4920, two 5000-level species management courses (A), 5130 (D); ASTE 3090 (D); Biol 1210, 1220, 3200, 3300; Chem 1210, 1220, 1230, 1240, 2310, 2320, 2330, 3700; Math 1050; Math 1100 or 1210; Stat 2000.

#### **Animal/Dairy Science: Industries Emphasis**

The following courses are required for students pursuing a bachelor's degree in the animal science or dairy science Animal (Dairy) Industries Emphasis: ADVS 1110, 1250, 1910, 2200, three 2000-level species production practices courses (A), 2130 (D), 3000, 3300, 3500, 3510, 3650 (A), 4200, 4250 or 4800, 4560, 4910, 4920, two 5000-level species management courses (A), 5030 (A), 5130 (D), 5520 (A); ASTE 3050; Biol 1010; Chem 1110, 1120; Econ 1500; Math 1050; NFS 5030 (D); Soil 2000 or 3000 (D); Stat 1040 or 2000 or 2300. In addition, students majoring in this emphasis must choose three directed elective courses in animal management from the following: ADVS 5030 (D), one 5000-level species management course in addition to the two courses required for the major (A), 5520 (D), 5530, 5860 (A); ASTE 3090 (D), 3600 (D), 4100 (D); NFS 5020 (A); PISc 4320;

FRWS 4000 (A); Soil 2000 or 3000 (A). Furthermore, students majoring in this emphasis must choose four directed elective courses in industry from the following: Acct 2010; ASTE 3090 (A); BA 3400, 3500, 3700; Econ 2010, 3030, 3050, 4010, 4030, 5030; MHR 2990, 3110.

### Biovetterinary Science

This curriculum includes those courses required for application to WICHE veterinary schools after three years of study. Requirements are as follows:

**Freshman year:** ADVS 1110, 1920, 2200; Chem 1210, 1220, 1230, 1240; Engl 1010; Math 1050; one University Studies Breadth course.

**Sophomore year:** ADVS 2920; Biol 1210, 1220; Chem 2310, 2320, 2330; Math 1100; Stat 1040; one University Studies Breadth course; electives.

**Junior year:** ADVS 3000; Biol 3200; Chem 3700, Engl 2010; Phyx 2110, 2120; one University Studies Breadth course; one University Studies Depth course; electives.

**Senior year:** Choose from among the following courses to complete the University requirements for the bachelor's degree: ADVS 3500, 3510, 4200, 4560, 5160, 5240, 5260, 5490, 5700; Biol 3300, 4200, 5150, 5330, 5340, 5600, 5620.

### BA Degree in Animal/Dairy/Biovetterinary Science

Students must complete requirements for the BS degree in these respective programs (see above), plus two years of a foreign language (see page 53 of this catalog).

### Honors

There is also an Honors Plan for students desiring a BA or BS degree "with Honors" in Animal/Dairy/Biovetterinary Science. For details, students should contact their academic advisor.

### ADVS Minors

A minor can be valuable when associated with a major in agricultural education, agricultural economics, plant science, nutrition and food science, business, economics, computer science, rangeland resources, and in other disciplines where the animal industry has direct or indirect involvement.

Requirements for specialty or emphasis area minors are listed below. The same departmental standards applying to animal science and dairy science majors also apply to all minors (see page 120).

### Requirements for Minors

The following is a listing of courses for the various minor emphasis areas. A specific course may **not** be used to fulfill the requirements of more than one ADVS minor.

**General Animal Science:** ADVS 1110, 2450; choose one or more courses from ADVS 2080, 2090, 2120, 2190; 6 elective ADVS credits with approval of an animal science advisor.

**General Dairy Science:** ADVS 1110, 2130, 2450; 6 elective ADVS credits with approval of a dairy science advisor.

**Biovetterinary Science:** ADVS 2200, 3000, 4200; 3 elective ADVS credits with approval of a biovetterinary science advisor.

**Horse Production:** ADVS 1110, 2190, 2250, 2450; 2 or more elective ADVS credits with approval of an animal science advisor.

**Horse Training:** ADVS 1110, 1600, 2190, 2600; 2 or more elective ADVS credits with approval of an animal science advisor.

**Dairy Herdsman:** ADVS 1020, 1030, 1040, 1050, 1060. (*Not available to Dairy Science Majors.*)

Transfer students must have a minimum of one 3-credit upper-division course in residency with the approval of an ADVS advisor.

### Additional Information and Updates

For more information about Bachelor of Science requirements and the sequence in which courses should be taken, see major requirement sheets. For more information on ADVS Department minors, see minor requirement sheet. These are available from the ADVS Department main office (AG S 230).

Successful completion of a bachelor's degree program in the ADVS Department requires that a very close student-academic advisor relationship be established and continued through each student's bachelor's degree program. Each student must take the responsibility of establishing this close working relationship with his or her advisor. Doing this soon after the student's entry into the department can keep academic problems to a minimum.

For updated information on ADVS programs and course offerings, check the departmental home page at:  
<http://adv.susu.edu/adv/home.html>.

### Safety and Liability in Classes and Laboratories

Certain classes and laboratories involve a risk of bodily injury or of damage to clothing. Students should take appropriate precautions and wear suitable protective clothing. Some of the risks include handling or being near animals, slick floors or corrals, use of toxic or corrosive substances, and the use of sharp or breakable instruments and equipment. Students should take precautions to avoid fainting during demonstrations or work with animal tissues or operative procedures. Students must assume their own liability protection for travel to and from classes, laboratories, and field trips. The University and its employees assume no liability in the performance of classroom or laboratory instruction or on scheduled field trips, or for other dangerous activities. The student, by voluntarily participating in these classes and activities, agrees to assume the risk and not hold USU or its staff liable.

### Financial Support

In addition to the scholarships and other financial aid available through the University, the department awards designated scholarships to qualified students (for details, refer to Scholarships and Awards in the College of Agriculture in the Financial Aid section of this catalog, pages 26-29). The department employs students on a part-time basis to assist with its research and operate its animal facilities. The department also coordinates cooperative education and internship employment opportunities for students.

(A) Required of Animal Science majors.

(D) Required of Dairy Science majors.

## Graduate Programs

### Admission Requirements

In addition to the general admission requirements (see pages 72-73), applicants should have satisfactory (3.0 GPA or better) grades in completion of previous degree programs. GRE exam, verbal, quantitative, and analytical scores at or above the 40th percentile are required.

The applicant for a graduate program in animal or dairy science should have completed a BS undergraduate program similar to the USU animal science or dairy science Science Emphasis BS degree. This background would include the following courses and their prerequisites: Biol 1210 and 1220 or their equivalents; Chem 2310 and 2320 or their equivalents; Math 1050 and Stat 1040 or their equivalents. Applicants with deficiencies in these areas may be admitted to the graduate program subject to the completion of remedial coursework specified by the department. Other preparatory courses may be specified by the student's supervisory committee.

Applicants to the bioveterinary science graduate program should have a degree in bioveterinary science, biology, microbiology, chemistry, or one of the animal sciences. Prevetinary students oriented towards graduate research studies are strongly encouraged to apply.

### Degree Programs

**Master of Science.** The MS is available to qualified students with bachelor's degrees. MS degrees are offered by the department in animal science and dairy science, with five specializations in each, and in bioveterinary science.

**Doctor of Philosophy.** The PhD degree in animal science is offered with four specializations. It is available to qualified students with master's degrees in related disciplines. Exceptionally well-qualified applicants may be considered for admission to a postbaccalaureate PhD program. The PhD degree in bioveterinary science is available to qualified students holding a DVM or a master's degree in a related discipline. The PhD is a terminal research degree that is awarded upon successful completion of a comprehensive program of coursework and original research in an approved area of specialization.

### Specializations

**Animal Nutrition.** This specialization involves studies in biochemistry, principles of nutrition, animal management, nutritional physiology, and animal feedstuffs. Cooperation with producers, feed industry groups, other departments of the University, and USDA collaborators, along with research funding from private industry, strengthens the graduate program in this area.

*Course requirements:* Students in the MS program are required to complete the following courses: ADVS 6010, 6800, any four ADVS graduate nutrition courses at the discretion of the supervisory committee; one 5000-level Statistics course. Students in the MS program are required to complete or to have completed Chem 3700 or its equivalent, but will not receive graduate credit for it. Students in the PhD program are required to meet or have met all MS program requirements, as well as to complete the following coursework: ADVS 6800 (additional to the MS requirement), ADVS graduate nutrition courses as directed by the supervisory committee; Chem 5700, 5710; one 5000-level Statistics course (additional to the MS requirement); additional coursework at the

discretion of the supervisory committee to a total of at least 30 credits.

**Breeding and Genetics.** This specialization involves studies in quantitative genetics, applied animal genetics, statistics, and animal management. Cooperation with other departments, particularly the Department of Biology and the Department of Mathematics and Statistics, and collaboration with other research institutions, livestock producers, and commercial animal breeding companies broadens the resources of this graduate program.

*Course requirements:* Students in the MS program are required to complete the following courses: ADVS 6010, 6300, 6800; Biol 6170, 6280; Stat 5110; and a minimum of 6 credits in the student's area of study. Students in the PhD program are required to complete the following courses in addition to those required for the MS degree: ADVS 6800, 6820; Math 5710, 5720; Stat 6710, 6720.

**Molecular Biology.** This specialization involves studies in molecular genetics, biochemistry of nucleic acids, cell biology, reproductive physiology, and bioveterinary science. Cooperation with other departments, particularly the Department of Biology and the Department of Chemistry and Biochemistry, the Biotechnology Center, and collaborators at other research institutions allows for a strong graduate program in this area.

*Course requirements:* Students in the MS program are required to complete the following courses: ADVS 5160 or 5240 or 5260; ADVS 6010, 6800; Biol 4200 or 6210; Biol 5190; Stat 5200; and a minimum of 6 credits in the student's area of study. Students in the PhD program are required to complete the following courses in addition to those required for the MS degree: ADVS 6800; Chem 5700, 5710.

**Reproductive Biology.** This specialization involves studies in physiology and endocrinology of reproduction; embryo technology, including collection, culture, manipulation, storage, and transfer of embryos; disease transmission, cytogenetics and molecular genetics; and environmental and toxicological influences on reproductive processes and fetal development. Cooperation with other departments and research centers of the University and with USDA collaborators allows for a strong graduate program in this area.

*Course requirements:* Students in the MS program are required to complete the following courses: ADVS 6010, 6200, 6800; Biol 4200; Stat 5200. Students in the PhD program are required to complete the following coursework additional to the MS requirements: ADVS 6800; Biol 5150, 6210; Chem 5700, 5710. Additional coursework for the MS and PhD degree may be required at the discretion of the supervisory committee.

**Animal or Dairy Management (MS only).** This specialization involves studies in the applications of the principles of genetics, reproductive biology, and nutrition to animal or dairy management at an advanced level. Appropriate emphasis is also placed on statistics, economics and business administration, and range management. The management specialization offers the option of degree programs with or without thesis (Plan A or Plan B). Graduates in management from a program including thesis (Plan A) may pursue advanced studies in more specialized fields. The MS in management without a thesis (Plan B) is considered a terminal degree.

*Course requirements:* Students choosing either the option with thesis (Plan A) or the option without thesis (Plan B) are required to complete the following courses: ADVS 6010, 6200, 6300, 6520

or 6530, 6800; plus one of the following (if comparable course not previously completed at the undergraduate level): ADVS 6080, 6090, 6120, 6130, 6190; one 5000-level Statistics course. Additional courses in related areas will be required as directed by the supervisory committee.

### ***Bioveterinary Science***

This degree program involves studies in biochemistry, statistics, pathology, theriogenology, toxicology, virology, parasitology, pharmacology, microbiology, and laboratory animal management. Advanced techniques in laboratory procedures and animal health research are emphasized. Cooperation with other departments and research centers of the University and with federal collaborators and agencies allows for a strong graduate program in bioveterinary science.

*Course requirements:* Students in the MS program are required to complete the following courses: ADVS 6010, 6700, 6800; Chem 5700; Stat 3000. Students in the PhD program are required to complete the following courses: ADVS 6010, 6700, 6710, 6800, 7890; Chem 5700, 5710; Stat 5200. Additional coursework will be required by the supervisory committee from among the following courses: ADVS 5260, 5750, 6200, 6350, 6490, 6500, 6600, 6710, 6820; Biol 5050, 5150, 5330, 5340; Chem 5700, 5710.

### ***Research***

The ADVS department conducts a broad range of basic and applied research in the areas of animal reproduction, animal nutrition, livestock and dairy management, animal health, virology, parasitology, toxicology, animal behavior, cytogenetics, and molecular genetics. Department facilities include over 30 research laboratories on campus and at local and regional animal research facilities. There are research herds and flocks of beef and dairy cattle, sheep, and swine housed close to the University. There are additional research units housing beef cattle, sheep, and turkeys located throughout the state. Research in the department is funded by a multimillion dollar budget derived from support by the Utah Agricultural Experiment Station and by substantial outside contracts and grants. Cooperation with other departments and research centers of the University and with federal collaborators enhances the ADVS research and graduate programs. Significant in this regard are the University Biotechnology Center, the Utah State Animal Disease Diagnostic Laboratories, the Laboratory Animal Research Center, the Center for Environmental Toxicology, the Center for the Genetic Improvement of Livestock, and the on-campus USDA Poisonous Plant Laboratory.

### ***Financial Assistance***

Both departmental and research grant support are available to matriculated graduate students on a competitive basis. The department funds a number of graduate assistantships, which are available on a competitive basis to matriculated graduate students who are U.S. citizens, nationals, or residents. Students interested in departmental assistantships may request an application form from the department. Applications for assistantships for the following academic year must be submitted by March 15.

Acceptance to graduate study in the ADVS Department does not constitute a guarantee of financial assistance.

### ***Career Opportunities***

Career opportunities are available for students who have earned graduate degrees in the MS and PhD programs offered by the ADVS Department as described below.

#### **Animal and Dairy Science Graduate Degree Programs**

**Animal Nutrition.** Career opportunities exist in extension, university and private research, the commercial animal feedstuffs industry, private consulting firms, and international programs.

**Breeding and Genetics.** Career opportunities exist in extension university and private research, commercial animal breeding and genetic engineering enterprises, and international programs.

**Molecular Biology.** Career opportunities exist in university, federal, and private research organizations, and in commercial applications in the rapidly growing area of biotechnology.

**Reproductive Biology.** Career opportunities exist in extension; university and private research; the pharmaceutical, embryo transfer, and artificial insemination industries; private consultation; and international programs.

**Animal or Dairy Management.** Career opportunities include extension, private consultation firms, farm and ranch management, sales and service to agricultural producers, agricultural finance, and international programs.

#### **Biovetterinary Science Graduate Degree Programs**

Career opportunities in this area exist in research, management, and submanagement positions in public and private health research and testing organizations, and in commercial industries in the health field. Graduates from the MS program may seek admission to advanced degree programs in the biological sciences or veterinary medicine.

## ***Animal, Dairy and Veterinary Sciences Courses (ADVS)***

**ADVS 1010. Artificial Insemination and Reproduction.** Principles of reproduction, artificial insemination, and handling of semen. Anatomy and physiology of the bovine reproductive tract and reproductive management of the dairy farm. (2 cr) (F)

**ADVS 1020. Dairy Cattle Nutrition and Feeding.** Applied approach to nutrients, feeds, digestion, and nutrient utilization by dairy cattle. Dietary requirements and feeding practices. (3 cr) (F)

**ADVS 1030. Lactation and Milking Systems.** The mammary gland, udder health, and mastitis and its control. Milk quality and marketing. Principles involved in the function, design, and maintenance of dairy equipment. (3 cr) (Sp)

**ADVS 1040. Records and Financial Aspects of Dairy Herd Operations.** Record keeping systems, tax records, estate planning, DHI records, and computer record systems. Principles of credit and finance. Accessing loan sources. (3 cr) (Sp)

**ADVS 1050. Dairy Genetics.** Principles of dairy genetics, mating, pedigrees, and breeding. Purebred cattle type traits and classification. (3 cr) (F)

**ADVS 1060. Applied Feeding and Management of Dairy Calves and Basic Construction of Facilities.** Practical experience in feeding and management of dairy

calves from birth to weaning. Students participate in actual calf-raising programs. Development of basic skills required for planning and building agricultural structures. (3 cr) (Sp)

**ADVS 1100. Small Scale Animal Production.** Fundamentals of raising domestic farm animals in a semi-rural, noncommercial setting. Considerations of feeding, breeding, housing, marketing, sanitation, general health care, and community zoning factors. For nonmajors. (3 cr) (F)

**ADVS 1110. Introduction to Animal Science.** Influence and contributions of animal production and its commodities to society. Introductory scientific principles of animal science, livestock production systems, and contemporary issues. Introduction to professions and careers in animal agriculture and veterinary sciences. (4 cr) (F,Sp)

**ADVS 1250 (QI). Applied Agricultural Computations.** Development of understanding and proficiency in the application of basic mathematical skills, including algebra and geometry, to practical computational situations encountered in the agricultural sciences. (2 cr) (F,Sp)

**ADVS 1600. Western Horsemanship I.** Grooming, saddling, bridling, mounting, seats and hands, horseback riding both bareback and on western saddle. For students with limited or no previous riding experience. Western-type riding boots and health insurance required. (2 cr) (F,Sp)

**ADVS 1720. Dairy Cattle Evaluation and Judging.** Evaluation of cattle based on exterior anatomical traits functional for improving longevity and milk production. Explanation of classification systems used by breed associations and the artificial insemination industry. Development of basic skills for preparing dairy cattle for show. (1 cr) (Sp)

**ADVS 1910. Orientation to Animal and Dairy Science.** Introduction to the Animal Science and Dairy Science programs, and to the opportunities in animal agriculture and related fields. (0.5 cr) (F)

**ADVS 1920. Orientation to Bioveterinary Science.** Introduction to the profession of veterinary medicine and related fields, and to the preparation required for veterinary medical careers. (1 cr) (F)

**ADVS 2080. Beef Production Practices.** Production practices in the handling, selection, and care of beef cattle. Demonstrations of equipment, facilities, and skills relevant to beef cattle production. Prerequisite: ADVS 1110 (may be taken concurrently) or permission of instructor. (2 cr) (Sp)

**ADVS 2090. Sheep Production Practices.** Production practices in the handling, selection, and care of sheep. Demonstrations of equipment, facilities, and skills relevant to sheep and wool production. Prerequisite: ADVS 1110 (may be taken concurrently) or permission of instructor. (2 cr) (Sp)

**ADVS 2120. Swine Production Practices.** Production practices in the selection, handling, and care of swine. Demonstrations of equipment, facilities, and skills relevant to swine industry. Prerequisite: ADVS 1110 (may be taken concurrently) or permission of instructor. (2 cr) (Sp)

**ADVS 2130. Dairy Production Practices.** Basic husbandry skills needed to carry out day-to-day operations on a dairy farm. Principles of dairy herd health, disease prevention, and treatment. Prerequisite: ADVS 1020 or 1110 (may be taken concurrently) or permission of instructor. (3 cr) (F)

**ADVS 2190. Horse Production Practices.** Production practices in the selection, care, and evaluation of horses. Survey of breeds of horses, their characteristics, and their uses, as well as equine behavior, health care, nutrition, reproduction, anatomy, and physiology. Prerequisite: ADVS 1110 (may be taken concurrently) or permission of instructor. (2 cr) (F)

**ADVS 2200. Anatomy and Physiology of Animals.** Normal structure and function studied systematically. Comparative livestock, poultry, pleasure and companion animals, laboratory animals, and humans. (4 cr) (Sp)

**ADVS 2250. Cooperative Work Experience.** For students who require animal industry experience to prepare them for advanced curriculum in Animal, Dairy, or Bioveterinary Science. (1-12 cr) (F,Sp,Su) ®

**\*ADVS 2450. Animal Feeds and Feeding Practices.** Feed composition and characteristics influencing animal performance. Digestion of feeds and nutrient utilization by animals. Ration formulation and feeding strategies. For nonmajors (4 cr) (F)

**ADVS 2600. Western Horsemanship II.** Alternative training techniques for western pleasure and western reining horses, teaching leads, cueing techniques, reining maneuvers, and show-style riding. Western-type riding boots and health insurance required. Prerequisite: ADVS 1600. (2 cr) (F,Sp)

**ADVS 2920. Orientation to Veterinary Medicine.** Preparation of preveterinary students for successful application and admission to professional veterinary schools. Taught first half of spring semester. (0.5 cr) (Sp)

**ADVS 3000. Animal Health and Hygiene.** Introduction to basic principles of disease. Agents, mechanisms, and preventive measures for common diseases of farm animals will be emphasized. Prerequisite: ADVS 2200. (3 cr) (Sp)

**ADVS 3200 (DSC). Ethical Issues in Genetic Engineering and Biotechnology.** Critical evaluation of ethical issues of genetic engineering in biotechnology, including biological engineering and cloning of plants, animals, and humans. Presents basic science of genetic engineering and biotechnology. (3 cr) (Sp)

**ADVS 3300 (CI). Animal Production and Public Policy.** Students identify problems, become involved, organize resources, read and analyze documents, see different sides of an issue, and arrive at workable solutions for dealing with contemporary forces in society impinging on the ability of farmers and ranchers to function. (2 cr) (F)

**ADVS 3500. Principles of Animal Nutrition.** Biochemical characterization and chemical analysis of feedstuffs for farm animals, with regard to carbohydrates, proteins, lipids, minerals, and vitamins. Catabolic/anabolic pathways associated with utilization of these nutrients with respect to production, general health, and nutritional disorders. Prerequisites: ADVS 2200; Chem 1120 or 2320. (3 cr) (F)

**ADVS 3510 (QI). Applied Animal Nutrition.** Categorization of farm animal feeds into energy feeds, protein feeds, dry forages, silages and haylages, pasture and range plants, and vitamin-mineral supplements. Emphasis placed on practical diet formulation, including computerization and aspects of feed delivery and nutritional management. Prerequisite: ADVS 3500 or Chem 3700. (3 cr) (Sp)

**ADVS 3600. Western Horsemanship III.** Utilization of current training methods relating to basic equine behavior, ground breaking skills, and riding and training of the unbroken and freshly broken horse. Prerequisite: ADVS 2600. (2 cr) (F)

**ADVS 3650. Live Animal and Carcass Evaluation.** Judging, grading, and pricing of market animals and carcasses, with emphasis on comparative evaluation of live animals and carcasses. (3 cr) (F)

**ADVS 3710. Advanced Livestock Judging.** Advanced methods of selection and identification of superior animals for breeding stock. Emphasis on performance records, judging, grading, and oral reasons. (2 cr) (F,Sp)

**ADVS 3900. Special Problems and Readings.** Students conduct short-term studies and/or literature review with critical analysis of individualized subject matter. Formal written reports required. Prerequisite: Permission of instructor. (1-3 cr) (F,Sp,Su) ®

**ADVS 3910. Special Topics.** Topics of special interest to those who have needs not satisfied by courses currently offered. (1-5 cr) (F,Sp,Su) ®

**ADVS 3920. Internship in Veterinary Medicine.** A directed and evaluated work experience with a veterinarian. For each credit, student must document at least 54 hours of work time. Prerequisite: Permission of instructor. (1-3 cr) (F,Sp,Su) ®

**ADVS 4200 (CI). Physiology of Reproduction and Lactation.** Introduction to principles of physiology as they relate to the reproductive and lactation processes in domestic mammals. Factors affecting reproductive and lactation performance and their applications in animal management. Prerequisites: ADVS 2200; Chem 1120 or 2310. (4 cr) (Sp)

**ADVS 4250. Internship in Animal Industry.** Directed and evaluated educational work experience with an animal production unit, related business, or government facility in cooperation with the Livestock Education Foundation. Prerequisite: Permission of instructor. (1-12 cr) (F,Sp,Su) ®

**ADVS 4560 (QI). Principles of Animal Breeding.** Genetic influences affecting animal performance and the application of selection principles, breeding systems, and methods of improvement to farm animals, including beef and dairy cattle, sheep, swine, and horses. Prerequisite: Biol 1010 or 1220. (3 cr) (F)

**ADVS 4800. Undergraduate Research or Creative Opportunity.** Research or creative activity pertaining to animals. May include management, production, medical, or basic science, with consideration of biological, chemical, or physical aspects, or instrument design. Prerequisite: Permission of instructor. (1-6 cr) (F,Sp,Su) ®

**ADVS 4910. Preprofessional Orientation.** Survey of the professional opportunities in the animal industries to enable graduating students to make the transition to careers and/or postgraduate study. Prerequisite: Senior standing. (0.5 cr) (F)

**ADVS 4920 (CI). Undergraduate Seminar.** Current developments in agricultural field selected by student. Each student is responsible for the research and oral presentation of a topic in the animal industries. Group investigations, preparations, and deliberations on issues in animal agriculture. Prerequisite: Senior standing. (2 cr) (F)

**ADVS 5030. Sustainable Agricultural Production Systems with Animals.** Study of various domestic animal production systems in relation to sustainable agriculture and integrated ranch and farm management strategies. Consideration of environmental factors and overall profitability. Prerequisite: ADVS 1110. (3 cr) (F)

**ADVS 5080 (d6080).<sup>1</sup> Beef Cattle Management.** Managing the beef enterprise to yield optimum returns through integrating resource use and applying breeding, nutrition, reproduction, and animal health practices. Prerequisites: ADVS 2080; ADVS 3510, 4200, 4560 (may be taken concurrently). (3 cr) (Sp)

**ADVS 5090 (d6090). Sheep Management and Wool Technology.** Detailed study of the managerial considerations for range and farm flock operations. Examinations of wool, and review of wool clip handling and merchandising. Prerequisites: ADVS 2090; ADVS 3510, 4200, 4560 (may be taken concurrently). (4 cr) (Sp)

**ADVS 5120 (d6120). Swine Management.** Management decisions based on nutrition, breeding programs, herd health practices, herd records, and marketing opportunities. Prerequisites: ADVS 2120; ADVS 3510, 4200, 4560 (may be taken concurrently). (3 cr) (Sp)

**\*ADVS 5130 (d6130). Dairy Cattle Management.** Capstone course drawing together concepts and applying them to a total dairy farm management program. Prerequisites: ADVS 2130; ADVS 3510, 4200, 4560 (may be taken concurrently). (3 cr) (Sp)

**ADVS 5160. Methods in Biotechnology: Cell Culture.** Techniques and fundamental knowledge for culturing mammalian and insect cells. Students will learn maintenance, growing, genetic engineering of cells, cytotoxicity, hybridoma creation, cloning, etc. Extensive laboratory experience is provided. Also taught as Biol 5160, Chem 5160, NFS 5160, and PSB 5160. (3 cr) (Sp)

**ADVS 5190 (d6190). Horse Management.** Management decisions in horse enterprises emphasizing business procedures, including merchandising, records, selection, uses, housing, facilities, nutrition, feeding, health care, and breeding. Emphasizes total management of horse enterprise, rather than husbandry. Prerequisites: ADVS 2190; ADVS 3510, 4200, 4560 (may be taken concurrently). (3 cr) (Sp)

**ADVS 5240. Methods in Biotechnology: Protein Purification Techniques.** Reviews basic methods of protein purification, including scaled-up use of 100L fermenter, large-scale centrifugation, diafiltration, chromatography, and use of BioCAD. Prerequisite: Chem 3700. Also taught as Biol 5240, Chem 5240, NFS 5240, and PSB 5240. (3 cr) (Sp)

**ADVS 5260. Methods in Biotechnology: Molecular Cloning.** Laboratory-oriented course designed to teach molecular biology techniques such as DNA cloning, genetic probes, polymerase chain reaction, and DNA sequencing. Prerequisite: Chem 3700 or 5710; or Biol 3200; or permission of instructor. Also taught as Biol 5260, Chem 5260, NFS 5260, and PSB 5260. (3 cr) (F)

**ADVS 5350 (d6350). Introductory Pharmacology and Pharmacokinetics.** Basic principles of pharmacology and pharmacokinetics providing basis for extrapolation of biological kinetics of foreign compounds to a wide variety of xenobiotics encountered in toxicology, biology, and research. Prerequisites: Biol 5600, Chem 3700. (3 cr) (Sp)

**ADVS 5400 (d6400). Environmental Toxicology.** Presents in-depth survey of toxic chemicals present in the environment, environmental factors impacting fate of chemicals, potential biological effects associated with chemical exposures, and methods of reducing associated risks. Prerequisite: Chem 3700. (3 cr) (Sp)

**ADVS 5490 (d6490). Research Animal Techniques.** Methods of live animal research including laboratory animals and livestock. Required to utilize those species of animals included under PHS Policy and by the Animal Welfare Act. Includes discussion of Institutional Animal Care and Use Committees (IACUC). (1 cr) (F,Sp) ®

**\*\*ADVS 5520 (d6520). Grazing Livestock Nutrition and Management.** Principles of livestock nutrition and production applied to the grazing environment and the relationships of livestock and range management for optimizing values from both. Prerequisites: ADVS 3510; FRWS 4000 (recommended). (2 cr) (Sp)

**\*ADVS 5530 (d6530). Nutritional Management of Farm Animals.** Nutritional management, problem solving, and feeding strategies as they influence performance of farm animals. Optimization of nutrition for various species and classes of domestic livestock. Prerequisite: ADVS 3510. (3 cr) (Sp)

**ADVS 5690 (d6690). Animal Histology.** Microscopic anatomy and physiology of normal domestic animal's cells, tissues, organs, and system. Prerequisite: ADVS 2200 or permission of instructor. (3 cr) (F)

**ADVS 5700 (CI) (d6700). General Animal Pathobiology.** Introduction to the principles of gross, microscopic, and physiological changes associated with diseases of domestic animals. Prerequisite: ADVS 5690/6690 or permission of instructor. (3 cr) (Sp)

**\*\*ADVS 5820 (d6820). Animal Cytogenetics and Gene Mapping.** Structure and properties of chromosomes, chromosome behavior during cell division, chromosomal influence on phenotype, and factors causing changes in chromosome structure and number. Gene markers and gene mapping, with emphasis on applications for livestock. Prerequisite: ADVS 4560 or Biol 3200. (3 cr) (F)

**\*\*ADVS 5860. Poisonous Range Plants Affecting Livestock.** Poisonous plants of rangelands and their effects on grazing animals, especially livestock. Management practices to reduce or prevent poisoning. Also taught as FRWS 5860. (2 cr) (Sp)

**ADVS 6010. Animal Research Orientation.** Orientation to graduate study and to research procedures and methods in the animal sciences, with introduction to the design and analysis of experiments, research ethics, and accessing research databases. For beginning graduate students. (1 cr) (F)

**ADVS 6080 (d5080). Beef Cattle Management.** Managing the beef enterprise to yield optimum returns through integrating resource use and applying breeding, nutrition, reproduction, and animal health practices. Prerequisites: ADVS 2080; ADVS 3510, 4200, 4560 (may be taken concurrently). (3 cr) (Sp)

**ADVS 6090 (d5090). Sheep Management and Wool Technology.** Detailed study of the managerial considerations for range and farm flock operations. Examinations of wool, and review of wool clip handling and merchandising. Prerequisites: ADVS 2090; ADVS 3510, 4200, 4560 (may be taken concurrently). (4 cr) (Sp)

**ADVS 6120 (d5120). Swine Management.** Management decisions based on nutrition, breeding programs, herd health practices, herd records, and marketing opportunities. Prerequisites: ADVS 2120; ADVS 3510, 4200, 4560 (may be taken concurrently). (3 cr) (Sp)

**\*ADVS 6130 (d5130). Dairy Cattle Management.** Capstone course drawing together concepts and applying them to a total dairy farm management program. Prerequisites: ADVS 2130; ADVS 3510, 4200, 4560 (may be taken concurrently). (3 cr) (Sp)

**ADVS 6190 (d5190). Horse Management.** Management decisions in horse enterprises emphasizing business procedures, including merchandising, records, selection, uses, housing, facilities, nutrition, feeding, health care, and breeding. Emphasizes total management of horse enterprise, rather than husbandry. Prerequisites: ADVS 2190; ADVS 3510, 4200, 4560 (may be taken concurrently). (3 cr) (Sp)

**\*\*ADVS 6200. Physiology of Reproduction.** Study of processes of reproduction in mammals, including fertilization, embryonic development, reproductive endocrinology, and mechanisms of control. Prerequisites: ADVS 4200, Chem 3700. (3 cr) (Sp)

**\*ADVS 6300. Animal Breeding Theory.** Basic theoretics of populations as applied to breeding and improvement of domestic animals with emphasis on effects of directed selection and mating and design of effective breeding plans. Prerequisite: ADVS 4560. (3 cr) (F)

**ADVS 6350 (d5350). Introductory Pharmacology and Pharmacokinetics.** Basic principles of pharmacology and pharmacokinetics providing basis for extrapolation of biological kinetics of foreign compounds to a wide variety of xenobiotics encountered in toxicology, biology, and research. Prerequisites: Biol 5600, Chem 3700. (3 cr) (Sp)

**ADVS 6400 (d5400). Environmental Toxicology.** Presents in-depth survey of toxic chemicals present in the environment, environmental factors impacting fate of chemicals, potential biological effects associated with chemical exposures, and methods of reducing associated risks. Prerequisite: Chem 3700. (3 cr) (Sp)

**ADVS 6490 (d5490). Research Animal Techniques.** Methods of live animal research including laboratory animals and livestock. Required to utilize those species of animals included under PHS Policy and by the Animal Welfare Act. Includes discussion of Institutional Animal Care and Use Committees (IACUC). (1 cr) (F,Sp) ®

**ADVS 6500. Animal Nutrition Research Techniques.** Laboratory intensive course in routine feedstuff evaluation and research techniques to evaluate nutritional and metabolic responses under in vivo, in situ, and in vitro conditions using feed, digesta, feces, urine, tissue, metabolites, and products. Prerequisite: ADVS 3510. (2 cr) (F)

**\*ADVS 6510 (d7510). Rumen Physiology and Metabolism.** Discussion of some key aspects of physiology and metabolism of the ruminant digestive tract, with emphasis on the rumen. Topics include anatomy and function; motility; metabolism of protein, carbohydrates, and lipids; rumen microbiology; and common digestive disorders. Prerequisite: ADVS 3510. (2 cr) (F)

**\*\*ADVS 6520 (d5520). Grazing Livestock Nutrition and Management.** Principles of livestock nutrition and production applied to the grazing environment and the relationships of livestock and range management for optimizing values from both. Prerequisites: ADVS 3510; FRWS 4000 (recommended). (2 cr) (Sp)

**\*ADVS 6530 (d5530). Nutritional Management of Farm Animals.** Nutritional management, problem solving, and feeding strategies as they influence performance of farm animals. Optimization of nutrition for various species and classes of domestic livestock. Prerequisite: ADVS 3510. (3 cr) (Sp)

**\*\*ADVS 6540 (d7540). Animal Energetics and Nutrient Metabolism.** Techniques and procedures in measurement of heat production; factors affecting heat production; efficiency of energy utilization in body processes such as work, growth, and synthesis of fats, proteins, and carbohydrates; and the energetic costs of nutrient interconversion and turnover. Prerequisites: ADVS 6510/7510; Chem 5700, 5710. (3 cr) (F)

**\*\*ADVS 6550 (d7550). Protein Metabolism and Utilization.** Processes involved in the digestion, synthesis, and degradation of protein in the rumen, with special emphasis on protein-energy relationships in the rumen and whole animal. Discussion of protein requirements and efficiency of protein utilization. Prerequisite: ADVS 6510/7510. (3 cr) (F)

**\*ADVS 6560 (d7560). Mineral and Vitamin Metabolism.** Principal roles of minerals and vitamins in nutrient metabolism as they apply to animal nutrition. Prerequisite: ADVS 6510/7510. (3 cr) (F)

**\*\*ADVS 6600 (d7600). Principles of Toxicology.** Mechanisms of action and effects of toxicants on living organisms. Prerequisite: ADVS 5350/6350. (3 cr) (F)

**ADVS 6690 (d6690). Animal Histology.** Microscopic anatomy and physiology of normal domestic animal's cells, tissues, organs, and system. Prerequisite: ADVS 2200 or permission of instructor. (3 cr) (F)

**ADVS 6700 (d5700). General Animal Pathobiology.** Introduction to the principles of gross, microscopic, and physiological changes associated with diseases of domestic animals. Prerequisite: ADVS 6690/5690 or permission of instructor. (3 cr) (Sp)

**ADVS 6800. Animal, Dairy and Veterinary Science Seminar.** Seminars on topics of interest in Animal, Dairy and Veterinary Sciences. (1 cr) (F,Sp)

**ADVS 6810. Seminar in Toxicology.** Graduate seminar in toxicology and related topics. (1 cr) (Sp) ®

**\*\*ADVS 6820 (d5820). Animal Cytogenetics and Gene Mapping.** Structure and properties of chromosomes, chromosome behavior during cell division, chromosomal influence on phenotype, and factors causing changes in chromosome structure and number. Gene markers and gene mapping, with emphasis on applications for livestock. Prerequisite: ADVS 4560 or Biol 3200. (3 cr) (F)

**ADVS 6900. Special Problems.** Readings, discussions, lectures, literature reviews, and research problems in animal, dairy, and bioveterinary sciences. Prerequisite: Consent of instructor and department. (1-3 cr) (F,Sp,Su) ®

**ADVS 6910. Readings and Conference in Pharmacology and Toxicology.** Independent readings and conferences in the area of pharmacology and toxicology with particular emphasis on current literature. Prerequisite: ADVS 6350/5350. (1-3 cr) (F) ®

**ADVS 6970. Research and Thesis.** (1-12 cr) (F,Sp,Su) ®

**ADVS 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

**\*ADVS 7510 (d6510). Rumen Physiology and Metabolism.** Discussion of some key aspects of physiology and metabolism of the ruminant digestive tract, with emphasis on the rumen. Topics include anatomy and function; motility; metabolism of protein, carbohydrates, and lipids; rumen microbiology; and common digestive disorders. Prerequisite: ADVS 3510. (2 cr) (F)

**\*\*ADVS 7540 (d6540). Animal Energetics and Nutrient Metabolism.** Techniques and procedures in measurement of heat production; factors affecting heat production; efficiency of energy utilization in body processes such as work, growth, and synthesis of fats, proteins, and carbohydrates; and the energetic costs of nutrient

interconversion and turnover. Prerequisites: ADVS 7510/6510; Chem 5700, 5710. (3 cr) (F)

**\*\*ADVS 7550 (d6550). Protein Metabolism and Utilization.** Processes involved in the digestion, synthesis, and degradation of protein in the rumen, with special emphasis on protein-energy relationships in the rumen and whole animal. Discussion of protein requirements and efficiency of protein utilization. Prerequisite: ADVS 7510/6510. (3 cr) (F)

**\*ADVS 7560 (d6560). Mineral and Vitamin Metabolism.** Principal roles of minerals and vitamins in nutrient metabolism as they apply to animal nutrition. Prerequisite: ADVS 7510/6510. (3 cr) (F)

**\*\*ADVS 7600 (d6600). Principles of Toxicology.** Mechanisms of action and effects of toxicants on living organisms. Prerequisite: ADVS 5350/6350. (3 cr) (F)

**ADVS 7970. Dissertation Research.** (1-12 cr) (F,Sp,Su) ®

**ADVS 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

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<sup>1</sup> Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

Department of  
**Aquatic, Watershed,  
 and Earth Resources**

College of Natural Resources

**Interim Head: Associate Professor** *Chris Luecke*, lake ecology and fisheries  
 Office in Natural Resources 210, (435) 797-2459

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**Professors** *Charles P. Hawkins*, stream ecology, conservation biology, and biomonitoring; *Wayne A. Wurtsbaugh*, limnology, fish ecology, and watershed biogeochemistry; **Professors Emeriti** *John A. Kadlec*, wetland ecology and biogeochemistry; *John M. Neuhold*, fisheries biology; **Associate Professors** *Todd A. Crowl*, aquatic ecology and conservation biology; *John C. Schmidt*, fluvial geomorphology and water policy; *Helga Van Miegroet*, biogeochemistry, soils, and ecosystem ecology; **Research Associate Professor** *Jeffrey L. Kershner*, USDA Forest Service, national habitat coordinator, stream ecology and fish-habitat relationships; **Assistant Professors** *Paul W. Box*, geographic information systems, spatial analysis, and modeling; *Phaedra E. Budy*, assistant leader, fisheries, Utah Cooperative Fisheries and Wildlife Research Unit, fisheries management and aquatic ecology; *Robert R. Gillies*, remote sensing and meteorology; *Nancy O. Mesner*, water quality, water policy, and modeling; *Karen E. Mock*, conservation genetics and population biology; *Michael A. White*, ecosystem modeling, remote sensing, and global climatology; **Research Assistant Professor** *Mark R. Vinson*, aquatic invertebrate ecology and biomonitoring; **Adjunct Assistant Professors** *Nicolaas W. Bouwes, Jr.*, fisheries management, aquatic ecology; *Jayne Brim-Box*, invertebrate ecology; *Ronald W. Goede*, fish diseases; *J. Christopher Wilson*, director, State of Utah Division of Wildlife Resources Fisheries Experiment Station, fish pathologist/nutritionist

**Degrees offered:** Bachelor of Science (BS) in Fisheries and Wildlife; BS, Master of Science (MS), and Doctor of Philosophy (PhD) in Watershed Science; MS and PhD in Ecology; MS and PhD in Fisheries Biology

**Undergraduate emphases:** *BS in Fisheries and Wildlife*—Fisheries, Conservation Biology

**Graduate specializations:** *MS, PhD in Ecology*—Aquatic Ecology; *MS, PhD in Fisheries Biology*—Aquatic Ecology, Conservation Biology, Fisheries Management

## Undergraduate Programs

### Objectives

The Department of Aquatic, Watershed, and Earth Resources offers comprehensive educational opportunities for graduate and undergraduate students in hydrology, geomorphology, biogeochemistry, water quality, watershed management, fisheries, aquatic ecology, remote sensing and geographic modeling. Departmental faculty provide expertise in fisheries, the hydrologic cycle, conservation biology, restoration and management of aquatic and riparian ecosystems, and in the remote sensing and geographic analysis of the earth's landcovers. Graduates of departmental programs become teachers and researchers at major universities, scientists and managers for natural resource agencies, and professionals with consulting and nonprofit environmental firms.

### Requirements

**Departmental Admission Requirements.** Admission requirements for the department are the same as those described for the College of Natural Resources (see pages 100-101).

**Graduation Requirements.** All Natural Resources core courses and all courses listed as major subject courses must be taken on an *A-B-C-D-F* basis. A grade of *C-* or better is required for all courses used to meet the requirements for a major or minor in the department. The grade point average for all courses taught by the College of Natural Resources must be 2.5 or higher.

**Bachelor of Science in Fisheries and Wildlife.** The Fisheries and Wildlife major is jointly administered by the Department of Aquatic, Watershed, and Earth Resources (AWER) and the Department of Forest, Range, and Wildlife Sciences (FRWS). Students interested in the Fisheries and Wildlife—Fisheries emphasis should declare the major in AWER. Those interested in the Fisheries and Wildlife—Conservation Biology emphasis may declare the major in either AWER or FRWS.

Students must meet the course requirements for University Studies in addition to the following departmental requirements. The first two years of study include courses designed to give the student a sound scientific background, an introduction to the field of natural resources management, and an introduction to aquatic and earth resources. Supporting math and science courses include: Biol 1210, 1220 (BLS); Chem 1210, 1220 (BPS), 1230, 1240;

Math 1050 (QL), 1100 (QL); Phyx 2110; and Stat 3000 (QI). Natural resource core courses include: EnvS 2340 (BSS); Geog 1130 (BPS) or Geol 1150 (BPS); and NR 2220. Introductory Fisheries and Wildlife core courses include: AWER 3100 (CI), 3110; FRWS 3200 (CI), 3210. University Studies, required, and elective courses must also be included, resulting in a total of approximately 15 credits per semester.

During the junior and senior years, all students take upper-division departmental and college core courses. Additionally, students take departmental elective courses to fulfill their special interests, as well as remaining University Studies courses. Upper-division core courses include: FRWS 3300, 3400; AWER 4500; AWER 4510 or FRWS 4400; AWER 4980 or FRWS 4980; and one management core course (see major requirement sheet for listing of courses). Natural resources upper-division core courses include: NR 3000, 3600 (QI), and 4000. University Studies and elective courses must also be included, resulting in a total of approximately 15 credits per semester and 120 credits required for the major. Elective courses are chosen in consultation with a faculty advisor and may include one of the following areas of emphasis.

Students pursuing the AWER **Fisheries** emphasis are required to take AWER 3700, 4650, and FRWS 5800.

Students pursuing the AWER **Conservation Biology** emphasis are required to take Biol 3200 (QI), 5250 (CI); and FRWS 5800. Students are also strongly encouraged to take AWER 6750.

**Fisheries and Wildlife Minor.** The minor is designed for students with a strong background in biology. The department head's approval and a minimum of 19 credits are required. Course requirements include: AWER 3100 (CI); FRWS 3200 (CI); NR 2220, 3000; and two of the following courses: EnvS 4110; FRWS 3300, 3400, and 5400.

**Bachelor of Science in Watershed Science.** All Watershed Science majors must complete the following communication skills/economics courses: Econ 1500 (BAI), Spch 3050 (DSS); and supporting math and science courses: AWER 3600; Biol 1210, 1220 (BLS); Bmet 4300; Chem 1210, 1220 (BPS), 1230; FRWS 3500; Geol 1150 (BPS), 5510 (QI); Math 1210 (QL); Phyx 2110; Soil 3000; Stat 3000 (QI). Majors must also complete the Natural Resources core courses: EnvS 2340 (BSS); NR 2220, 3000, 3600 (QI), 4000; and the Watershed Science core courses: AWER 3700, 4490, 4500, 4530, 5150, 5330, 5660; EnvS 5320. Students must also complete 10 credits of electives in the areas of physical science, watershed ecology, watershed management tools, or watershed policy. For specific courses, see the current major requirement sheet.

**Watershed Science Minor (16-17 credits).** For the Watershed Science minor, students must complete AWER 3700, 4490, 4530, plus two courses selected from the following: AWER 4500, 5150, 5660, FRWS 5640.

For information about changes in requirements, course sequence, and scheduling, students should confer with a departmental advisor. The undergraduate program can be readily tailored to individual student needs with the help of a faculty advisor.

### **Career Opportunities**

Graduates in Aquatic, Watershed, and Earth Resources (AWER) occupy an expanding niche in the fields of natural resources and environmental management. Degree holders often work as environmental scientists, hydrologists, fisheries biolo-

gists, or specialists in geographic information analysis and remote sensing. With experience and/or advanced degrees, AWER graduates may do natural resource assessment, management planning, and resource impact analysis.

Federal agencies, such as the Forest Service, Fish and Wildlife Service, Geological Survey, Bureau of Land Management, Environmental Protection Agency, National Park Service, Bureau of Reclamation, and National Marine Fisheries Service, hire graduates of AWER academic programs. Graduates also find employment with state natural resource agencies, nongovernmental conservation organizations, and private consulting firms.

### **Financial Assistance**

The main sources of undergraduate financial assistance include University scholarships, grants-in-aid, work-study, and loans; these are listed on pages 22-25 in the *Financial Aid and Scholarship Information* section. In addition, more than 30 scholarships for eligible students in the College of Natural Resources are listed on pages 37-38 of the same section.

Scholarships are awarded for scholastic and professional achievements at the department, College of Natural Resources, and University level. For more information, contact departmental and College of Natural Resources academic advisors. Grants-in-aid and work-study are available from the Financial Aid Office and the Student Employment Office, respectively. In addition, departmental faculty often employ undergraduate students to assist in research, extension, and outreach projects. These projects often involve field and laboratory data collection, data management and analysis, and report preparation.

### **Additional Information**

For additional information about the Bachelor of Science requirements, course sequencing, and departmental specialization options and their related coursework, as well as updated information describing current programs and courses offered by the Department of Aquatic, Watershed, and Earth Resources, visit the Aquatic, Watershed, and Earth Resources main office, Natural Resources 210, or visit <http://www.cnr.usu.edu> and link to the departmental website.

## **Graduate Programs**

### **Admission Requirements**

General admission requirements apply, in addition to the requirements which follow. Although admission to the graduate program is treated on an application-by-application basis, the following are usually required: (1) a bachelor's degree from an accredited college or university; (2) a GPA of 3.2 or better (out of 4.0) for the most recent two years of academic coursework; (3) combined verbal and quantitative GRE scores above the 40th percentile; and (4) a letter of "interest and purpose" detailing the applicant's reasons for seeking an advanced degree. Foreign students should have a TOEFL score of at least 550. The written statement of interest helps match applicants with faculty advisors. A faculty member must agree to serve as the major professor in order for an applicant to be accepted. Prospective students are encouraged to contact faculty members early in the application process to investigate mutual interests, projects, and prospects for financial support.

Previous training in the field is not a prerequisite for admission, although a sound background in the physical and biological sciences is recommended. Successful applicants without the necessary background will be expected to obtain it in the course of their studies for the advanced degree.

### ***Degree Programs***

A Master of Science degree in Fisheries Biology or Watershed Science, with emphasis on the management of fisheries or watershed resources directed toward decision-making roles in natural resource agencies, is offered for the applicant with previous agency experience and for the student motivated toward an administrative career. A Doctor of Philosophy degree in Fisheries Biology, Ecology, or Watershed Science is provided for students interested in pursuing a research or academic career.

A thesis or dissertation based on original research performed by the student is required. Written comprehensive examinations are required of all students pursuing the PhD degree. At the discretion of the student's graduate supervisory committee, an additional oral examination may be required.

The minimum requirement for an MS degree is 30 credits, including at least 24 credits in residency and 6 credits of thesis research. The minimum requirement for a PhD degree is 60 approved graduate credits in addition to an MS degree, or 90 approved graduate credits with no MS degree. At least one year (a minimum of 32 credits), including a minimum of two consecutive semesters, of full-time registration must be in residence at USU.

With committee approval, graduate credit may be transferred from accredited graduate schools, provided the minimum residency requirement (including thesis and dissertation credit) at USU is met. Transfer credit, which must not have been used for any other degree, will be shown on official USU transcripts at completion of the degree.

**Master of Natural Resources.** The department also participates in the College of Natural Resources Master of Natural Resources (MNR) degree program. For more information, see page 374.

### ***Specializations***

The MS and PhD degrees in Fisheries Biology and Ecology allow students to specialize in either Fisheries Management or Aquatic Ecology.

### ***Financial Assistance***

General aspects of financial support for graduate students at Utah State University are listed on pages 71-72 in the *Graduate Financial Assistance* section. This includes important information on the University-wide policies and terms of reference for research and teaching assistantships, graduate tuition obligations and benefits, Western Regional Graduate Programs, and competitive University-wide fellowships and scholarships.

### ***Assistantships***

Research assistantships are available through individual faculty members who hold research grants or contracts. Occasionally, teaching assistantships are available through the department. Recipients of teaching assistantships are usually selected from among PhD students.

### ***Western Regional Graduate Programs***

The MS and PhD in Watershed Science are Western Regional Graduate Programs. For more information, see page 71.

## ***Aquatic, Watershed, and Earth Resources Courses (AWER)***

**AWER 1200 (BLS). Biodiversity: Its Conservation and Future.** Today, species extinctions are occurring at an unprecedented rate. People in developed countries are concerned with this loss. Solving this problem requires knowledge of what determines biodiversity, how it is being threatened, and how its loss can be countered. (3 cr) (Sp)

**AWER 2250. Introductory Internship/Co-op.** Introductory-level educational experience in internship/cooperative education position approved by department. (1-3 cr) (F,Sp,Su) ®

**AWER 3000 (DSC). Oceanography.** Examines fundamental interrelationships between physical environment of the oceans and the life forms they support. Suitable for nonbiologists. (3 cr) (Sp)

**AWER 3100 (CI). Fish Diversity.** Systematics, physiology, ecology, and evolution of major groups of marine and freshwater fishes. Stresses functional morphology, physiological ecology, and community interactions explaining fish abundance and distribution. Prerequisite: Biol 1220. (3 cr) (F)

**AWER 3110. Fish Diversity Laboratory.** Focuses on field collection, identification, and habitat relationships of freshwater fishes in North America. Prerequisite: AWER 3100 (may be taken concurrently). (1 cr) (F)

**AWER 3600. Geomorphology.** Geomorphic processes, origin of landforms and surficial deposits. Emphasizes fluvial and hillslope landscape elements, and surficial geologic mapping. Three one-hour lectures and one three-hour lab per week. Prerequisite: Geol 1100 or 1150 or Geog 1130. Also taught as Geol 3600. (4 cr) (F)

**AWER 3700. Fundamentals of Watershed Science.** Study of water movement, hillslope processes, and nutrient movement in catchments, and its relevance to the properties, land use, and management of watersheds as natural resource units. Prerequisite: Soil 3000 or permission of instructor. (3 cr) (Sp)

**AWER 3820 (DSC, QI). Global Climatology.** Emphasizes physical basis of climate (climate dynamics) and the mechanisms and processes for its fluctuations on sub-seasonal to interannual time scales (climate variations), and on regional to hemispheric/global time scales. Prerequisite: Bmet 2000 or Geog 1130. Also taught as Bmet 3820. (4 cr) (F)

**AWER 3900. Spatial Analysis.** Analysis of geographic data, including spatial economic theory, spatial quantitative methods, and spatial distributions. Prerequisite: Stat 2000. (3 cr) (Sp)

**AWER 4250. Advanced Internship/Co-op.** Internship/cooperative education work experience; increased complexity to help student gain a more professional level of experience. (1-9 cr) (F,Sp,Su) ®

**\*\*\*AWER 4490 (d5490).<sup>1</sup> Small Watershed Hydrology.** Detailed exploration of concepts of hydrologic processes in small, wildland watersheds. Concentrates on recent research findings concerning examining key hydrological processes. Particular attention paid to study of partitioning of water in the hydrologic cycle, sources for runoff generation, snow and snowmelt, and erosion. Features process modeling and

parameter estimation techniques as related to wildland systems. Prerequisites: Math 1210, AWER 3700. (4 cr) (F)

**AWER 4500. Freshwater Ecology.** Ecosystem analysis of physical, chemical, and biological interactions in lakes and streams. Application of these concepts for managing aquatic system. Prerequisites: Chem 1210 and NR/Biol 2220. (3 cr) (F)

**AWER 4510. Aquatic Ecology Practicum.** Integration of limnological theory and methods of conducting field and laboratory analyses of physical, chemical, and biological parameters in writing. Field trips required. Prerequisite: AWER 4500 (may be taken concurrently). (3 cr) (F)

**AWER 4530 (d6530). Water Quality and Pollution.** Reviews biological and social problems caused by point and nonpoint source water pollution; toxicology; abiotic and biotic water quality parameters; and use criteria of the Clean Water Act. Graduate-level class will require additional readings of the peer-reviewed literature and an additional class meeting to have in-depth discussions of those readings. Each graduate student will be responsible for making a presentation at the beginning of class, and leading the discussion. (3 cr) (Sp)

**AWER 4600 (d6600). Principles of Surface Hydrology.** Study of physical elements of the water cycle, surface hydrological processes, and watershed responses. Explores basic hydrologic concepts and terminology, as well as collection, analysis, and presentation of hydrologic data. Includes field laboratory. Prerequisite: Soil 3000 or instructor's permission. Also taught as Soil 4600/6600. (3 cr) (Sp)

**AWER 4650 (d6650). Principles in Fishery Management.** Emphasizes management of fish populations within context of community and ecosystem dynamics. Stresses use of simulation models to assess effects of growth, recruitment, and mortality on age-structured populations. (3 cr) (Sp)

**AWER 4750. Fundamentals of Remote Sensing.** Develops the scientific principles behind remote sensing. Examines the basic physics of electromagnetic radiation and the interactions of radiation with the surface and the atmosphere. Prerequisites: Math 1060, 1210; Phyx 2210. (3 cr) (F)

**AWER 4930. Geographic Information Systems.** Examines structure and operation of Geographic Information Systems (GIS). Explores design, theory, and implementation of GIS software, digitizing, fundamentals of vector and raster GIS processing, georeferencing, map accuracy, and site location. (4 cr) (F)

**AWER 4950. Special Topics.** Individual study and research upon selected aquatic, watershed, and earth resources problems. (1-3 cr) (F,Sp,Su) ®

**AWER 4960. Directed Readings.** Provides one-on-one interaction between student and instructor. (1-3 cr) (F,Sp,Su) ®

**AWER 4970. Undergraduate Research.** Individual or team research. Prerequisite: Advisor approval. (1-3 cr) (F,Sp,Su) ®

**AWER 4980. Undergraduate Seminar.** Intended to bring upperclassmen up-to-date on aquatic, watershed, and earth resources topics. (1 cr) (F,Sp)

**AWER 5130 (d6130). Terrestrial Ecosystem Modeling.** Introduces concepts of terrestrial ecosystem cycles, using computer modeling techniques. Includes discussions of modeling concepts, as well as in-class student projects. Prerequisites: Math 1050 and NR/Biol 2220; or permission of instructor. (3 cr) (Sp)

**AWER 5150 (d6150). Fluvial Geomorphology.** Focuses on physical processes in streams that control their shape, plan form, slope, bed material, and distribution of channel bars. Emphasizes field analysis of these topics, and application of geomor-

phology to aquatic ecology and environmental restoration. Prerequisite: Geol/AWER 3600. Also taught as Geol 5150/6150. (4 cr) (F)

**\*\*AWER 5160 (d6160). Hillslope and Landscape Geomorphology.** Includes basics of hillslope weathering, transport, and hydrologic processes. Surveys classic and recent literature on hillslope-scale and landscape-scale geomorphic research. Three lectures and several Saturday field trips. Prerequisite: Geol/AWER 3600. Also taught as Geol 5160/6160. (3 cr) (Sp)

**\*AWER 5200. Fish Habitat Relationships in Managed Forests.** Examines biological and social factors influencing aquatic ecosystems and fish habitats within the context of forest management. Analyzes ecological relationships of fish habitats within forest ecosystem, and how these are influenced by forest management practices. Provides examples of forest habitat issues in major regions of North America, illustrating that both biological and social factors must be considered in developing management strategies and programs. (3 cr) (F)

**AWER 5330 (d6330). Large River Management.** Focuses on constituencies participating in modern management of large river basins, including water developers, irrigators, municipalities, power consumers, recreationists, environmentalists, and scientists. Primary examples drawn from Colorado, Columbia, Rio Grande, and Missouri river basins. (3 cr) (F)

**\*\*\*AWER 5490 (d4490). Small Watershed Hydrology.** Detailed exploration of concepts of hydrologic processes in small, wildland watersheds. Concentrates on recent research findings concerning examining key hydrological processes. Particular attention paid to study of partitioning of water in the hydrologic cycle, sources for runoff generation, snow and snowmelt, and erosion. Features process modeling and parameter estimation techniques as related to wildland systems. Additional oral and written assignments required for graduate students. Prerequisites: Math 1210, AWER 3700. (4 cr) (F)

**AWER 5550. Freshwater Invertebrates.** Taxonomy, ecology, and biology of major freshwater invertebrate taxa, including insects, crustaceans, molluscs, and oligochaetes. Several weekend field trips and a collection required. Prerequisite: One year of general biology or zoology, or permission of instructor. Also taught as Biol 5550. (3 cr) (Sp)

**AWER 5660. Watershed and Stream Restoration.** Overview of the current theory and practice of watersheds and streams. Emphasizes field visits with restoration projects and specialists. Prerequisites: AWER/FRWS 5490/4490, AWER/Geol 5150, FRWS 5610 (or equivalent). (2 cr) (Sp)

**AWER 5670. Watersheds and Stream Restoration Practicum.** Capstone experience. Development of a restoration plan for a site, involving site planning and design. (2 cr) (Sp)

**\*AWER 5680 (d6680). Paleoclimatology.** Covers climate through the past four billion years of geologic time. Explores driving forces behind climate changes. Examines data and methods used in paleoclimate research. Includes discussion of literature and stresses local paleoclimate records. Three lectures per week, along with field trips. Prerequisite: Geol/AWER 3600 or permission of instructor. Also taught as Geol 5680/6680 and Bmet 5680/6680. (3 cr) (Sp)

**AWER 5760 (d6760). Remote Sensing: Modeling and Analysis.** Advanced techniques in the analysis of the earth's surface using remotely-sensed imagery and data in a digital format. Projects employ and/or develop research models. (3 cr) (Sp)

**AWER 5930 (6930). Geographic Information Analysis.** Techniques of geographic information systems, data structures, data input and output, and data manipulation and analysis. Prerequisites: Stat 2000; AWER 4930 or NR 3600 or instructor's permission. (4 cr) (Sp)

**\*AWER 6100 (d7100). Aquatic Production and Fish Ecology.** Reviews current literature on bacterial, algal, invertebrate, and fish production in lakes, rivers, and the sea. Analyzes physiological, behavioral, population, and community concepts of fish interactions with their environment. Prerequisite: AWER 4500 or equivalent, or instructor's permission. (3 cr) (Sp)

**\*\*AWER 6120 (d7120). Aquatic Production Biology.** Review of current literature on bacterial, algal, invertebrate, and fish production in lakes, rivers, and the sea. Particular emphasis is placed on whole-ecosystem productivity studies. (2 cr) (Sp)

**AWER 6130 (d5130). Terrestrial Ecosystem Modeling.** Introduces concepts of terrestrial ecosystem cycles, using computer modeling techniques. Includes discussions of modeling concepts, as well as in-class student projects. Prerequisites: Math 1050 and NR/Biol 2220; or permission of instructor. (3 cr) (Sp)

**AWER 6150 (d5150). Fluvial Geomorphology.** Focuses on physical processes in streams that control their shape, plan form, slope, bed material, and distribution of channel bars. Emphasizes field analysis of these topics, and application of geomorphology to aquatic ecology and environmental restoration. Prerequisite: Geol/AWER 3600. Also taught as Geol 6150/5150. (4 cr) (F)

**\*\*AWER 6160 (d5160). Hillslope and Landscape Geomorphology.** Includes basics of hillslope weathering, transport, and hydrologic processes. Surveys classic and recent literature on hillslope-scale and landscape-scale geomorphic research. Three lectures and several Saturday field trips. Prerequisite: Geol/AWER 3600. Also taught as Geol 6160/5160. (3 cr) (Sp)

**\*\*AWER 6230 (d7230). Fish Ecology.** Reviews current literature on physiological, behavioral, population, and the community ecology of fishes. Particular emphasis placed on current literature relevant to management of sport and endangered freshwater species. Prerequisite: AWER 4500 or equivalent, or instructor's permission. (2 cr) (Sp)

**AWER 6240. Graduate Internship/Co-op.** Graduate-level educational experience in internship/cooperative education position approved by department. (1-9 cr) (F,Sp,Su) ®

**AWER 6330 (d5330). Large River Management.** Focuses on the scientific basis of river management and the constituencies participating in modern management of large rivers, including water developers, irrigators, municipalities, power consumers, recreationists, environmentalists, and scientists. Primary examples drawn from Colorado, Columbia, Rio Grande, and Missouri river basins. (3 cr) (F)

**\*\*AWER 6520. Applied Hydraulics.** Basic fluid mechanics applied to wildland watershed systems and directed at nonengineering students. Explores nature of fluid state, fluid motion, and steady uniform and varied flow in open channels, under both subcritical and supercritical conditions. Surveys concepts of boundary layers, turbulence, convection, dispersal, and wave formation in unsteady flows. Emphasizes problem formulation and solving. Prerequisites: AWER 5490/4490; Math 2280 (recommended). Also taught as CEE 6520. (3 cr) (Sp)

**AWER 6530 (d4530). Water Quality and Pollution.** Reviews biological and social problems caused by point and nonpoint source water pollution; toxicology; abiotic and biotic water quality parameters; and use criteria of the Clean Water Act. Graduate-level class will require additional readings of the peer-reviewed literature and an additional class meeting to have in-depth discussions of those readings. Each graduate student will be responsible for making a presentation at the beginning of class, and leading the discussion. (3 cr) (Sp)

**AWER 6550. Assessment of Abundance and Related Parameters for Biological Populations.** Students learn to estimate population abundance and associated error bounds using mark-recapture, area-swept, declining catch, line-transect, and other techniques. Emphasizes sampling design considerations to match objectives of an assessment to appropriate/feasible level of accuracy and precision. (3 cr) (Sp)

**AWER 6600 (d4600). Principles of Surface Hydrology.** Study of physical elements of the water cycle, surface hydrological processes, and watershed responses. Explores basic hydrologic concepts and terminology, as well as collection, analysis, and presentation of hydrologic data. Includes field laboratory. Prerequisite: Soil 3000 or instructor's permission. Also taught as Soil 6600/4600. (3 cr) (Sp)

**AWER 6650 (d4650). Principles in Fishery Management.** Emphasizes management of fish populations within context of community and ecosystem dynamics. Stresses use of simulation models to assess effects of growth, recruitment, and mortality on age-structured populations. (3 cr) (Sp)

**\*AWER 6680 (d5680). Paleoclimatology.** Covers climate through the past four billion years of geologic time. Explores driving forces behind climate changes. Examines data and methods used in paleoclimate research. Includes discussion of literature and stresses local paleoclimate records. Three lectures per week, along with field trips. Prerequisite: Geol/AWER 3600 or permission of instructor. Also taught as Geol 6680/5680 and Bmet 6680/5680. (3 cr) (Sp)

**\*AWER 6750 (d7750). Advanced Conservation Biology.** Examines cases and consequences of population and species declines, including activities such as habitat fragmentation and introduction of exotic species, as well as natural causes due to genetics and demography. (3 cr) (Sp)

**AWER 6760 (d5760). Remote Sensing: Modeling and Analysis.** Advanced techniques in the analysis of the earth's surface using remotely-sensed imagery and data in a digital format. Projects employ and/or develop research models. (3 cr) (Sp)

**AWER 6800 (d7800). Aquatic, Watershed, and Earth Resources Departmental Seminar.** (1 cr) (F,Sp) ®

**AWER 6820 (d7820). Stream Ecology.** Explores structure, function, and dynamics of flowing water ecosystems. Prerequisites: NR/Biol 2220 and AWER 4500. (3 cr) (F)

**AWER 6870. Ecology Seminar.** The Ecology Center schedules regular seminars throughout the school year with ecological scientists from other institutions participating. Ecology majors are required to attend a minimum of 10 such lectures. Students should register for fall semester, but attend through spring semester. Also taught as Biol 6870, EnvS 6870, and FRWS 6870. (1 cr) (F,Sp) ®

**AWER 6900. Graduate Special Topics.** Offers credit for special assignments, reading, and seminars beyond regularly scheduled courses. (1-6 cr) (F,Sp,Su) ®

**AWER 6910. Directed Study.** Offers credit for special assignments, reading, and seminars beyond regularly scheduled courses. (1-6 cr) (F,Sp,Su) ®

**AWER 6930 (5930). Geographic Information Analysis.** Techniques of geographic information systems, data structures, data input and output, and data manipulation and analysis. Prerequisites: Stat 2000; AWER 4930 or NR 3600 or instructor's permission. (4 cr) (Sp)

**AWER 6960. Graduate General Ecology.** General concepts, history, and issues in all major areas of the science of ecology including: environmental biophysics; and physiological, behavioral, evolutionary, community, ecosystem, and applied ecology in both terrestrial and aquatic environments. Also taught as Biol 6960, EnvS 6960, and FRWS 6960. (5 cr) (F)

**AWER 6970. Thesis Research.** Offers credit for field or laboratory research at master's level. (1-12 cr) (F,Sp,Su) ®

**AWER 6990. Continuing Graduate Advisement.** Offers credit for students currently enrolled in a master's program, who are not currently taking classes. Students

may be conducting research or waiting for final approval from School of Graduate Studies. (1-9 cr) (F,Sp,Su) ®

\***AWER 7100 (d6100). Aquatic Production and Fish Ecology.** Reviews current literature on bacterial, algal, invertebrate, and fish production in lakes, rivers, and the sea. Analyzes physiological, behavioral, population, and community concepts of fish interactions with their environment. Prerequisite: AWER 4500 or equivalent, or instructor's permission. (3 cr) (Sp)

\***AWER 7120 (d6120). Aquatic Production Biology.** Review of current literature on bacterial, algal, invertebrate, and fish production in lakes, rivers, and the sea. Particular emphasis is placed on whole-ecosystem productivity studies. (2 cr) (Sp)

\***AWER 7230 (d6230). Fish Ecology.** Reviews current literature on physiological, behavioral, population, and the community ecology of fishes. Particular emphasis placed on current literature relevant to management of sport and endangered freshwater species. Prerequisite: AWER 4500 or equivalent, or instructor's permission. (2 cr) (Sp)

\***AWER 7750 (d6750). Advanced Conservation Biology.** Examines cases and consequences of population and species declines, including activities such as habitat fragmentation and introduction of exotic species, as well as natural causes due to genetics and demography. (3 cr) (Sp)

**AWER 7800 (d6800). Aquatic, Watershed, and Earth Resources Departmental Seminar.** (1 cr) (F,Sp) ®

**AWER 7820 (d6820). Stream Ecology.** Explores structure, function, and dynamics of flowing water ecosystems. Prerequisites: NR/Biol 2220 and AWER 4500. (3 cr) (F)

**AWER 7900. Graduate Special Topics.** Offers credit for special assignments, reading, and seminars beyond regularly scheduled courses. (1-6 cr) (F,Sp,Su) ®

**AWER 7910. Directed Study.** Offers credit for special assignments, reading, and seminars beyond regularly scheduled courses. (1-6 cr) (F,Sp,Su) ®

**AWER 7970. Dissertation Research.** Offers credit for field or laboratory research at doctoral level. (1-12 cr) (F,Sp,Su) ®

**AWER 7990. Continuing Graduate Advisement.** Offers credit for students currently enrolled in a doctoral program, who are not currently taking classes. Students may be conducting research or waiting for final approval from School of Graduate Studies. (1-9 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

\*\*\*This course is taught alternating years. Check with department for information about when course will be taught.

## Department of

# Art

## College of Humanities, Arts and Social Sciences

**Interim Head and Graduate Program Coordinator:** Professor *John Neely*, ceramics  
Office in Fine Arts Visual 122, (435) 797-3460

**Assistant Head: Associate Professor** *Sara J. Northerner*, photography

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**WWW** <http://www.usu.edu/artdept/>

**Professors** *Craig J. Law*, photography; *Christopher T. Terry*, painting; *Adrian Van Suchtelen*, drawing; **Professors Emeritus** *Jon I. Anderson*, graphic design; *Glen L. Edwards*, illustration; **Associate Professors** *Alan Hashimoto*, graphic design; *Gregory Schulte*, drawing, painting; *Janet Shapero*, sculpture; *Thomas E. Toone*, art history; **Associate Professor Emeritus** *Marion R. Hyde*, printmaking, art education; **Assistant Professors** *Jane S. Catlin*, art education, painting; *Julie M. Johnson*, art history; *Robert Winward*, graphic design; *Koichi Yamamoto*, printmaking; **Temporary Assistant Professor** *J. Daniel Murphy*, ceramics; **Temporary Lecturer** *M. Shane Larson*, illustration

**Degrees offered:** Bachelor of Arts (BA), Bachelor of Science (BS), Bachelor of Fine Arts (BFA), Master of Arts (MA), and Master of Fine Arts (MFA) in Art

**Undergraduate emphases:** Art Education, Art History, Ceramics, Drawing, Graphic Design, Painting, Photography, Printmaking, Sculpture; **Graduate specializations:** Ceramics, Drawing, Graphic Design, Painting, Photography, Printmaking, Sculpture

## Undergraduate Programs

### Objectives

The Department of Art's primary goal is to prepare undergraduate students for careers in either teaching or the applied and fine arts. Requirements in nine different emphasis areas address the specific needs of each career. The Department of Art also serves the University community by offering courses in the University Studies program and by offering training in applied art areas for students in related degree programs.

### Departmental Admission Requirements

Entering freshmen are admitted to the Department of Art as BS candidates by meeting the Utah State University admission requirements. New freshmen admitted to USU in good standing must submit a portfolio of 10 35 mm slides of their best work or complete a series of designated drawing and design problems. Details are available from the Art Department. Entrance to the BFA program in studio art is accomplished by formal application after completion of the department's foundation courses. Students applying for this degree program should have a GPA of at least 2.75. Application to the BFA program is done by portfolio review and should be made during the spring semester in which the prerequisites will be completed. Transfer students should make application during the spring semester prior to their entrance to USU to arrange for the portfolio review of their work prior to acceptance in the department. Participation in the BA program in Art History is limited to students with at least a 2.5 GPA.

### Degrees Offered

#### Bachelor of Science Degree

The BS degree is a general art degree for the student who is not interested in specializing in one area of art. This degree requires 50 semester credits in Art courses, 30 credits in University Studies courses, and allows for 40 elective credits. A GPA of 2.5 is required for the BS degree. No grade less than C is acceptable in any art class. Art classes may be retaken for a higher grade. This degree does not fulfill the requirements for entrance into graduate schools of art.

#### Bachelor of Arts Degree

This degree is available primarily to students selecting an emphasis in Art History at USU. BA degree candidates should complete the majority of University Studies lower-division requirements, the modern language requirement, and the foundation curriculum by the end of the sophomore year. This will allow concentration in an area of specialization during the junior and senior years.

In addition, BA candidates must either complete requirements for the Art History Emphasis, as listed below, or the general art requirements as listed under the BS degree. The major professor may also prescribe other courses to serve the particular needs of different students. A minimum of 50 semester credits in art is necessary for this degree.

## Bachelor of Fine Arts Degree

The BFA is a professional art degree requiring above-average accomplishment in art. Only students demonstrating considerable promise will be accepted for this more demanding professional degree. Students interested in the BFA degree program must have a GPA of at least 2.75. Application to the BFA program must be made during the spring semester in which the art foundation courses will be completed. For most students, this will occur at the end of their sophomore year. Transfer students may make application during the spring semester prior to their entrance to USU.

A minimum 2.75 grade point **average** in the foundation and basic core and a minimum grade of *B-* in **each** emphasis class is required. Emphasis classes can be retaken for a higher grade. A minimum of 70 semester credits in Art, including 12 semester credits of Art History and 2 credits in BFA exhibition (spring semester), must be completed for the BFA degree. The standard University Studies requirements and 20 credits of electives also apply.

## Department of Art Curriculum

**Foundation Courses.** Students in the BS, BA, and BFA degree programs (except for students in the Art History emphasis) need to complete the following foundation curriculum. (Art History students should *instead* complete the BA foundation courses, which are listed in the *Art History* section.)

### Suggested Sequence:

*Freshman year—first semester:* Art 1110 (or 1140), 1120 (or 1150), 2710.

*Freshman year—second semester:* Art 1130 (or 1160), 2140, 2720.

Subsequent curriculum requirements are specific to these individual emphasis areas:

**Art Education.** The art education curriculum prepares students to teach art in the public schools. Students graduate with a Bachelor of Fine Arts (BFA) degree in art and obtain a secondary education teaching license. The BFA degree requires 70 credits in Art courses. A minimum of 45 credits must be completed in the core and broadening area: Art 1110 (or 1140), 1120 (or 1150), 1130 (or 1160), 2140, 2200, 2230, 2400, 2600, 2650, 2710, 2720, 2800 or 2810, and 6 credits in upper-division art history courses. A minimum of 25 art credits must be taken in a specialization area. The secondary education teaching license requires the following courses: Art 3000, 3300, 4000, 4300, 5500, 5600; InsT 5200; ScEd 3100, 3210, 4200, 4210, 5300; SpEd 4000.

**Art History.** For the BA degree in Art with an emphasis in Art History, 50 semester credits in the major are required, with a 2.5 grade point average required for graduation. The following foundation classes (21 semester credits) must be completed within the first four semesters: Art 2710, 2720; Hist 1040, 1050; 9 credits chosen from the following courses: Art 1100, 1110 (or 1140), 1120 (or 1150), 1130 (or 1160), Hist 3220, 3230, 4230, LAEP 2300, or Phil 3810. Advanced courses (24 semester credits) should be selected from: Art 3820, 3830, 4710, 4720, 4730, 4740, 4750, 4760, 4790, 5700, and 5710. Four semesters of one foreign language **or** two semesters each of two foreign languages are required. A minor in a related area, or specific courses chosen in consultation with the advisor, is also required.

**Ceramics.** Contemporary ceramics represents the extension and synthesis of clay sculpture and vessel traditions. Students are acquainted with the technology of ceramic materials and firing processes, while developing sound craftsmanship as a means to personal expression. Enrichment is provided through the ceramics collection of the Nora Eccles Harrison Museum, numerous ceramics exhibitions, and visiting guest artists. Juniors and seniors in the program may compete for one of the Ellen Stoddard Eccles Scholarships, an endowed scholarship fund set aside especially for undergraduate ceramics majors. Students must complete the following courses for a Ceramics emphasis: Art 2600, 2650, 3610, 3650, 3660, 4610, 4640, 4650, 4910; Chem 1010 **or** Chem 1110 and 1130; and Geol 1100 or 1150. Art 4640 and 4650 must each be taken during at least two semesters.

**Drawing.** Drawing is the two-dimensional study of form and space, as well as the exploration of drawing media, graphic elements, and visual dynamics. It is an essential discipline for all artists, as it provides the fundamental visual skills needed in their search for a personal idiom. At the same time, drawing itself is also a vehicle of creative expression, visual adventure, and self-discovery. Students must complete the following courses for a Drawing emphasis: Art 2140, 2200, 2230, 3200, 3260, 3610, 4250, 4260, 4710, 4910, and 5220. One course must be chosen from Art 3230, 3240, and 3250. Two additional upper-division art history courses are also required. The remainder of the 70 semester credits can be taken as electives.

**Graphic Design.** Graphic design is the study of visual communications and the art of presenting information. Visual elements, such as animation, photography, illustration, symbols, and type, are designed or arranged using various techniques and materials. Materials range from traditional ink, paper, and printing presses to video and the internet, using the latest computer software and hardware. Students in graphic design complete a variety of courses that involve working with symbols, trademarks, typography, layout, and all formats of print and publication design. Illustration, digital imaging, motion graphics, animation, and interactive media are also part of the graphic design curriculum. Seniors may specialize in one or more of these areas of study and create a professional portfolio specific to their interests. Graphic Design emphasis students should complete the following courses: Art 2400, 2810, 3400, 3410, 3420, and 4910. A total of 18 semester credits must be taken in 4000- and 5000-level graphics courses, and 6 semester credits of 4000-level art history courses must be completed.

**Painting.** The painting curriculum emphasizes an analysis of historical approaches to painting, and the exploration of new ideas, techniques, and materials. Basic courses are designed to foster a respect for the craft of painting, and subsequent courses encourage application of the craft to expressive goals. Central to the focus of painting study at USU is the development of a personal portfolio reflecting the specific interests of the individual. Students must complete the following courses for a Painting emphasis: Art 2200, 2230, 2600, 2650, 3200, 3260, 3610, 4200, 4260, 4910, and 5200. In addition, one course must be selected from the following: Art 3230, 3240, or 3250. Also, two upper-division courses (3000 level and above) in Art History are required.

**Photography.** Found throughout all of contemporary life, photographic images shape the way we document, interpret, and direct our lives. As an art form, photography constantly reinvents our concept of beauty, reality, and culture. Within the program in photography, students learn the aesthetic and technical skills of the medium. The fundamentals of craft and the “hands on” application of knowledge at each level will enable the student to pursue a variety of photographic professions. Requirements for the Photography emphasis include: Art 2140, 2810, 3810, 3820, 3830, 4810, 4820, 4830, 4910, 5810, 5820, 5830, and 5840.

**Printmaking.** Students in the printmaking emphasis have the opportunity to explore all aspects of traditional and contemporary printmaking. After an introduction to the basics of intaglio, lithographic, silkscreen, and relief processes, students are encouraged to continue their development in a specific area of interest. Independent studio projects will investigate the wide field of printmaking, providing a framework for the student to become engaged in a creative pursuit involving both technical and aesthetic considerations. Requirements for the Printmaking emphasis include: Art 2230, 2810, 3230, 3240, 3250, 3260, 4250, and 4910. Also, students must choose two of the following courses: Art 4710, 4720, 4730, 4740, 4750, and 4760.

**Sculpture.** Sculpture is the three-dimensional expression of ideas. Its range extends from discrete, permanent objects to ephemeral, multi-media environments.

Students in the sculpture emphasis develop a base of knowledge in traditional approaches to the creation of form. After gaining competency in figure modeling, as well as in stone or wood carving, they explore both site-specific sculpture and sculptural installations. Intermediate and advanced students investigate specific problems involving technical, aesthetic, and conceptual considerations. They develop their own direction, based on both experience with form, materials, and techniques, and an understanding of traditional concerns and contemporary issues in the vast field encompassed today by sculpture.

The following courses are required for students in the sculpture emphasis: Art 2600, 2650, 2810, 3610, 4610, 4910, 5610, and 5620. In addition, students must complete 6 credits of 4000-level art history courses. Also, Art 3260 is recommended. Other required courses outside of the Art Department are: two Industrial Technology and Education (ITE) courses, and one design course taken through Landscape Architecture and Environmental Planning (LAEP), Theatre Arts (Thea), or Human Environments (HEnv).

## **Minor Requirements**

### **Art Minor**

The requirements for a minor in art are flexible and can be completed in most areas of specialization. Generally, the minimum requirements include Art 1110, 1120, and 1130, depending on area of specialization, plus 3 semester credits from the art history group (Art 1100, 2710, and 2720), and 12-15 credits in a specialization area. To plan a minor in Art, students should meet with an advisor.

USU does not offer an art teaching minor for secondary teachers. Students choosing to train for teaching art in secondary schools must complete the art education major listed under art specialties and must comply with all requirements listed by the Department of Secondary Education.

### **Art History Minor**

A minor in art history requires Art 2710 and 2720, plus 9 credits from the art history group.

## **Graduate Programs**

The Department of Art offers two graduate degrees and cooperates with the College of Education on another degree. The Master of Arts (MA) and the Master of Fine Arts (MFA) are offered by the Art Department. A Master of Education (MEd) with a specialization in art is offered through the College of Education.

### **Master of Arts**

Students are selected for the MA program on the basis of a portfolio demonstrating artistic individuality and a level of development beyond the need of classroom instruction.

### **Admission Requirements**

All applicants are required to have earned a bachelor's degree in the visual arts or its equivalent. During the last two years of undergraduate work, the GPA in art courses must have been at least 3.0 on a 4 point scale. MAT scores should be at or above the 40th percentile. Applicants taking the GRE should have verbal and quantitative scores at or above the 40th percentile.

### **Degree Requirements**

Candidates for the MA must complete a minimum of 30 credits, to include: (1) 21 graduate studio credits, which may be divided into two or three areas of study at the graduate level; (2) 3 credits which may be earned in classes outside the department; (3) 3 credits of art history; and (4) 3 credits of Research and Thesis. In conjunction with the thesis exhibition, the student is required to submit bound and illustrated documentation of the thesis project.

A total of 12 credits of art history, including undergraduate credits, is required for graduation, but only 3 credits earned as a matriculated graduate student at USU may be applied toward the 30-credit MA requirement. The additional 9 credits of art history may include credits earned at the undergraduate level.

A candidate must complete a minimum of two semesters in residency. Nine credits per semester is considered full-time graduate enrollment, while 12 credits are considered the maximum enrollment. A minimum of three semesters is thus required to complete the 30-credit program.

### **Master of Fine Arts**

The Master of Fine Arts degree is the terminal degree in the visual arts field. The MFA program is designed to allow students to mature to a level of professional competence in the making of art. Related studies augment a rigorous studio program. The prospective student must exhibit both academic excellence and a well-developed personal artistic vision.

## Admission Requirements

All applicants are required to have earned a BFA degree in the visual arts or its equivalent, including a minimum of 12 credits of art history. During the last two years of undergraduate work, *students must submit either MAT or GRE scores*. GPA in art courses must have been at least 3.0 on a 4-point scale. MAT scores should be at or above the 40th percentile. Applicants taking the GRE should have verbal and quantitative scores at or above the 40th percentile.

## Degree Requirements

Students must earn 60 credits, to include: (1) 43 credits of graduate-level studio art as determined by the student in consultation with his or her major professor, including a minimum of 6 credits outside of the emphasis area; (2) 6 credits of Graduate Seminar; (3) 2 credits of Graduate Interdisciplinary Critique; (4) 6 credits outside the Art Department as specified by the supervisory committee; and (5) 3 credits of Research and Thesis, which concludes with an MFA thesis exhibition and an oral defense. The MFA thesis is a visual presentation, the equivalent of a written dissertation in other disciplines. The thesis exhibition is the single most important feature of the MFA program; the culmination of at least two years, and often three or more years, of intensive study in a single discipline. In conjunction with the thesis exhibition, a student must submit bound and illustrated thesis documentation and an adequate selection of slides.

*The MFA program is a resident program; it is not possible to complete the requirements for graduation by correspondence. The program is predicated upon the assumption that students will live in the Logan Area.* Students must complete a minimum of four semesters in residency. Nine credits per semester is considered full-time graduate enrollment, while 12 credits are considered the maximum enrollment. A minimum of five semesters is thus required to complete the 60-credit program; most students require three years.

## Application Procedures

Completed applications must include: (1) completed application forms; (2) a letter of intent; (3) transcripts of all previous graduate and undergraduate work; (4) three letters of recommendation from qualified professionals; (5) GRE or MAT scores; and (6) the \$40 application fee.

These materials must be sent directly to the School of Graduate Studies. When complete, applications will be forwarded by the School of Graduate Studies to the Art Department for review.

A portfolio of twenty 35mm slides of recent work must be mailed directly to: Graduate Coordinator, Department of Art, Utah State University, 4000 Old Main Hill, Logan UT 84322-4000.

Completed applications and slide portfolios must be received by **February 1**. Students should note that applications will be considered *only* at this time, and *only* completed applications will be reviewed. Admission will *only* be considered for fall semester. The deadlines for financial aid may be earlier than the admissions deadline. For further information about financial aid, visit the Financial Aid Office in Taggart Student Center 106; write to: Financial Aid Office, Utah State University, 1800 Old Main Hill, Logan UT 84322-1800; or phone (435) 797-0173.

Applications are reviewed by the Art Department faculty. Candidates are selected primarily on the basis of their **portfolio**, which should demonstrate a level of development beyond the need of classroom instruction and encouragement. The faculty will also look in the portfolio for evidence of significant personal exploration.

Secondary to the portfolio, but important nonetheless, the applicant's **letter of intent** and **letters of recommendation** will also be given careful consideration. In reviewing these letters, the faculty will look for, among other things, indications that the applicant will be capable of prolonged and concentrated effort, guided by realistic personal goals. Letters should address both academic and artistic accomplishments, as well as potential for further growth in both of these areas.

Applicants are strongly encouraged to visit the USU campus and meet with the faculty in their proposed field of study *well in advance* of the February 1 application deadline.

**Important Note.** Please note that the graduate programs in the Art Department have limited enrollment; admission is *very* competitive. Because only a small fraction of applicants can be accommodated, there can be no guarantee that applicants who meet minimum admission requirements will be accepted into master's programs.

## Financial Assistance

Departmental support is available to graduate students on a competitive basis. Students requesting financial support should apply to the department by February 15. Other assistance is available through the University Financial Aid Office. Students should note that applications for Federal work-study should be mailed during the first week of February.

## Art Courses (Art)

**Art 1100 (BCA). Exploring Art.** Introduction to the visual arts, including the language, elements, and history of art. (3 cr) (F) ©

**Art 1110 (BCA). Drawing I.** Introduction to the visual language of drawing, the graphic elements, various drawing media, and the creative problems involved. (3 cr) (F,Sp)

**Art 1120 (BCA). Two-dimensional Design.** Study and problem solving of form, space, texture, value, and color theory. Required for art majors. (3 cr) (F,Sp)

**Art 1130. Three-dimensional Design.** Fosters development of basic understanding of three-dimensional form and space relationships. Includes three-dimensional problem solving, as well as use of a range of materials. Prerequisite: Art 1120. (3 cr) (F,Sp)

**Art 1140. Drawing I (Art Majors Only).** Development of foundation drawing skills for art majors. Introduction to fundamental drawing principles and various drawing media through creative applications. Required for art majors. Enrollment limited to art majors *only*. (3 cr) (F,Sp)

**Art 1150. Two-dimensional Design (Art Majors Only).** Foundation design course for art majors. Exploration of the elements and principles of two-dimensional design. Extensive use of a variety of media in creative problem solving. Required for art majors. Enrollment limited to art majors *only*. (3 cr) (F,Sp)

**Art 1160. Three-dimensional Design (Art Majors Only).** Foundation design course for art majors. Exploration into the principles and vocabulary of visual organi-

zation in three dimensions. Through the manipulation of a variety of materials, students gain understanding of form and space. Required for art majors. Enrollment limited to art majors *only*. (3 cr) (F,Sp)

**Art 1170. Art Theory and Analysis.** Introduces art majors to University and Art Department graduation requirements, learning resources of the University, the Career Services Office, and career opportunities in the arts. Students develop understanding of basic art theory and analysis skills. (3 cr) (F)

**Art 2140. Drawing II.** A continuation of Art 1110, with an emphasis on more complex problems and techniques. Prerequisite: Art 1110. (3 cr) (Sp)

**Art 2200. Painting I.** Introduction to visual language of painting. Focuses on organization of visual ideas and basic oil painting techniques. Provides experience in both direct and indirect painting methods, as well as introducing applied color concepts. Prerequisites: Art 1110 and 1120. (3 cr) (F)

**Art 2230. Basic Printmaking.** Introductory course to acquaint students with the broader aspects of relief, intaglio, and planographic processes. Prerequisites: Art 1110 and 1120. (3 cr) (F)

**Art 2400. Computers and Art.** Basic course dealing with the study and use of the personal computer as a creative medium. Emphasizes hands-on software training directed toward the art of visual design and aesthetic expression. Several projects created using the computer and related peripherals. Discusses various forms of digital output and communications. Critical reviews of art projects focus on the elements and principles of visual design, as well as basic graphic design concepts. Prerequisite: Approval of instructor. (3 cr) (Sp)

**Art 2600. Basic Sculpture.** Introduction to additive and subtractive processes in the realization of sculptural ideas. Student involvement in carving, clay modeling, and construction projects. Recommended: Art 1110, 1120, 1130. (3 cr) (F,Sp)

**Art 2650. Introduction to Ceramics.** Introduction to basic processes of ceramics and the operation of the USU ceramics lab. Includes handbuilding, throwing, and firing. (3 cr) (F,Sp,Su)

**Art 2710 (BHU). Survey of Western Art: Prehistoric to Medieval.** Prehistoric art through the end of the Gothic era. (3 cr) (F) ©

**Art 2720 (BHU). Survey of Western Art: Renaissance to Post-Modern.** Renaissance through modern. (3 cr) (Sp) ©

**Art 2800. Introduction to Photography.** Overview of photography. Operation of camera and related equipment, exposure and development of black and white and color positive film materials, and enlarging and printing of black and white negatives, with a strong emphasis on composition and photographic aesthetics. (3 cr) (F)

**Art 2810. Photography I.** Black and white photography, including camera operation, exposure and development, and enlarging and printing of black and white negatives, with a concern for advancing technical controls, aesthetics, and darkroom experimentation. Introduction to electronic imaging. (3 cr) (F,Sp)

**Art 2900. Introductory Internship/Coop.** Introductory level educational work experience in an internship/cooperative education position approved by the Department of Art. (3 cr) (F,Sp) ®

**Art 3000. Secondary Art Methods I.** Focuses on developing art curricula by formulating objectives for teaching art history, art appreciation, and the making of art in the secondary schools. Required for art education majors. (3 cr) (F,Sp) ®

**Art 3050. Japanese Calligraphy.** Study of Japanese writing system through practicing the art of calligraphy. No prerequisites. Also taught as Japn 3050. (1 cr) (Sp)

**Art 3110 (DHA, CI). Ancient Near East.** Survey of history and civilization of ancient Mesopotamia, Egypt, and Israel, from prehistory to 500 B.C. Writing intensive. Prerequisite: Engl 2010 or equivalent. Also taught as Hist 3110. (3 cr) (F,Sp)

**Art 3200. Painting II.** Continuation of concepts and techniques covered in Art 2200, emphasizing more complex formal and conceptual problems. Prerequisite: Art 2200. (3 cr) (Sp)

**\*Art 3210. Classical Mythology.** Introduces major myths of the Classical world. Explores how these myths serve as keys to understanding the documents and arts of Classical civilization. Also taught as Clas 3210. (3 cr) (Sp)

**Art 3230. Lithography.** Investigation of the basic processes employed in lithography, including surface preparation, basic drawing techniques, registration, processing, and printing of the stone or plate, as well as photo, transfer, and color methods. Prerequisite: Art 2230. (3 cr) (F)

**Art 3240. Intaglio.** Investigation of the basic processes employed in intaglio, including acid (line etch, aquatint, lift grounds, soft ground) and nonacid (dry point, mezzotint, engraving) techniques, as well as transfer and color methods. Prerequisite: Art 2230. (3 cr) (Sp)

**Art 3250. Relief Prints.** Introduction to relief printing, including woodcut, linoleum cut, and wood engraving. Prerequisite: Art 2230. (3 cr) (F) ®

**Art 3260. Anatomy for Artists.** Study of principles of anatomical structure of the figure as it applies to two-dimensional and three-dimensional art media. Prerequisites: Art 1110, 2140. (3 cr) (F)

**Art 3300. Clinical Experience I.** First clinical practicum (30 hours minimum) in middle and secondary schools, arranged by special methods instructors in department. Required at level I. (1 cr) (Sp) ®

**\*Art 3370. Intermediate Illustration: Concept.** Students develop ideas for illustrations. Student carries one of these ideas through the stages of roughs, a comprehensive, and a finished piece of art. Prerequisites: Art 1140 and 1150. (3 cr) (F) ®

**Art 3400. Graphic Design I.** Introductory graphic design course, dealing with concepts and principles related to the exploration of typography as an art and design element. Series of exercises designed to give students professional and philosophical look at aesthetic and functional use of type and related visual elements. Prerequisites: Art 1120, 2400. (3 cr) (F) ®

**Art 3410. Intermediate Computers and Art.** Intermediate digital imaging, motion graphics, and interactive multimedia course. Concepts and principles dealing with the art and design of digitally created still art, animation, and interactive presentations. Includes series of exercises designed to further students' understanding of the aesthetic and functional use of the computer as an art medium. Prerequisites: Art 1120, 2400, 3400. (3 cr) (Sp) ®

**Art 3420. Communication Arts Seminar.** Lecture seminars by professional guest artists in illustration and graphic design. (1 cr) (F,Sp) ®

**Art 3610. Intermediate Sculpture.** Further development in the materials, techniques, and traditions of sculpture. Expands on specific explorations, such as modeling, construction, and carving. Emphasizes strong relationship between concept and the technical execution of a sculptural form. Prerequisite: Art 2600. (3 cr) (F)

**Art 3650. Intermediate Ceramics: Handbuilding.** Application of traditional ceramic construction techniques to vessel and sculptural subjects. Prerequisite: Art 2650. (3 cr) (F) ®

**Art 3660. Intermediate Ceramics: Throwing on the Potter's Wheel.** Focuses on throwing and trimming techniques using the potter's wheel. Emphasizes production of multiples. Prerequisite: Art 2650. (3 cr) (Sp) ®

**Art 3700. Elementary Art Methods.** Focuses on developing art curricula by formulating objectives for teaching art processes, art history, and art appreciation in the elementary schools. Required preparation for a grade school teacher. (3 cr) (F,Sp) ®

**Art 3810. Photography II.** Advanced black and white photography emphasizing technical controls, including the zone system and introduction to the 4x5 camera. Application of technical skills to enhance creative photographic expression. Continuation of digital imaging and use of computer for sensitometry graphing. Prerequisite: Art 2810 or equivalent experience. (3 cr) (Sp)

**\*Art 3820. History of Early Photography.** Reviews early history of photography, beginning before the 1839 public announcement by Daguerre and continuing through the early twentieth century. Explores social change, invention, and the fulfillment of the artist's desire to represent reality. (3 cr) (Sp)

**\*\*Art 3830. History of Contemporary Photography.** Reviews history of contemporary photography, beginning with the modernist movements of the 1920s and progressing through the aesthetic, technical, and communicative changes, up to today's contemporary uses of the medium. Examines photography's relationship to the historical changes in society, through its evolution as an art form, a commercial venue, and a visual record. (3 cr) (Sp)

**Art 4000. Secondary Art Methods II.** Focuses on developing methodologies for presenting art concepts and techniques in the secondary schools. Prerequisite: Art 3000. (3 cr) (F) ®

**Art 4200. Advanced Painting Studio.** Advanced individual painting projects. Students may use a variety of painting methods to execute a series of closely related paintings that are intended to develop a focused and personal portfolio. Prerequisite: Art 2200. (3-6 cr) (F,Sp) ®

**Art 4250. Advanced Printmaking Studio.** In-depth investigation of one printmaking process with emphasis placed on both technical and aesthetic considerations. Prerequisites: Art 2230 and consent of instructor. (1-9 cr) (F,Sp) ®

**Art 4260. Life Drawing.** Drawing from live models with emphasis on exploring interpretation, techniques, and compositional approach. Prerequisite: Art 3260. (3 cr) (Sp) ®

**Art 4300. Clinical Experience II.** Second clinical practicum (30 hours minimum) in middle and secondary schools, arranged by special methods instructors in department. Required at level II. Prerequisite: Art 3300. (1 cr) (F) ®

**Art 4400. Graphic Design II.** Graphic design production and prepress. Study of concepts and techniques concerning camera-ready art for mass printing. Closely examines process of getting artwork from designer to the presses. Prerequisite: Art 3400. (3 cr) (F) ®

**Art 4410. Advanced Computers in Art I.** Advanced graphic design course dealing with motion as an art element. Studies concepts and principles related to the research and development of new ideas concerning various motion graphic techniques and ideas. Includes a series of exercises designed to give the student a professional and philosophical look at the aesthetic and functional use of animation as it relates to business and society. Prerequisites: Art 3400, 4400. (3 cr) (F) ®

**Art 4420. Advanced Graphic Design I: The Graphic Symbol.** Advanced graphic design course dealing with concepts, principles, and techniques related to symbols and their applications. Trademarks, logos, pictographs, and labels will be designed and applied to various formats such as letterheads, packages, and digital advertising. Includes a series of exercises designed to give the student a professional and philosophical look at the aesthetic and functional use of symbols as they relate to business and society. Prerequisites: Art 3400, 4400. (3 cr) (F) ®

**Art 4610. Sculpture Projects.** Develops skills in a particular sculptural methodology. Investigates genres of public sculpture, installation, and advanced modeling, from traditional to contemporary. Stresses ideas based in a broader context of social and cultural issues. Prerequisite: Art 3610. (3 cr) (Sp) ®

**Art 4640. Technology of Ceramic Art.** Selected topics in aesthetics and technology of ceramic art, including ceramic history, glaze chemistry and calculation, firing techniques, kiln design and construction, etc. Students enrolling for more than 3

credits arrange credit for directed studies in specific topics. Prerequisites: Art 3650, 3660. (3 cr) (F,Sp,Su) ®

**Art 4650. Advanced Ceramic Studio.** Provides time, equipment, and facilities for advanced students to pursue directed studies leading to personal expression through ceramic media. To be repeated during at least four semesters by art majors with ceramics emphasis. Prerequisites: Art 3650, 3660. (3-6 cr) (F,Sp,Su) ®

**Art 4710. Greek and Roman Art.** Origin and development of art and architecture of Crete, Mycenae, Greece, and the Roman world. (3 cr)

**Art 4720. Renaissance Art.** Development of European art and architecture from the thirteenth to the sixteenth century. (3 cr)

**Art 4730. Baroque and Rococo Art.** Development of painting, sculpture, and architecture in Europe from the late sixteenth through the eighteenth centuries. (3 cr)

**Art 4740. Nineteenth Century Art.** Painting and sculpture from Neoclassicism to Symbolism. Prerequisite: Art 2720. (3 cr)

**\*Art 4750. Twentieth Century Art.** History of painting, sculpture, and architecture from post-impressionists to the present. Prerequisite: Art 4710. (3 cr)

**Art 4760. American Art.** History of painting, sculpture, and architecture in America from colonial times to the present. Prerequisite: Art 2720. (3 cr) (Sp)

**Art 4790. Art History Seminar and Special Problems.** Prerequisite: Permission of instructor. (1-6 cr) (F,Sp,Su) ®

**\*\*Art 4810. Digital Photography.** Continued exploration of digital photography, from computer to studio, with strong ties to traditional image making. Digital image processing and use of both software and hardware of digital photography. Study of ethical, artistic, and personal issues. Prerequisite: Art 3810. (3 cr) (F)

**\*Art 4820. Nineteenth Century Photography Printing Processes.** Introduction to hand-made photographic emulsions invented and used in the nineteenth century. Production of gum prints, cyanotypes, photogravures, carbon prints, and platinum prints. Explores unique visual characteristics of each process. Includes basic bookbinding. Prerequisite: Art 3810. (3 cr) (F)

**Art 4830. Independent Projects in Photography.** Student-initiated, independent projects in photography. Provides opportunity for students to gain technical proficiency and aesthetic creativity. Major emphasis on critiques and group discussions. Prerequisite: Art 3810 or permission of instructor. (1-9 cr) (F,Sp,Su) ®

**Art 4900. Advanced Internship/Coop.** Internship/cooperative education work experience in art. For those students needing complexity and a more professional level of experience in the workplace. (1-9 cr) (F,Sp) ®

**Art 4910. Senior BFA Exhibition.** Professional presentation and exhibition procedures. Enrollment limited to senior standing and BFA candidates only. Required for all BFA candidates. Prerequisite: Approval of advisor. (2 cr) (Sp)

**Art 4920. Independent Projects.** Student-planned projects, executed through individual initiative and scheduled consultation with instructor. Prerequisites: Art 1110, 1120, 1130. (1-9 cr) (F,Sp,Su) ®

**Art 4930. Student Teaching at University Level.** Teaching methods and procedures for university-level classes, working directly with faculty in lower-division classes. Prerequisite: Approval of instructor. (3 cr) (F,Sp,Su)

**Art 5200. Figure Painting.** Painting from the model, with emphasis on solving problems of the planar structure of the human form. Prerequisites: Art 3200 and 3260. (3 cr) (Sp) ®

**\*\*Art 5210. Advanced Painting: Alternative Materials.** Advanced course dealing with painting methods important to modernism and postmodernism. Explores collage, assemblage, and encaustic painting. (3 cr) (Sp)

**Art 5220. Drawing Studio.** Independent study. Individually chosen drawing projects focus on central theme and specific approach. Prerequisite: Approval of major professor. (1-9 cr) (F,Sp,Su) ®

**Art 5370. Advanced Illustration.** Production of art work suitable for publication in a variety of forms. Organization of portfolio and self-promotion pieces. Painting in class and homework assignments, including comprehensives and finishes. (3 cr) (F,Sp) ®

**Art 5410. Advanced Computers in Art II.** Advanced graphic design course dealing with multimedia as an art element. Studies concepts and principles related to the research and development of new ideas concerning various computer graphic techniques. Includes series of exercises using the interaction between still imagery, animation, and sound to give the student a professional and philosophical look at the aesthetic and functional use of multimedia as it relates to business and society. Prerequisites: Art 3400, 4400. (3 cr) (F) ®

**Art 5420. Advanced Graphic Design II: Word and Image/Visual Continuity.** Advanced graphic design course dealing with concepts and principles related to exploration of word as image and ideas of visual continuity. Studies text type and layout. Various communication formats, such as magazines, books, and posters, created using various digital and traditional techniques. Gives students a professional and philosophical look at the aesthetic and functional use of type and related visual elements. Prerequisite: Art 4400. (3 cr) (Sp) ®

**Art 5430. Advanced Graphic Design Studio.** Independent research and development of advanced projects in the field of graphic design. Prerequisite: Art 5420. (1-9 cr) (F,Sp,Su) ®

**Art 5440. Advanced Computer Graphics Studio.** Independent research and development of advanced projects in the field of digital graphics. Prerequisite: Art 5420. (1-9 cr) (F,Sp,Su) ®

**Art 5500. Student Teaching Seminar.** Capstone seminar focused upon student teaching issues, professional development, and principles of effective instruction, emphasizing a reflective methodology. Prerequisites: Level 1 and Level 2 completion, and student teaching placement. (2 cr) (F,Sp)

**Art 5600. Student Teaching in Secondary Schools.** Ten-week culminating practicum in which students assume full-time teaching responsibilities under direction of cooperating teachers in major and minor fields. Prerequisites: Level 1 and Level 2 completion, and student teaching placement. (8 cr) (F,Sp)

**Art 5610. Sculpture Seminar.** Designed to focus on and challenge current assumptions in regard to contemporary issues in sculpture. Prerequisite: Art 5620. (3 cr) (F)

**Art 5620. Advanced Sculpture Studio.** Advanced directed study in specific technical, aesthetic, and/or conceptual issues in sculpture. Prerequisite: Art 4610. (1-9 cr) (Sp) ®

**Art 5700. Art History Seminar and Special Problems.** Emphasizes research and writing skills in selected art history topics. (3 cr) (F,Sp) ®

**Art 5710. Gender Issues in Art.** Discussion of major issues and debates regarding gender in the visual arts. Topics include: revising the canon, representing gender, and theories of gender and spectatorship. Readings are discussed and applied to visual works of art. (3 cr) (Sp)

**Art 5720. Sacred Art: Art of the World's Major Religions.** Designed to give students understanding of the world's seven major religions or "wisdom traditions" (Hinduism, Buddhism, Confucianism, Taoism, Judaism, Christianity, and Islam) through the history of their art. (3 cr) (Alt Sp)

**\*Art 5810. Color Photography I.** Introduction to technical, conceptual, aesthetic, and digital explorations available with exposure and development of color positive and negative films. Investigation of color theory accompanied by production of correctly balanced color prints. Prerequisite: Art 3810. (3 cr) (F)

**\*Art 5820. Color Photography II.** Continuation of study with color materials including digital investigations. Explores alternative techniques and manipulative capabilities with color processes. Stresses individual pursuit of color print portfolio. Prerequisite: Art 5810. (3 cr) (Sp)

**\*\*Art 5830. Photographic Studio.** Exploration of the photographic studio, 4x5 view camera, the principles of applied lighting, and the communication of an idea through photography. Commercial, editorial, portrait, and digital photography directed toward professional portfolio preparation. All students required to have 4X5 camera. Enrollment limited to BFA students only. Prerequisite: Art 3810. (5 cr) (F)

**\*\*Art 5840. Photographic Portfolio.** Advanced photography class in preparation for life after graduation. Strong emphasis on work toward a personal professional portfolio (fine art and commercial) and written support documentation (resumes, cover letters, artist statement, etc.). Enrollment limited to BFA students only. Prerequisite: Art 5830. (5 cr) (Sp)

**Art 6100. Graduate Drawing Studio.** Advanced individual drawing projects designed to aid in preparation for the thesis project. (3-9 cr) (F,Sp,Su) ®

**Art 6200. Graduate Painting Studio.** Emphasizes individual attainment of personal conviction or direction in painting. Prerequisite: Graduate status. (3-9 cr) (F,Sp,Su) ®

**Art 6250. Graduate Printmaking Studio.** Intensive individual production in advanced printmaking techniques. Prerequisite: Graduate status. (1-9 cr) (F,Sp,Su) ®

**Art 6370. Graduate Illustration Studio.** (Advertising, Editorial, Fashion.) Techniques in advertising illustration meeting the needs of client and his or her audience. Prerequisite: Graduate status. (3-9 cr) (F,Sp,Su) ®

**Art 6400. Graduate Graphic Design Studio.** Graphic design problems leading to understanding of major concepts in this area. Prerequisite: Graduate status. (3-9 cr) (F,Sp,Su) ®

**Art 6640. Technology of Ceramic Art.** Selected topics in aesthetics and technology of ceramic art, including ceramic history, glaze chemistry and calculation, firing techniques, kiln design and construction, etc. Prerequisite: Graduate status. (3 cr) (F,Sp,Su) ®

**Art 6650. Graduate Ceramic Studio.** Arranged to provide time, equipment, and facilities for graduate students to pursue directed studies. Tutorial format with group critiques. Prerequisite: Graduate status. (3-9 cr) (F,Sp,Su) ®

**Art 6660. Graduate Sculpture Studio.** Advanced individual problems in various media and technique. Prerequisite: Graduate status. (3-9 cr) (F,Sp,Su) ®

**Art 6710. Graduate Greek and Roman Art.** Origin and development of the art and architecture of Crete, Mycenae, Greece, and the Roman world. Prerequisite: Graduate status. (3 cr) (Sp)

**Art 6720. Graduate Renaissance Art.** Development of European art and architecture from the thirteenth to the sixteenth centuries. Prerequisite: Graduate status. (3 cr) (F)

**Art 6730. Graduate Baroque and Rococo Art.** Development of art and architecture in Europe from the sixteenth to the eighteenth centuries. Prerequisite: Graduate status. (3 cr) (Sp)

**Art 6740. Graduate Nineteenth Century Art.** Painting and sculpture from Neoclassicism to Symbolism. Prerequisites: Art 2720 or consent of instructor, graduate status. (3 cr) (F)

**Art 6750. Graduate Twentieth Century Art.** History of painting, sculpture, and architecture from the post-impressionists to the present. Prerequisite: Graduate status. (3 cr) (Sp)

**Art 6760. Graduate American Art.** History of painting, sculpture, and architecture from the post-impressionists to the present. Prerequisite: Graduate status. (3 cr) (F)

**Art 6790. Art History Seminar and Special Problems.** Prerequisite: Graduate status and consent of instructor. (1-6 cr) (F,Sp,Su) ®

**Art 6800. Graduate Photography Studio.** Designed to cover several phases of photography, with emphasis on composing what we see in an artistic manner. Allows graduate students to further emphasize their thesis project area of study. Prerequisite: Graduate status. (3-9 cr) (F,Sp,Su) ®

**Art 6900. Graduate Seminar.** Deals with general topic of professional practice, including art criticism and how contemporary work relates to current social issues. Prerequisite: Graduate status. (3 cr) (F,Sp) ®

**Art 6910. Graduate Interdisciplinary Critique.** Focuses on current work of critique participants. Brings disciplinary analysis to specific problem. Prerequisite: Graduate status. (1 cr) (F,Sp) ®

**Art 6920. Graduate Independent Projects in Art.** Advanced problems in emphasis, medium, and idiom of student's choice. Student plans project and executes it through individual initiative and scheduled consultation with the instructor. Prerequisites: Consent of instructor, graduate status. (1-9 cr) (F,Sp,Su) ®

**Art 6940. Graduate Internship/Coop.** Internship/cooperative education work experience in art. Designed to allow graduate students to receive more complex and professional workplace experience. Prerequisite: Graduate status. (1-9 cr) (F,Sp,Su) ®

**Art 6970. Research and Thesis.** Prerequisite: Candidacy status. (3 cr) (F,Sp,Su) ®

**Art 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

## Department of

# *Biological and Irrigation Engineering*

## *College of Engineering*

**Head: Professor Wynn R. Walker**, surface irrigation  
Office in Engineering Class 216, (435) 797-2785

**FAX** (435) 797-1248

**E-mail** [biesu@cc.usu.edu](mailto:biesu@cc.usu.edu)

**WWW** <http://www.engineering.usu.edu/bie>

**Professors** *Conly L. Hansen*, food engineering; *Robert W. Hill*, irrigation and water resource extension; *Christopher M. U. Neale*, remote sensing; *Richard C. Peralta*, groundwater; *Linda S. Powers*, bioprocess engineering; **Research Professor** *L. Humberto Yap-Salinas*, drainage; **Adjunct Professor** *Dani Or*, soil physics; **Professors Emeritus** *Richard E. Griffin*, irrigation extension; *George H. Hargreaves*, crop water requirements; *Jack Keller*, sprinkle and drip irrigation; *Howard B. Peterson*, water quality; *Gaylor V. Skogerboe*, waterlogging and salinity; *Glen E. Stringham*, surface irrigation; *Lyman S. Willardson*, drainage; **Associate Professors** *Gary P. Merkley*, conveyance systems; *Timothy A. Taylor*, bioprocessing; **Associate Professor Emeritus** *Edwin C. Olsen III*, international irrigation; **Research Assistant Professors** *Arnulfo González-Meza*, irrigation system transfer; *Babukannan Kasilingam*, canal hydraulics; **Research Assistant Professor Emeritus** *R. Kern Stutler*, irrigation structures; **Research Engineers** *Greg S. Crosby*, remote sensing; *German Sabillon*, surface irrigation

**Degrees offered:** Bachelor of Science (BS) in Biological Engineering; Master of Science (MS) and Doctor of Philosophy (PhD) in Biological and Agricultural Engineering, and in Irrigation Engineering

**Undergraduate options:** BS—Bioprocess; Bioenvironmental; Biomedical; and Soil and Water Resource Systems Engineering; **Graduate specializations:** MS, PhD—Agricultural Hydrology; Crop Water-Yield Analysis; Drainage; Evapotranspiration; Groundwater Management and Simulation; Irrigation Conveyance and Control Structures; Irrigation Project Planning, Design, and Operation and Management; Molecular Biology; On-Farm Water Management; Remote Sensing and Geographical Information Systems; Surface, Sprinkle, and Trickle Irrigation Methods

## *Mission*

The mission of the Department of Biological and Irrigation Engineering (BIE) is to teach students preparing to become biological engineers how to apply engineering principles and the knowledge of biological sciences to the solutions of bioresource problems. The department also prepares students for entry into other professions, such as biomedical engineering, medicine, or law.

The BIE program is designed to help students learn to manipulate biological materials for useful purposes, understand the biological literature, and be able to communicate with biological scientists. Biological engineering encompasses engineering applications in a broad range of biological systems. The biological engineering curriculum at USU emphasizes bioprocess and biomedical engineering, as well as soil and water resource systems engineering. The curriculum at both the Bachelor of Science and graduate levels is designed to prepare students for a wide variety of professional jobs related to the utilization, management, and protection of bioresources.

## *Scope and Objectives*

The objective of the Biological Engineering Program is to provide students with broad-based engineering skills necessary to

solve biological-based problems. Students first learn to integrate biological sciences with conventional studies in mathematics and chemistry. These skills are broadened with a liberal exposure to humanities and social sciences, then sharpened with the study of engineering topics which develop practical problem-solving abilities; expand a sensitivity to the economic, social, and legal dimensions of technical problems; provide an understanding of ethics and professional responsibility; and stimulate a desire for life-long learning.

## *Outcomes*

The Biological Engineering curriculum emphasizes three important outcomes:

1. The knowledge needed to identify, formulate, and perform the functions of a biological engineer.
2. The intellectual skills and creative abilities graduates should possess in order to design systems and conduct experiments in an interdisciplinary team setting, as well as the ability to use these skills in modern engineering practice.
3. The specific career-preparation competencies of ethical responsibility, effective communications, comprehension of engineering in the global context, and a commitment to life-long learning and self-improvement.

## Assessment and Evaluation

The BIE Department is committed to an assessment process aimed at evaluating the effectiveness of BIE programs in preparing graduates as productive professionals. The foundation of departmental assessment is the undergraduate accreditation by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

The accreditation activities performed every six years by the EAC/ABET provide the only formal and external review of the undergraduate program. This assessment insures that the USU program meets an overall objective and structure consistent with similar programs in the U.S. and Canada.

The biological engineering program that currently exists is the result of integrating the results of this formal assessment with the day-to-day assessments garnered from both students and faculty. To insure the overall quality of the program, the department conducts several specific assessments. These are:

1. Annual faculty survey
2. Teaching evaluations
3. Graduating student exit interviews
4. Fundamentals of Engineering Examination performances
5. Biological and Irrigation Engineering Advisory Board, involving employer responses and board reviews

## Undergraduate Programs

General biological engineering concepts include the properties of biological materials, electronics and instrumentation, computer use and programming, engineering mechanics, thermodynamics, computer-aided drafting, bio-environmental transport phenomena, and fluid mechanics.

Students gain a strong foundation in biological, chemical, and physical sciences. Each student then selects an option within the field, based on personal interest. These areas of study are tailored for each student with 24 semester credits of technical electives and one-on-one academic advisement with a member of the faculty. Design is a major theme of both the student's general coursework and specialization, with most courses including open-ended design problems. The entire design experience is brought together in a capstone design course.

The Biological Engineering Program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET).

### Requirements

**Admission and Graduation Requirements.** The student who is majoring in or planning to major in Biological Engineering needs to be aware of the College of Engineering requirements concerning admission to the college, pre-engineering, admission to the professional engineering school, general education, and other academic requirements. Additional information concerning these items is given in the College of Engineering write-up on pages 90-92. It is the responsibility of the student to be aware of these rules and regulations.

### Biological Engineering Curriculum

Biological Engineering is divided into a preprofessional and a professional program involving either a four-year or a five-year schedule that will satisfy the requirements for a BS degree in Biological Engineering. Students receiving credit from the College Level Examination Program (CLEP) or from Advanced Placement (AP) may complete a BS degree program in less than four years. The academic work, particularly in the junior and senior years, is supplemented by hands-on laboratories which are required as part of the coursework. Modification in the program to meet special needs and priorities of a student may be obtained with the approval of the department head and advisor.

**Preprofessional Program:** BIE 1880, 2330; Chem 1210, 1230, 2300, 2330; Engr 1010, 2000, 2020, 2200; Biol 1210; Engl 2010; ITE 2270; MAE 2400; Math 1210, 1220, 2250; Phyx 2200; and three credits of communication literacy.

**Professional Program:** BIE 3000, 3200, 3670, 3870, 4880, 4890; Biol 3300, 5200; CEE 3500; Chem 3700, 3710; Stat 3000; ECE 2200; Biological Engineering Electives (6-21 credits); Engineering Electives (0-15 credits); Technical Electives (0-12 credits); and University Studies (18 credits).

### Additional Information

For more information about the Bachelor of Science requirements and the sequence in which courses should be taken, see major requirement sheet, available from the Biological and Irrigation Engineering Department.

### Financial Support

Scholarships, assistantships, grants-in-aid, and work-study programs are available through the University. In addition, the department employs students to assist in engineering research and development. Cooperative education and industrial employment opportunities for students are coordinated by the University Placement Office.

### Concurrent BS/Master's Program

The concurrent BS/Master's program allows engineering students to begin taking graduate-level classes during their senior year. This permits them to complete requirements for *both* the BS degree *and* the master's degree concurrently during two years. Students in this program have a greater selection of graduate courses, since many graduate courses are taught during alternate years. In addition, the student's senior design project could be a start for a graduate design project or thesis. After completing their BS degree, students in the program can earn a master's degree in only one additional year. Both the BS and the master's degree can generally be earned with 150 total credits, although students should note that a Plan C MS requires 3 extra credits. Finally, students with a master's degree can expect a much higher starting salary following graduation. (For more information, see *College of Engineering* section of this catalog, page 92.)

## Graduate Programs

### Admission Requirements

See general admission requirements, pages 72-73. Admission committees also consider experience, undergraduate record and curriculum, and formal recommendations. A student without an undergraduate engineering background will be required to complete selected undergraduate courses prior to or concurrently with enrollment in graduate courses.

**Prerequisites for Matriculation.** Students who are admitted provisionally or who have been changed from matriculated to probationary matriculated status will have their records reviewed by a faculty committee when they have completed 12 credits of coursework (among which must be formal engineering courses) or at the end of their second semester at USU. Those students who have earned a 3.0 GPA at that time and desire to be matriculated may apply to the department to have their status changed. If they meet all other academic requirements of the School of Graduate Studies and the department, they will be matriculated and admitted to the degree program. When a student is admitted as a degree candidate, the committee may allow up to 12 credits taken while on nonmatriculated status to be transferred. Nonmatriculated students may continue to study at USU but without degree candidate status. At the end of their studies, nondegree students are granted a Certificate of Completion.

**Prerequisite Requirements.** All students must have had formal courses in engineering and computer programming, as well as at least one year of calculus. Students without this background can satisfy these requirements by taking the appropriate undergraduate courses at USU. An additional year of calculus (Math 1210, 1220, and 2250, or equivalent) is required for the MS degree in Irrigation Engineering and for all PhD programs. These background courses will not be counted toward the degree credit requirements.

### MS in Biological and Agricultural Engineering and in Irrigation Engineering

Students must have a BS from an ABET-accredited engineering program in the U.S. or its equivalent in their home countries or must take the make-up coursework required for a BS in engineering at USU. It is assumed that the bachelor's degree mathematical training includes courses in calculus, linear analysis, and differential equations.

Three MS options are available: research (Plan A), technical practice (Plan B), and training/extension (Plan C). All MS students are admitted initially into the technical practice (Plan B) option. They may subsequently transfer to one of the other two options depending upon interests and skills.

**Research Option.** Students wishing to gain experience in irrigation research may select the research option, particularly if they have a long-term goal of PhD study. The minimum requirements for this option are 30 credits, of which 8 may be awarded for the thesis.

**Technical Practice Option.** Some students wishing to study for either the biological and agricultural engineering degree or the irrigation engineering degree may not be interested in pursuing a PhD degree or in doing the research necessary for a thesis. For such students, the technical practice (Plan B) option is offered.

The requirements for the degree are similar to those for the research option, with the exception of the thesis. The 8 thesis credits are replaced by 4 credits for a significant engineering report or design project and 4 additional credits of coursework. The minimum course requirement for the technical practice option is 30 approved graduate credits.

**Training/Extension Option.** Students expecting to terminate their graduate studies at the MS level and wishing to develop an emphasis in the training and/or extension fields of biological and agricultural engineering, or irrigation engineering, may choose the training/extension option (Plan C). The same engineering BS or equivalent requirements noted under the Plan A option apply. The minimum requirements for this degree are 30 approved graduate credits. No report or thesis is required. The degree requirements under this option can be met by taking courses.

### Doctor of Philosophy

Two PhD programs are offered in the department: (1) **Biological and Agricultural Engineering**, and (2) **Irrigation Engineering**. Students who have completed an MS with a thesis (Plan A or equivalent) in an engineering discipline are eligible to apply for admission to a PhD program in either biological and agricultural engineering or irrigation engineering. Admission will be based on the students' prior academic records and, if they are graduates of USU, the recommendations of their graduate committees. It is assumed that students are adequately prepared in mathematics and engineering design courses to compete at the PhD level. If such is not the case, a program of courses to make up the deficiency will be required.

In addition to any prescribed review courses and seminars, the minimum requirements for a PhD program include 60 credits of approved graduate courses beyond a master's degree, satisfactory completion of the comprehensive examinations after completion of the formal coursework, and the writing of a dissertation based on an original research project. The degree requirements beyond a master's degree can be met by taking courses in engineering design, synthesis, and systems; mathematics; and related science.

### Research

In more than 80 years of irrigation engineering experience, USU has attained worldwide prestige through the successful professional records of its many graduates.

The department is heavily involved in overseas research and training activities concerned with managing irrigation systems, on-farm water management, and water resource development.

Research projects in several areas of irrigation and drainage engineering are currently being conducted by the department. Hence, graduate students have the opportunity to conduct research for their degree programs and obtain financial support. Current projects include hydraulics of surface irrigation, consumptive use, return flow quantity and quality of irrigation waters and application techniques, transient flow in tile drainage systems, drain envelopes, sprinkler irrigation, trickle irrigation, crop production and water requirements, salt movement, regional groundwater modeling for optimizing sustainable yield, conveyance system modeling and control, and remote sensing.

Specific research projects in the bioprocessing option include ventilation and environmental control of livestock buildings, the contribution of rural municipalities to nonpoint source pollution, and agricultural waste management.

Land application of food processing wastes, extrusion of dairy-based foods, multi-stage anaerobic digestion of biological materials, functional properties of foods, and biological detoxification of metals are some of the topics researched in food engineering.

### **Financial Assistance**

The large departmental research programs make it possible to offer graduate students financial support in the form of assistantships and traineeships. The financial support is mainly available to U.S. citizens with a small number of assistantships for others. The traineeships and assistantships are attached to research projects on the Logan campus and overseas. Traineeships carry tuition waivers and additional financial support.

### **Additional Information**

Two guides are available from the department to assist students: (1) *Report, Thesis, and Dissertation Format Guidelines and Policies*, and (2) *Policies and Procedures for Graduate Study*.

## **Biological and Irrigation Engineering Courses (BIE)**

**BIE 1880. Engineering Quantification of Biological Processes.** Introduction to engineering practice of biological modeling and quantification of biological processes. Introduction to transport of heat and mass; bioenergetics, thermodynamics, and enzyme kinetics; metabolism; mechanical work processes; and modeling of biological systems. (3 cr) (Sp)

**BIE 2330. Engineering Properties of Biological Materials.** Relationships between composition, structure, and properties of biological materials. Definition, measurement, and use of mechanical, thermal, electromagnetic, chemical, and biological properties in computation and design. Prerequisites: Biol 1210, BIE 1880, Chem 1210, 1230. (3 cr) (F)

**BIE 3000. Instrumentation for Biological Systems.** Fundamentals of measurement systems used in agricultural, biological, and environmental applications. Selection and use of sensors, data acquisition systems, and elementary controls. Prerequisite: ECE 2200. (2 cr) (Sp)

**BIE 3200. Introduction to Unit Operations in Biological Engineering.** Introduction to the fundamental unit operations required to process biological materials in bioprocessing, biomedical, and food engineering applications. Integration of biology and chemistry into biological engineering using basic concepts in heat, mass, and energy conservation and transport. Prerequisites: BIE 2330, Chem 2300. (3 cr) (Sp)

**BIE 3670. Transport Phenomena in Bio-Environmental Systems.** Core course in both biological and environmental engineering. Students develop a detailed understanding of the principles, concepts, modes, and methods of calculating heat and mass transfer. Emphasis given to contaminant and nutrient flux, along with their state

transformations, in order for the biological or environmental engineer to evaluate options for production, clean-up, and control of bio-environmental systems. Prerequisite: CEE 3500. Also taught as CEE 3670. (3 cr) (Sp)

**BIE 3870. Biological Engineering Design I.** Students select and plan a senior design project. A project proposal, including a technical description of the project and management plans, is required. (1 cr) (F,Sp,Su)

**BIE 4250. Cooperative Practice.** Planned work experience in industry or government. Detailed program must be approved prior to registration. Written report required. (3 cr) (F,Sp,Su)

**BIE 4880 (CI). Biological Engineering Design II.** Execution and completion of a comprehensive senior design project. Design reviews and written reports are required. Prerequisite: BIE 3870. (3 cr) (F,Sp,Su)

**BIE 4890 (CI). Biological Engineering Design III.** Preparation and presentation of the senior design project. The presentation will involve a professional standard report and an evaluation and critique by Biological Engineering students and faculty. Prerequisite: BIE 4880. (3 cr) (F,Sp,Su)

**BIE 4930. Special Studies.** Independent or group study of biological and irrigation engineering subjects not covered in regular course offerings. (2 cr) (F,Sp,Su) ®

**BIE 5010 (d6010).<sup>1</sup> Principles of Irrigation Engineering.** Soil-water-plant relationships; evapotranspiration and water requirements; effective water use; irrigation scheduling; infiltration; irrigation systems planning. Prerequisites: CEE 3430, 3500, Engr 2200. (3 cr) (F)

**BIE 5110 (d6110). Sprinkle and Trickle Irrigation.** Sprinkle and trickle irrigation system demand, system selection and configuration, emitter and sprinkler characteristics and sizing, uniformity and efficiency, pipe network layout and sizing, and system operation, management, and maintenance. Prerequisite: BIE 5010/6010. (4 cr) (F)

**BIE 5150 (d6150). Surface Irrigation Design.** Design and evaluation of surface irrigation systems. Field measurements for evaluating and improving uniformity and efficiency. Simulation of surface systems. Land leveling computation and equipment. Prerequisite: BIE 5010/6010. (3 cr) (Sp)

**BIE 5250 (d6250). Remote Sensing of Land Surfaces.** Basic principles of radiation and remote sensing. Techniques for ground-based measurements of reflected and emitted radiation, as well as ancillary data collection to support airborne and satellite remote sensing studies in agriculture, geography, and hydrology. Prerequisites: Basic calculus and physics. Also taught as Bmet 5250/6250 and FRWS 5250/6250. (4 cr) (Sp)

**BIE 5300 (d6300). Irrigation Conveyance and Control Systems.** Design, evaluation, and operation of irrigation distribution systems. Measurement and monitoring of flows and water levels, and canal and pipeline automation. Simulation of system hydraulics. Prerequisite: BIE 5010/6010. (3 cr) (F)

**BIE 5350 (d6350). Drainage and Water Quality Engineering.** Introduction to principles and practices of drainage. Engineering investigation and design of drains. Formation and function of wetlands caused by irrigation and drainage systems. Prerequisite: BIE 5010/6010. (3 cr) (Sp)

**BIE 5520 (d6520). Irrigation Project Operation and Maintenance.** Organizing, administering, and financing irrigation and drainage projects. Operation and maintenance of irrigation distribution systems. Simulation of command area water demands. Prerequisite: BIE 5010/6010. (3 cr) (Sp)

**BIE 5550 (d6550). Groundwater Systems Engineering I.** Groundwater exploration; well drilling and testing; pumping plant design, operation, and testing; aquifer evaluations; siting of multiple well systems. Development of pumping strategies for water supply and environmental control systems. Introduction to conjunctive use. Prerequisite: BIE 5010/6010. (3 cr) (F)

**BIE 5610 (d6610). Food and Bioprocess Engineering.** Standardization and compounding of biomaterials and food products; preservation processing using heat, refrigeration, concentration, and dehydration. Basic unit operations in the bioprocessing industry. Prerequisite: BIE 3200. Also taught as NFS 5610/6610. (3 cr) (F)

**BIE 5810 (d6810). Biochemical Engineering.** Fundamentals of bioreactor design and bioengineering. Emphasizes mathematical models of microbial and enzymatic processes in environmental and industrial biotechnology. Prerequisites: BIE 3200 and BIE/CEE 3670; *or* BIE/CEE 3670, CEE/PubH 3610, and CEE 3640. Also taught as CEE 5810/6810. (3 cr) (F)

**BIE 5830 (d6830). Management and Utilization of Biological Solids and Wastewater.** Focuses on production, management, and disposal of biosolids and wastewater generated in food processing and wastewater treatment. Emphasizes beneficial use of biosolids and wastewater for agricultural production, forest enhancement, and land reclamation. Prerequisites: BIE 3200, BIE/CEE 3670, CEE/PubH 3610, CEE 3640. Also taught as CEE 5830/6830. (3 cr) (F)

**BIE 5850 (d6850). Biomaterials Engineering.** Explores identification and modification of properties of natural and artificial biomaterials. Design of applications for by-product recovery and recycling, environmental, food processing, and biomedical industries. Commercialization of biomaterial feed stocks, biotechnology output, and bioprocessing by-products into traditional and alternative products. Prerequisites: BIE 2330, BIE/NFS 5610/6610. (3 cr) (F)

**BIE 6010 (d5010). Principles of Irrigation Engineering.** Soil-water-plant relationships; evapotranspiration and water requirements; effective water use; irrigation scheduling; infiltration; irrigation systems planning. Prerequisites: CEE 3430, 3500, Engr 2200. (3 cr) (F)

**BIE 6110 (d5110). Sprinkle and Trickle Irrigation.** Sprinkle and trickle irrigation system demand, system selection and configuration, emitter and sprinkler characteristics and sizing, uniformity and efficiency, pipe network layout and sizing, and system operation, management, and maintenance. Prerequisite: BIE 6010/5010. (4 cr) (F)

**BIE 6150 (d5150). Surface Irrigation Design.** Design and evaluation of surface irrigation systems. Field measurements for evaluating and improving uniformity and efficiency. Simulation of surface systems. Land leveling computation and equipment. Prerequisite: BIE 6010/5010. (3 cr) (Sp)

**BIE 6250 (d5250). Remote Sensing of Land Surfaces.** Basic principles of radiation and remote sensing. Techniques for ground-based measurements of reflected and emitted radiation, as well as ancillary data collection to support airborne and satellite remote sensing studies in agriculture, geography, and hydrology. Prerequisites: Basic calculus and physics. Also taught as Bmet 6250/5250 and CEE 6250/5250. (4 cr) (Sp)

**BIE 6260. Hydrology of Irrigation Agriculture.** Impacts of irrigation activities on local and regional hydrology, wetlands, and natural systems. Determination of components of field and project water balances, including evapotranspiration. Effects of water conservation practices and changes in efficiency on timing and disposition of water resources and return flows. Irrigation scheduling and use of computer models. Prerequisite: BIE 6010/5010. (3 cr)

**BIE 6300 (d5300). Irrigation Conveyance and Control Systems.** Design, evaluation, and operation of irrigation distribution systems. Measurement and monitoring of flows and water levels, and canal and pipeline automation. Simulation of system hydraulics. Prerequisite: BIE 6010/5010. (3 cr) (F)

**BIE 6350 (d5350). Drainage and Water Quality Engineering.** Introduction to principles and practices of drainage. Engineering investigation and design of drains. Formation and function of wetlands caused by irrigation and drainage systems. Prerequisite: BIE 6010/5010. (3 cr) (Sp)

**BIE 6520 (d5520). Irrigation Project Operation and Maintenance.** Organizing, administering, and financing irrigation and drainage projects. Operation and maintenance of irrigation distribution systems. Simulation of command area water demands. Prerequisite: BIE 6010/5010. (3 cr) (Sp)

**BIE 6550 (d5550). Groundwater Systems Engineering I.** Groundwater exploration; well drilling and testing; pumping plant design, operation, and testing; aquifer evaluations; siting of multiple well systems. Development of pumping strategies for water supply and environmental control systems. Introduction to conjunctive use. Prerequisite: BIE 6010/5010. (3 cr) (F)

**BIE 6610 (d5610). Food and Bioprocess Engineering.** Standardization and compounding of biomaterials and food products; preservation processing using heat, refrigeration, concentration, and dehydration. Basic unit operations in the bioprocessing industry. Prerequisite: BIE 3200. Also taught as NFS 6610/5610. (3 cr) (F)

**BIE 6800 (d7800). Research Orientation and Planning.** Promotes familiarization with departmental and graduate school rules and procedures, departmental research, and tools for writing research proposals. (2 cr) (F)

**BIE 6810 (d5810). Biochemical Engineering.** Fundamentals of bioreactor design and bioengineering. Emphasizes mathematical models of microbial and enzymatic processes in environmental and industrial biotechnology. Prerequisites: BIE 3200 and BIE/CEE 3670; *or* BIE/CEE 3670, CEE/PubH 3610, and CEE 3640. Also taught as CEE 6810/5810. (3 cr) (F)

**BIE 6830 (d5830). Management and Utilization of Biological Solids and Wastewater.** Focuses on production, management, and disposal of biosolids and wastewater generated in food processing and wastewater treatment. Emphasizes beneficial use of biosolids and wastewater for agricultural production, forest enhancement, and land reclamation. Prerequisites: BIE 3200, BIE/CEE 3670, CEE/PubH 3610, CEE 3640. Also taught as CEE 6830/5830. (3 cr) (F)

**BIE 6850 (d5850). Biomaterials Engineering.** Explores identification and modification of properties of natural and artificial biomaterials. Design of applications for by-product recovery and recycling, environmental, food processing, and biomedical industries. Commercialization of biomaterial feed stocks, biotechnology output, and bioprocessing by-products into traditional and alternative products. Prerequisites: BIE 2330, BIE/NFS 6610/5610. (3 cr) (F)

**BIE 6930. Special Problems.** Independent study of problems in biological and agricultural engineering. (1-4 cr) (F,Sp,Su) ®

**BIE 6970. Thesis Research.** Credit for MS research and report requirements. (1-8 cr) (F,Sp,Su) ®

**BIE 6990. Continuing Graduate Advisement for MS and PhD Students.** (1-3 cr) (F,Sp,Su) ®

**BIE 7350. Groundwater Systems Engineering II.** System analysis techniques applied to aquifer and stream/aquifer management. Development of economically, quantitatively, and environmentally optimal strategies for alternative water policies. Modeling techniques for managing aquifer systems under volumetric, economic, and environmental management goals. Prerequisites: CEE 5470/6470 or 6500. (4 cr) (Sp)

**BIE 7600. Advanced Research Topics.** Study of advanced biological and engineering topics. Analysis of project scale water management issues, software development, crop modeling, advanced drainage systems, remote sensing, groundwater

systems, and other topics taken from the research interests of the faculty. Prerequisite: PhD enrollment. (3 cr) (Sp)

**BIE 7800 (d6800). Research Orientation and Planning.** Promotes familiarization with departmental and graduate school rules and procedures, departmental research, and tools for writing research proposals. (2 cr) (F)

**BIE 7970. Dissertation Research.** (1-10 cr) (F,Sp,Su) ®

**BIE 7990. Continuing Graduate Advisement for PhD Students.** (1-9 cr) (F,Sp,Su) ®

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<sup>1</sup> Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

## Department of **Biology**

### College of Science

**Head: Professor Edmund D. Brodie, Jr.**, behavior and evolution  
Office in Biology-Natural Resources 121, (435) 797-2485

**Associate Head: Professor Frank J. Messina**, insect biology

**Director of Undergraduate Studies: Associate Professor Richard J. Mueller**, plant anatomy

**Director of Graduate Studies: Associate Professor John M. Stark**, microbial ecology and biogeochemistry

**FAX** (435) 797-1575

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**WWW** <http://www.biology.usu.edu/>

**Professors** Anne J. Anderson, plant pathology; Kandy D. Baumgardner, genetics; William A. Brindley, entomology and toxicology; E. W. "Ted" Evans, insect ecology; James A. Gessaman, vertebrate physiological ecology; James W. Haefner, systems analysis; Joseph K.-K. Li, virology; James A. MacMahon, community ecology; Keith A. Mott, plant physiology; William J. Pependorf, industrial hygiene; Peter C. Ruben, neurobiology; Jon Y. Takemoto, microbial physiology; Sherman V. Thomson, plant pathology; **Associate Professors** Diane G. Alston, integrated pest management; Mary E. Barkworth, plant systematics; Daryll B. DeWald, plant molecular biology; Bradley R. Kropp, ecology, genetics, and systematics of fungi; Gregory J. Podgorski, developmental biology; Kimberly A. Sullivan, behavioral ecology; Dennis L. Welker, molecular biology; Paul G. Wolf, systematics and molecular biology; **Assistant Professors** Brett A. Adams, neurobiology; Michelle A. Baker, ecology, hydrology; Timothy A. Gilbertson, neurobiology; Joseph R. Mendelson, III, vertebrate systematics; Michael E. Pfrender, evolutionary quantitative genetics; Carol D. von Dohlen, insect biology; **Professors Emeriti** Thomas L. Bahler, histology, human physiology and anatomy; Donald W. Davis, entomology and pest management; Keith L. Dixon, ornithology and mammalogy; LeGrande C. Ellis, endocrinology and reproductive physiology; B. Austin Haws, entomology and pest management; Ting H. Hsiao, insect physiology and biochemistry; Gene W. Miller, plant biochemistry and physiology; Ivan G. Palmblad, evolutionary ecology; Frederick J. Post, aquatic microbiology and microbial ecology; Reed S. Roberts, entomology; Richard J. Shaw, vascular plant taxonomy; John R. Simmons, biochemical genetics; John J. Skujins, soil biochemistry and microbial ecology; Nabil N. Youssef, cellular biology and parasitology; **Associate Professors Emeriti** David B. Drown, environmental health; Wilford J. Hansen, systematic entomology; Raymond I. Lynn, algology and microbial ecology; George W. Welkie, plant physiology and virology; **Research Professor** Donald W. Roberts, insect pathology; **Research Assistant Professors** Jordi Bosch, bee biology; Michelle A. Grilley, molecular biology; Charles D. Miller, plant pathology; Yuriy Y. Vilin, neurobiology; **Adjunct Professors** James H. Cane, bee biology; Noelle E. Cockett, biotechnology; William P. Kemp, insect ecology; J. Russell Mason, predation, ecology, and behavior; Darwin L. Sorensen, aquatic microbiology; Rex S. Spendlove, virology; **Adjunct Associate Professors** John C. Bailey, public health; Jay B. Karren, entomology; Vincent J. Tepedino, entomology; Anthony R. Torres, immunology; **Adjunct Assistant Professor** Terry Griswold, bee biology; **Clinical Assistant Professor** Daniel A. Boston, DDS, dentistry; **Principal Lecturer** David M. "Andy" Anderson, medical technology; **Lecturers** Alice Lindahl, invertebrate biology; David O. Wallace, public health, industrial hygiene

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), and Doctor of Philosophy (PhD) in Biology; BS and BA in Composite Teaching—Biological Science; BS in Public Health; MS and PhD in Ecology; MS and PhD in Toxicology is available through the Interdepartmental Program in Toxicology.

**Undergraduate emphases:** *Biology BS, BA*—Biology, Cellular/Molecular, Ecology/Biodiversity, Environmental; *Public Health BS*—Industrial Hygiene, Environmental Health, Public Health Education

## Undergraduate Programs

### Objectives

**Biology.** The Department of Biology offers programs leading to a Bachelor of Science or Bachelor of Arts degree. Majors will complete a core of courses which provide an understanding of biological principles. Upper-division courses provide integration, in-depth study, and an opportunity for specialization within the different degree emphases. Additional coursework in chemistry, physics, statistics, and mathematics provides knowledge and analytical skills in these important related fields. Most biology de-

grees provide a foundation for graduate work. Biology majors can add a minor area of study, such as business or chemistry, to enhance their employment opportunities.

**Prehealth Professions Programs.** The Department of Biology supervises premedical, pre dental, and other health professions. These programs satisfy entrance requirements for most medical and dental schools in the United States and Canada and are recognized for the high quality preprofessional preparation they provide. After four years, the student receives a BS degree in Biology or another major. **Coordinator:** Susan Haddock, BNR 101. **Advisor:** Andy Anderson, VSB 231.

**Composite Teaching—Biological Science.** This major combines content training in biology and related fields (including chemistry, physics, geology, mathematics, and statistics) with education courses. Graduates are licensed to teach at the secondary level.

**Public Health.** The Department of Biology offers preprofessional training in public health. Individuals completing the BS degree have employment opportunities in such areas as environmental health, industrial hygiene, public health education, administration, nursing, nutrition, mental health, and social work. **Advisor:** David O. Wallace, BNR 333.

The Department Head, the Director of Undergraduate Studies, and advisors in the Department of Biology are available to provide undergraduate majors with additional information regarding specific programs and career opportunities. The Biology Advising Center and the Director of Undergraduate Studies are located in BNR 101. Program requirements, advising information, and an “Ask an Advisor” e-mail service are on the Department of Biology web page at <http://www.biology.usu.edu>.

Students with majors in the Department of Biology should consult with their advisors regularly as they plan their course of study. Students have the responsibility to keep themselves aware of major requirements and course prerequisites. General requirements, specific course offerings, and the semesters that courses are taught may change.

Mathematics is an important and required skill to enhance one's success in the sciences. Proper course level placement in mathematics at the beginning of the degree program is essential. Students should consult with an advisor to determine the appropriate level to begin their mathematics studies for meeting requirements and completion of their major. For detailed information, obtain an official Major Requirement Sheet from the Biology Advising Center.

## Requirements

**University Requirements.** Students are responsible for meeting all University requirements for total credits, upper-division credits, credits of C- or better, and the University Studies Program. (See pages 53-63 in this catalog.)

**College of Science Requirements.** All college requirements are met by completing the departmental degree requirements; no additional coursework is required.

**Departmental Admission Requirements.** New freshmen admitted to USU in good standing qualify for admission to the Biology and Public Health majors. Transfer students from other institutions need a 2.25 transfer GPA, and students transferring from other USU majors need a 2.25 total GPA for admission to the Biology and Public Health majors in good standing. Admission requirements differ for the Composite Teaching—Biological Science Major, as explained below.

**Admission Requirements for the Composite Teaching—Biological Science Major.** New freshmen admitted to USU in good standing qualify for admission to this major. To qualify for admission to the Secondary Teacher Education Program (STEP), new freshmen must acquire a cumulative 2.75 GPA and 60 credits of coursework. Transfer students from other institutions or other USU majors need a cumulative 2.75 GPA and 60 credits of

coursework to be admitted to the major and the STEP. For information on additional admission criteria, students should contact the Department of Secondary Education.

**GPA Requirement.** To graduate, a candidate for any bachelor's degree offered by the Department of Biology must maintain a grade point average of 2.25 in all Department of Biology (Biol or PubH prefix) courses required for the major (Composite Teaching also requires a 2.75 cumulative GPA) and a grade of C- or better in Biol 1210 and 1220. The *Pass-Fail* option is not acceptable for any course required for the degree, but D grades are permitted within the restrictions of the 2.25 GPA. The Composite Teaching—Biological Science Major requires a cumulative overall GPA of 2.75 for admission and graduation. The 2.25 GPA requirement applies to the Biology, Public Health, and BioMath minors.

**BS Degree in Biology.** Four different emphases are available within the Biology degree. The **Biology Emphasis** is the most flexible option. Electives may be selected in any subdiscipline the student wishes to emphasize (e.g., botany, ecology, zoology, entomology, microbiology, etc.). The **Cellular/Molecular and Ecology/Biodiversity** emphases provide more directed training that is appropriate for research or other technical employment in academic institutions, government agencies, and the private sector. They also provide excellent preparation for graduate work. The **Environmental Emphasis** prepares students in the biological and physical sciences as they relate to environmental problems and concerns. This degree serves as a foundation for graduate work and provides practical training for employment at the bachelor's degree level. Emphases will be listed on transcripts to indicate the student's specialization. The course requirements are as follows:

*Biology Emphasis:* Biol 1210, 1220, 2220, 3200; Biol 3300 or 4200; Biol 5250; one of Biol 2410, 3050, 3220, 4500, 5400, 5530, 5550, 5560, or 5570; a physiology course with a lab selected from: Biol 4400 or 5300 or 5540; or Biol 5600 and 5610; 10 credits of 4000-level and above Biol prefix courses as electives. In addition, students must complete: Chem 1210, 1220, 1230, 1240, 2300, 2330, 3700, 3710; Phyx 2110 and 2120, or Phyx 2210 and 2220; Math 1210; and Stat 3000.

*Cellular/Molecular Emphasis:* Biol 1210, 1220, 2220, 3200, 4100, 4200, 5190, 5250; a physiology course with a lab selected from: Biol 4400 or 5300 or 5540; or Biol 5600 and 5610; one of Biol 5160, 5240, or 5260; nine credits of 4000-level and above Biol prefix courses as electives. In addition, students must complete: Chem 1210, 1220, 1230, 1240, 2310, 2320, 2330, 2340, 5700, 5710, 5720; Phyx 2110 and 2120, or Phyx 2210 and 2220; Math 1210; and Stat 3000.

*Ecology/Biodiversity Emphasis:* Biol 1210, 1220, 2220, 3200, 3220, 3300, 5250; a physiology course with a lab selected from: Biol 4400 or 5300 or 5540; or Biol 5600 and 5610; one of Biol 2410, 3400, or 5400; one of Biol 4500, 5530, 5550, 5560, 5570 or 5580; one of Biol 5170, 5200, or 5590; an additional course from one of the three previous groups or the following list: Biol 4100, 4410, 5280, 5310, 5350 or 5800. In addition, students must complete: Chem 1210, 1220, 1230, 1240, 2300, 2330, 3700, 3710; Phyx 2110 and 2120, or Phyx 2210 and 2220; Math 1210; Stat 3000; Soil 3000; and Geol 1150.

**Environmental Emphasis:** Biol 1210, 1220, 2220, 3200, 3220, 3300, 5250; a physiology course with a lab selected from: Biol 4400 or 5300 or 5540; or Biol 5600 and 5610; one of Biol 2410, 3400, or 5400; twelve elective credits from: Biol 4500, 5050, 5200, 5310, 5320, 5410, 5800; PubH 3610; CEE 5620; ADVS 5400; Geol 1150; Soil 3000. In addition, students must complete: Chem 1210, 1220, 1230, 1240, 2310, 2320, 2330, 2340, 3600, 3610, 3700, 3710; Phyx 2110 and 2120, or Phyx 2210 and 2220; Math 1210; and Stat 3000.

**BS Degree in Composite Teaching—Biological Science.** The Composite Teaching—Biological Science Major leads to licensure to teach in secondary schools. The course requirements are as follows: Biol 1210, 1220, 2000, 2220, 3200, 3220, 3300, 4100, 5250; a physiology course with a lab selected from: Biol 4400 or 5300 or 5540; or Biol 5600 and 5610; Geol 1150; Sci 4300; Math 1210; Stat 3000; Phyx 2110, 2120; Chem 1110, 1120, 1130. In addition, students must be accepted into the Secondary Teacher Education Program (STEP) and complete the following: InsT 5200; SpEd 4000; ScEd 3100, 3210, 3300, 3400, 4200, 4210, 4300, 4400, 5300, 5500, and 5600.

**BA Degrees in Biology and Composite Teaching—Biological Science.** The student must complete the requirements for the BS (above) plus two years of a foreign language. (See page 53 of this catalog.)

**BS Degree in Public Health.** A four-year program leading to the Bachelor of Science in Public Health is offered by the Department of Biology with options in the following areas: environmental health, industrial hygiene, and public health education. Individuals completing the environmental health option are qualified to take the Registered Sanitarian's Examination. Those completing the industrial hygiene option qualify to sit for examination by the American Board of Industrial Hygiene following one year of professional experience. The Public Health degree requires a core of biology courses similar to that required for the biology degrees; additional biology and public health courses; and chemistry, physics, mathematics, statistics, and allied science and engineering courses appropriate to each emphasis. Three different emphases are available. The course requirements are as follows:

**Industrial Hygiene Emphasis:** Biol 1210, 1220, 2000, 2220, 3300; PubH 3310, 3610, 5020, 5310, 5320, 5330, 5350, 5500; ADVS 5400; one of CEE 5730, CEE 5790, or SW 4900. In addition, students must complete: Chem 1210, 1220, 1230, 1240, 2310, 2320, 2330, 2340, 3600, 3610, 3700, 3710; Phyx 2110 and 2120, or Phyx 2210 and 2220; Math 1210, 1220; and Stat 3000.

**Public Health Education Emphasis:** Biol 1210, 1220, 2000, 2220, 3200, 3300; PubH 3120, 3610, 4000, 5000, 5010, 5020, 5500; Spch 1050; NFS 1020, 5210; Soc 3330, 3500; HEP 2000, 2500, 3000, 4000, 4400. In addition, students must complete: Chem 1120, 1210, 1220, 1230, 1240; Phyx 1200; Math 1210; and Stat 3000.

**Environmental Health Emphasis:** Biol 1210, 1220, 2000, 2220, 3200, 3300, 5050; PubH 3310, 3610, 4000, 5000, 5010, 5020, 5310, 5500; NFS 5110; one of CEE 5730, CEE 5790, or SW 4900; ten elective credits from: Biol 3050, 3220, 3400, 5550; Soil 3000; Spch 1050; ADVS 5400; and Chem 3700, 3710. In addition, students must complete: Chem 1210, 1220, 1230, 1240, 2310, 2320, 2330, 2340; Phyx 2110 and 2120, or Phyx 2210 and 2220; Math 1210; and Stat 3000.

**Biology Minor.** The Biology minor requires completion of the following: Biol 1210, 1220; and 12 credits of upper-division (3000-level and above) Biol prefix courses.

**BioMath Minor.** This minor requires mathematics and quantitative biology courses beyond those required for the basic biology degrees. It is an excellent option for students considering graduate work. Biology majors may take this minor through the Mathematics and Statistics Department. For details, contact the Biology Advising Center (BNR 101) or James Haefner (BNR 233).

**Public Health Minor.** The Public Health minor requires completion of the following: Biol 1210, 1220; and 12 credits of upper-division (3000-level and above) Public Health elective courses.

**Honors.** An Honors Plan is available for students desiring a BS or BA degree "with Honors" in Biology. Departmental Honors requires the completion of a research-based Bachelor's Thesis. For details, students should contact Richard Mueller (BNR 101).

**Field Trips.** Many biology courses require field trips. Those enrolled are expected to dress appropriately for the conditions and observe any safety precautions issued by instructors. Many courses require modest laboratory fees.

### ***Undergraduate Research— Bachelor's Thesis in Biology***

Students may do undergraduate research work under the supervision of selected faculty members. To participate and receive academic credit, a student must enroll in Biol 5800, Undergraduate Research. To complete the research project and write a thesis, a student must be enrolled in Biol 5810, Bachelor's Thesis, for 3 credits. A thesis supervisory committee must be organized, consisting of an approved biology faculty member and at least one other faculty member. The supervisory committee is subject to the approval of the Director of Undergraduate Studies. Three credits of Biol 5800 or 5810 may be applied toward elective requirements in some degree programs. Contact the Director of Undergraduate Studies, BNR 101, for assistance.

### ***Financial Support***

Scholarships, assistantships, grants-in-aid, and work-study programs are available from the University. Both the College of Science and the Department of Biology offer scholarships. Contact the College of Science office (SER 101) and the Biology Advising Center (BNR 101) for details.

## ***Graduate Programs***

### ***Admission Requirements***

See general admission requirements on pages 72-73. To be recommended for matriculated status, an applicant must have earned a bachelor's degree (or equivalent) from an accredited institution, and a Biology faculty member must have agreed to serve as major professor for that applicant. The Department of Biology also considers these guidelines for admission: (1) the transcript should show a minimum GPA of 3.0 (*B*); and (2) the scores on the verbal, quantitative, and analytical portions of the GRE should be above the 50th percentile. Advanced GREs (especially biology) are also recommended. Applicants for whom English is not the

primary language must have scored at least 575 on the TOEFL. The applicant's undergraduate program should be similar to that offered by the Department of Biology at Utah State University, which includes the following and their prerequisites: general biology, microbiology, genetics, ecology, physiology, cell biology, developmental biology, and evolution; general and organic chemistry; calculus; statistics; and physics. Other preparatory courses may be specified by the student's supervisory committee.

### ***Degree Programs***

For those who have demonstrated strong academic capability as well as research interest, the Department of Biology offers the **Master of Science Degree** and the **Doctor of Philosophy Degree** in either Biology or Ecology. Graduate degrees in **Toxicology** are available through the Interdepartmental Program in Toxicology.

Undergraduate majors in Biology at USU with especially strong backgrounds and interest in research may apply for study of the Master of Science degree as **transitional students**. Acceptance as a transitional student allows undergraduates with advanced standing to integrate up to 9 credits of graduate work into the final semesters of their Bachelor of Science study. Acceptance into this program, as into all graduate programs in Biology, is closely regulated. Formal application through the School of Graduate Studies is required.

### ***Course Requirements***

**Biology MS and PhD Degrees.** Course requirements are determined by the student's supervisory committee. They will vary depending on the research emphasis selected and the background of the student.

**Ecology MS and PhD Degrees.** For specific requirements, see the description of the Ecology Interdepartmental Program (pages 202-203).

### ***Research***

The Department of Biology provides a dynamic and broad base for research and graduate study through a balanced program of basic and applied studies at ecosystem, population, organismal, cellular, and molecular levels. An outstanding variety of field sites; animal, plant, and microbe growth facilities; and modern well-equipped laboratories are available. Also, the Intermountain Herbarium, an excellent insect collection, the USDA/ARS U.S. National Pollinating Insects Collection, a state-of-the-art electron microscope facility, a stable isotope laboratory, and the Biotechnology Center exist as research and support facilities.

Faculty members participate in and are supported by several interdepartmental programs, including the Ecology Center and the Center for Environmental Toxicology. In addition, many less formal contacts and interactions exist with colleagues in the colleges of Agriculture, Natural Resources, and Science.

Students are encouraged to carefully consider how their career goals match the faculty's research interests. Prospective students are strongly encouraged to contact faculty members with whom they are interested in working. Because of the combination of a diverse interdisciplinary base and excellent focused research programs, students have an opportunity to learn the philosophies and methods of many branches of biology.

### ***Financial Assistance***

Research assistantships are available from the grants of major professors and from Utah Agricultural Experiment Station funds. Teaching assistantships are awarded annually. All awards are made on a competitive basis and specific teaching needs are considered in awarding teaching assistantships. Given satisfactory performance, MS students are supported for at least two years and PhD candidates for at least four years on teaching assistantships. The department may also recommend particularly qualified students for College of Science or University fellowships. Admission to the graduate program of the Department of Biology does not guarantee financial support; however, applicants will not normally be admitted without financial support.

### ***Career Opportunities***

Completion of graduate degrees in Biology prepares students for careers in teaching and research in universities and colleges. Many graduates also find employment with private industry and state and national governmental agencies. Specific employment possibilities will depend on the nature of the graduate program pursued. The extensive background provided by a graduate degree also prepares students for eventual administrative responsibilities.

### ***Research Emphases***

Research areas of departmental faculty are diverse. Areas of research currently include: **Cellular and Molecular Biology:** plant-microbial interactions; molecular neurobiology and biophysics; gene regulation and signal transduction; membrane transport; molecular virology; **Ecology and Behavior:** insect ecology and behavior; pollination biology; plant-insect interactions; vertebrate behavioral ecology; mathematical and computer modeling; community and ecosystem ecology; soil microbiology; fungal ecology; biological control; integrated pest management (IPM); **Physiological and Developmental Biology:** toxicology and industrial hygiene; avian ecophysiology; insect toxicology and pathology; plant physiology, pathology, morphology, and anatomy; and **Systematics and Evolution:** systematics and evolution of plants, fungi, insects, reptiles, and amphibians; evolutionary quantitative genetics; biogeography; evolution of chemical defenses and resistance in microorganisms, insects, reptiles, and amphibians.

### ***Research and Teaching Facilities***

**Herbarium.** Graduate study in plant taxonomy offered in the Department of Biology utilizes the extensive facilities of the Intermountain Herbarium. The collection includes over 220,000 research specimens. About 50 percent are from the Intermountain Region, while most of the remainder are from North America.

**Insect Collection.** Comprising over a million specimens, the insect collection is available to scientists and graduate students involved in taxonomic research and to those requiring identification of insects in various research projects. The collection primarily covers the Intermountain Region, but it also contains species from nearly all areas of the world. The BNR Building also houses the USDA/ARS U.S. National Pollinating Insect Collection.

**Electron Microscopy Facility.** A state-of-the-art teaching and research electron microscope laboratory is located in the VSB Building. This facility has four electron microscopes, with two for

electron transmission microscopy, including a Zeiss CEM902 with electron energy loss elemental analysis capability. There are two scanning electron microscopes, including a Hitachi S4000 field emission SEM with analytical elemental analysis capability. In addition, a complete electron microscopy preparation laboratory is available.

**Laser Scanning Confocal Microscope.** The Department of Biology has a BioRad 1024 Laser Scanning Confocal Microscope. This state-of-the-art technology utilizes highly tuned lasers to give detailed sectional views of the interior of intact structures such as cells and tissues, and greatly extends the advantages of fluorescence microscopy. This microscope is utilized by researchers campuswide, and is an indispensable tool for molecular and cellular studies.

**Biotechnology Center.** The Biotechnology Center operates three service laboratories and a variety of research projects. The service laboratories provide essential biological resources for biotechnology research and development including: DNA synthesis, peptide synthesis, protein sequencing, antibodies, and fermentation.

## *Biology Courses (Biol)*

**Biol 1010 (BLS). Biology and the Citizen.** Principles and methods of biology and how they impact the daily life and environment of the individual. (3 cr) (F,Sp,Su) ©

**Biol 1020. Biological Discovery: A Lab Course.** Field and laboratory investigative exercises. Emphasizes observation, hypothesis formulation and testing, data analysis, and writing. (1 cr) (F,Sp)

**Biol 1100. Introduction to Microbiology.** Biology and the role of microorganisms in the world around us, with emphasis on their contributions to human disease. Offered only through Independent Study. No laboratory component. Not open to students with credit in Biol 1110. (3 cr) (F,Sp,Su) ©

**Biol 1110. Elementary Microbiology.** Biology and role of microorganisms in the world around us, with emphasis on their contributions to human disease. Not intended for biology majors. (4 cr) (F) ©

**Biol 1210 (BLS). Biology I.** Principles of cell biology, energetics, and genetics. Plant structure, function, and development. Three lectures and one lab. To receive Breadth Life Sciences credit, students must complete *both* Biol 1210 *and* either Biol 1220 or 3300. (4 cr) (F)

**Biol 1220 (BLS). Biology II.** Animal structure, function, and development. Principles of evolution, ecology, and behavior. Three lectures and one lab. Prerequisite: Biol 1210. (4 cr) (Sp)

**Biol 1750. Topics in Biology (Topic).** (1-3 cr) (F,Sp) ®

**Biol 2000. Human Physiology.** Functioning of the human body, with emphasis upon major organ systems. Medical and athletic examples used to illustrate important concepts. (4 cr) (F,Sp,Su) ©

**Biol 2010. Human Anatomy.** Study of the human body, with emphasis on the structure of each of the body's essential organ systems. Three lectures, one lab. (4 cr) (Sp,Su)

**Biol 2220. General Ecology.** Study of the interrelationships among organisms and their environments, addressing where and how organisms live. Adaptation, population growth, species interactions, biodiversity, and ecosystem function are explored for a wide variety of organisms and ecosystems. Prerequisites: Biol 1210 and 1220. Also taught as NR 2220. (3 cr) (F,Sp)

**Biol 2300. Mushroom Identification.** Lecture course covering taxonomy, ecology, and importance of macro and micro fungi. Also taught as FRWS 2300. (1 cr) (F)

**Biol 2310. Mushroom Identification Lab.** Lab course acquainting students with basic fungal taxonomic groups. Students collect, preserve, and identify fungi they collect. Edible fungi prepared and eaten. Also taught as FRWS 2310. (1-2 cr) (F) ®

**Biol 2700. Predental Orientation and Observation.** Introduces predental students to the dental curriculum and characteristics of the dental profession. Each student assigned to a practicing dentist for part of the course. Prerequisite: Permission of advisor. (3 cr) (F)

**Biol 3010 (DSC, CI). Evolution.** Origins and evidence for the theory of biological evolution, and its significance for society and science. Prerequisite: University Studies Breadth Life Sciences course. (3 cr) (Sp)

**Biol 3020 (DSC). Brain and Behavior.** Introduction to human brain structure and function. Perspectives on development, normal function, aging, illness, diagnosis, and treatment will range from molecular to cellular to behavioral. Prerequisite: University Studies Breadth Life Sciences course. (3 cr) (Sp)

**Biol 3030 (DSC). Genetics and Society.** Course for nonscience majors. Addresses ethical, political, and social implications of advances in genetics. Basic genetic principles, as well as contemporary issues in human genetics. Prerequisite: University Studies Breadth Life Sciences course. Not open to biology majors or to those with credit in Biol 3200. (3 cr) (F)

**Biol 3040 (DSC). Plants and Civilization.** Examines the importance of plants as food, shelter, clothing, medicine, and drugs. Social and historical role of plants in aesthetics, religion, energy, biotechnology, human exploration, and migration. Prerequisite: University Studies Breadth Life Sciences course. (3 cr) (F)

**Biol 3050 (DSC). Insect Biology.** Examines life systems and anatomy of insects. Relationship of insects to other arthropods, society, and science. Two lectures, one lab. Prerequisite: University Studies Breadth Life Sciences course. (3 cr) (F)

**Biol 3060 (DSC). Exploring Animal Behavior.** In-depth investigation into four or five current topics in animal behavior. Students will generate hypotheses, and design and complete experiments to test them in field and laboratory settings. Two lectures, one lab. Prerequisite: University Studies Breadth Life Sciences course. (3 cr) (Sp)

**Biol 3100 (CI). Bioethics.** Discussion of current controversial ethical issues in medicine, animal rights, and environmental conservation. (3 cr) (Sp)

**Biol 3200 (QI). Principles of Genetics.** Introduction to transmission, population, and molecular aspects of modern genetics. Prerequisites: Biol 1210; Math 1050; Chem 1110 or 1220. (4 cr) (F,Sp,Su)

**Biol 3220 (QI). Field Ecology.** Field trips and exercises to study ecological patterns and processes in terrestrial and aquatic habitats. Emphasis on hypothesis testing and collection and analysis of data from the field. Prerequisite: Biol 2220 (may be taken concurrently); Math 1100 or 1210. Recommended: Course in statistics. (2 cr) (F)

**Biol 3300 (BLS). General Microbiology.** Biology, ecology, and diversity of microorganisms. Emphasis placed on bacteria, viruses, fungi, and protists, and their role in the environment. Two lectures, two labs. Prerequisites: Biol 1210 (with a grade of C- or better); Chem 1120 or 2300 or 2310 (may be taken concurrently). To receive Breadth Life Sciences credit, students must complete *both* Biol 1210 *and* 3300. (4 cr) (F,Sp)

**Biol 4000. Human Dissection.** Exposure and dissection of the human body, with an emphasis on bones, joints, muscles, and internal organs. One evening lab per week. Prerequisite: Biol 2010. (1 cr) (F)

**Biol 4100. Genetics Laboratory.** Experimental approach to genetics using bacteria, fungi, plants, insects, and humans. Students will be introduced to several computer and laboratory techniques, and will design many of the experiments. Prerequisite: Biol 3200. (2 cr) (F)

**Biol 4200. Cell and Developmental Biology.** Advanced course emphasizing cellular structure and function relationships and examining regulation of tissue and organism development. Prerequisites: Biol 1220, 3200; Chem 2300 or 2320; Chem 3700 highly recommended. (4 cr) (Sp)

**Biol 4230 (QI). Applied Mathematics in Biology.** Formulation, analysis, and experimental tests of mathematical models in biology. Combines mathematics, computing, experimental design, and statistical analysis while applying the scientific method to biological systems. Lectures, recitations, and a laboratory. Prerequisites: Biol 1220 and Math 2250; or permission of instructor. Programming recommended. Also taught as Math 4230. (3 cr) (Sp)

**Biol 4250. Prehealth Internship/Co-op.** Internship/cooperative work experience in prehealth biology to allow student to gain a professional level of experience. (1-2 cr) (F,Sp,Su)

**Biol 4700. Natural History Excursion.** Eight-day trip, which may include museums, aquaria, zoos, nature parks and preserves, biological field stations and research stations, and unique habitats in the western United States. Preparatory study and a written report are required. Maximum of 2 credits may be counted toward major electives. Prerequisite: Biol 2220. (2 cr) (Sp) ®

**Biol 4710. Teaching Internship.** Advanced undergraduates function as teaching interns under supervision of faculty member. Only 1 credit may be counted toward Biology degree electives. Prerequisite: Consent of instructor. (1 cr) (F,Sp,Su) ®

**Biol 4750. Topics in Biology (Topic).** (1-3 cr) (F,Sp,Su) ®

**Biol 4760. Independent Study.** Directed individual or group study. Prerequisite: Biol 1220. Not counted as Biology degree elective. (1-3 cr) (F,Sp,Su) ®

**Biol 5050. Biophysics of Radiological Health.** Brings together sciences relating to nuclear biophysics. Prepares students to be aware of radiological hazards, to safely use radioactive materials, and to comply with relevant laws. Prerequisites: Biol 1210, 1220, Chem 1210, 1220, a physics course, and senior standing. Also taught as Phys 5050. (3 cr) (F,Sp)

**Biol 5060. Principles of Electron Microscopy.** Integrative course covering theoretical and applied principles of instruments and techniques necessary to perform biological electron microscopy. Prerequisite: Chem 1220. (3 cr) (Sp)

**Biol 5100 (d6100).<sup>1</sup> Neurobiology.** Physiology, organization, and development of nervous systems. Examples taken from vertebrate and invertebrate systems. Special emphasis placed on cellular and molecular substrates of electrical excitability. Prerequisites: Biol 5600 or 5620; Chem 1220; and Phys 2120 or 2220. (3 cr) (F)

**Biol 5150. Immunology.** Immune response in health and disease. Experimental approach to investigating immune function and abnormalities. Prerequisites: Chem 1220; Biol 3200; and Biol 3300 or 4200. (3 cr) (Sp)

**Biol 5160. Methods in Biotechnology: Cell Culture.** Techniques and fundamental knowledge for culturing mammalian and insect cells. Students will learn maintenance, growing, genetic engineering of cells, cytotoxicity, hybridoma creation, cloning, etc. Extensive laboratory experience is provided. Also taught as ADVS 5160, Chem 5160, NFS 5160, and PSB 5160. (3 cr) (Sp)

**Biol 5170 (d6170). Introduction to Population Genetics.** Examines theoretical and applied aspects of how genes behave in natural and artificial populations of plants and animals. Genetic diversity, population structure, mating systems, selection, mu-

tation, gene flow, genetic drift, molecular evolution, and quantitative genetics. Prerequisite: Biol 3200. (3 cr) (Sp)

**Biol 5190. Molecular Genetics.** Molecular aspects of genetics, including DNA replication, structure, rearrangement, transposition, recombination, repair, genetic engineering, and gene expression. Prerequisites: Biol 3200; and Chem 3700 or 5700. (3 cr) (Sp)

**Biol 5200 (QI). Modeling Biological Systems.** Basic techniques of mathematical and computer simulation applied to a wide variety of biological systems: ecology, physiology, agroecosystems, and cell biology. Model formulation, validation, sensitivity and stability analysis, stochastic systems. Prerequisites: Math 1220, Stat 3000, programming experience. (3 cr) (F)

**Biol 5240. Methods in Biotechnology: Protein Purification Techniques.** Reviews basic methods of protein purification, including scaled-up use of 100L fermenter, large-scale centrifugation, diafiltration, chromatography, and use of BioCAD. Prerequisite: Chem 3700. Also taught as ADVS 5240, Chem 5240, NFS 5240, and PSB 5240. (3 cr) (Sp)

**Biol 5250 (CI). Evolutionary Biology.** Current topics in organic evolution from molecular to macroevolutionary scales. Prerequisite: Biol 3200 or permission of instructor; Biol/NR 2220 recommended. (3 cr) (F,Sp)

**Biol 5260. Methods in Biotechnology: Molecular Cloning.** Laboratory-oriented course designed to teach molecular biology techniques such as DNA cloning, genetic probes, polymerase chain reaction, and DNA sequencing. Prerequisite: Chem 3700 or 5710; or Biol 3200; or permission of instructor. Also taught as ADVS 5260, Chem 5260, NFS 5260, and PSB 5260. (3 cr) (F)

**\*\*\*Biol 5280 (d6280). Quantitative Genetics.** Theory and practice of the genetics of quantitative (continuously-varying) traits. Emphasizes intersection of quantitative genetics with issues in evolution, ecology, and conservation biology. Prerequisites: Biol 3200, Stat 3000. (3 cr) (Sp)

**Biol 5800. Undergraduate Research.** Faculty-directed research in biology. Prerequisites: Biol 1220 and consent of instructor. Maximum of 3 credits of Biol 5800 or 5810 are acceptable toward Biology degree requirements. (1-3 cr) (F,Sp,Su) ®

**Biol 5810. Bachelor's Thesis.** Preparation of a written thesis, based upon individual investigation, under the supervision of faculty. Prerequisites: 3 credits of Biol 5800 (or concurrent enrollment) and consent of instructor. Maximum of 3 credits of Biol 5800 or 5810 are acceptable toward Biology degree elective requirements. (3 cr) (F,Sp,Su)

**Biol 6100 (d5100). Neurobiology.** Physiology, organization, and development of nervous systems. Examples taken from vertebrate and invertebrate systems. Special emphasis placed on cellular and molecular substrates of electrical excitability. For graduate (6000-level) credit, additional reading, recitation, and/or writing will be required. Prerequisites: Biol 5600 or 5620; Chem 1220; and Phys 2120 or 2220. (3 cr) (F)

**Biol 6170 (d5170). Introduction to Population Genetics.** Examines theoretical and applied aspects of how genes behave in natural and artificial populations of plants and animals. Genetic diversity, population structure, mating systems, selection, mutation, gene flow, genetic drift, molecular evolution, and quantitative genetics. For graduate (6000-level) credit, additional reading, recitation, and/or writing will be required. Prerequisite: Biol 3200. (3 cr) (Sp)

**Biol 6180. Molecular Population Genetics Laboratory.** Application of molecular techniques to population genetics, ecology, and systematics. Includes experimental and sampling design, and data analysis. Prerequisite: Biol 6170/5170 or permission of instructor. Also taught as FRWS 6180. (5 cr) (F)

**\*\*Biol 6200. Biogeochemistry of Terrestrial Ecosystems.** Inputs, outputs, and cycling patterns of major nutrients. Emphasizes mechanisms for transformations, fac-

tors influencing process rates, and the impacts of management and global change on nutrient cycles and air and water quality. Prerequisites: Biol 1220, Soil 3000, Chem 2300 or 2310, or permission of instructor. Also taught as FRWS 6200 and Soil 6200. (3 cr) (F)

**\*Biol 6210. Advanced Cell Biology.** Presents most recent advances in cell biology research. Prerequisites: Biol 3200 and 4200. (3 cr) (F)

**\*\*\*Biol 6260. Behavioral Ecology.** Focuses on current topics, emphasizing critical reading and thinking skills. Includes lectures, student presentations, and discussions of primary literature. (3 cr) (Sp)

**\*\*\*Biol 6270. Evolutionary Ecology.** Contemporary topics in evolutionary ecology with emphasis on life history evolution. Prerequisite: Biol 2220 or permission of instructor. (3 cr) (Sp)

**\*\*\*Biol 6280 (d5280). Quantitative Genetics.** Theory and practice of the genetics of quantitative (continuously-varying) traits. Emphasizes intersection of quantitative genetics with issues in evolution, ecology, and conservation biology. For graduate (6000-level) credit, additional reading, recitation, and/or writing will be required. Prerequisites: Biol 3200, Stat 3000. (3 cr) (Sp)

**Biol 6290. Biophysics Radioisotope Tracer Methodology.** Training for users of radioactive material. Instructor provides guidance and study at each student's lab on an individual basis. Prerequisites: Biol/Phys 5050 and senior or graduate standing. (1-3 cr) (F,Sp)

**Biol 6750. Topics in Biology (Topic).** (1-3 cr) (F,Sp,Su) ⑥

**Biol 6800. Biology Seminar.** Format for general graduate-level seminar topics. (1 cr) (F,Sp,Su) ⑥

**Biol 6810. Microbiology Seminar.** (1 cr) (F,Sp,Su) ⑥

**Biol 6820. Plant Biology/Pathology Seminar.** (1 cr) (F,Sp,Su) ⑥

**Biol 6830. Entomology Seminar.** (1 cr) (F,Sp,Su) ⑥

**Biol 6840. Zoology Seminar.** (1 cr) (F,Sp,Su) ⑥

**Biol 6870. Ecology Seminar.** The Ecology Center schedules regular seminars throughout the school year with ecological scientists from other institutions participating. Ecology majors are required to attend a minimum of 10 such lectures. Students should register for fall semester, but attend through spring semester. Also taught as AWER 6870, EnvS 6870, and FRWS 6870. (1 cr) (F) ⑥

**Biol 6890. Molecular Biology Seminar.** (1 cr) (F,Sp,Su) ⑥

**Biol 6910. Special Problems.** Individual or group study under faculty guidance. Prerequisite: Permission of instructor. (1-3 cr) (F,Sp,Su) ⑥

**Biol 6960. Graduate General Ecology.** General concepts, history, and issues in all major areas of the science of ecology including: environmental biophysics; and physiological, behavioral, evolutionary, community, ecosystem, and applied ecology in both terrestrial and aquatic environments. Also taught as AWER 6960, EnvS 6960, and FRWS 6960. (5 cr) (F)

**Biol 6970. Thesis Research.** (1-12 cr) (F,Sp,Su) ⑥

**Biol 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ⑥

**Biol 7750. Topics in Biology.** (1-3 cr) (F,Sp,Su)

**Biol 7970. Dissertation Research.** (1-12 cr) (F,Sp,Su) ⑥

**Biol 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ⑥

## Botany Courses (Biol)

**Biol 2410. Field Botany.** Introduction to identification of macrofungi and green plants. Quantitative methods for describing populations and communities. Prerequisite: Biol 1210. (2 cr) (Su)

**Biol 3400. Plant Taxonomy.** Identification of vascular plant species and recognition of families common in northern Utah. Introduction to principles and practices of plant taxonomy. Prerequisite: Biol 1210. (3 cr) (Sp)

**Biol 4400 (QI). Plant Physiology.** Introduction to plant metabolism, water relations, and growth. Prerequisites: Biol 1220, Math 1050. (4 cr) (F)

**Biol 4410. Plant Structure.** Morphology, anatomy, and development of seed plants, with an emphasis on angiosperms. Two lectures, one recitation, and one lab. Prerequisites: Biol 1210, 1220. (3 cr) (Sp)

**\*\*\*Biol 5400. Advanced Plant Taxonomy.** Survey of vascular plant diversity presented in a phylogenetic and biogeographic context. Introduction to morphologically oriented research in plant taxonomy. Prerequisites: Biol 3400 and Stat 3000. (4 cr) (F)

**Biol 5410. Introduction to Plant Pathology.** Combined lecture-lab course emphasizing concepts in plant pathology. Symptoms and disease-causing organisms are described. Methods of control, the nature of epidemics, and disease prediction. Prerequisites: Biol 1210, 1220; Biol 3300 recommended. (4 cr) (F)

**Biol 5420 (CI). Forest Pathology.** Nature, cause, and management of forest diseases. Also taught as FRWS 5420. (2 cr) (Sp)

**\*\*\*Biol 5440 (d6440). Plant Molecular, Cellular, and Developmental Biology I.** Examines background and recent advances. Students analyze and discuss structure, genome, molecular, development, and photosynthesis topics from a research perspective. Prerequisites: Biol 3200, 4200; Chem 3700 or 5710. Also taught as PISc 5440/6440. (3 cr) (Sp)

**\*\*\*Biol 5450 (d6450). Plant Molecular, Cellular, and Developmental Biology II.** Examines background and recent advances. Students analyze and discuss cell wall, growth regulator, and environmental response topics from a research perspective. Prerequisites: Biol 3200, 4200; Chem 3700 or 5710. Also taught as PISc 5450/6450. (3 cr) (Sp)

**\*\*\*Biol 6440 (d5440). Plant Molecular, Cellular, and Developmental Biology I.** Examines background and recent advances. Students analyze and discuss structure, genome, molecular, development, and photosynthesis topics from a research perspective. For graduate (6000-level) credit, additional reading, recitation, and/or writing will be required. Prerequisites: Biol 3200, 4200; Chem 3700 or 5710. Also taught as PISc 6440/5440. (3 cr) (Sp)

**\*\*\*Biol 6450 (d5450). Plant Molecular, Cellular, and Developmental Biology II.** Examines background and recent advances. Students analyze and discuss cell wall, growth regulator, and environmental response topics from research perspective. For graduate (6000-level) credit, additional reading, recitation, and/or writing will be required. Prerequisites: Biol 3200, 4200, Chem 3700 or 5710. Also taught as PISc 6450/5450. (3 cr) (Sp)

## Microbiology Courses (Biol)

**Biol 5300 (QI). Microbial Physiology.** Lectures, discussions, and laboratory investigations concerning the physiology, structure, and metabolism of prokaryotic and eukaryotic microbes. Prerequisites: Biol 3300, Math 1210. (4 cr) (Sp)

**\*Biol 5310. Soil Microbiology.** Ecology and diversity of microorganisms in soils. Emphasis on factors controlling microbial activity and the role of microorganisms in organic matter decomposition and nutrient cycling. Prerequisites: Biol 1210, 1220; Chem 2300 or 2310; Soil 3000. Also taught as Soil 5310. (3 cr) (F)

**\*Biol 5320. Soil Microbiology Laboratory.** Techniques for measuring microbial activity and diversity in soils. Includes use of molecular and isotope methods. Prerequisite: Concurrent or prior enrollment in Biol/Soil 5310. Also taught as Soil 5320. (2 cr) (F)

**Biol 5330. Virology.** Structure, replication, genetics, and molecular biology of viruses. Virus-host interactions. Viral diseases and antiviral agents. Prerequisites: Biol 3200 and 3300. (3 cr) (Sp)

**Biol 5340. Virology Laboratory.** Introduction to laboratory techniques using bacterial and animal viruses. Prerequisite: Biol 5330 (may be taken concurrently). (2 cr) (Sp)

**\*Biol 5350. Mycology.** Classification, ecology, genetics, and physiology of the fungi. Two lectures and one lab. Prerequisite: Biol 1220. (3 cr) (Sp)

## Public Health Courses (PubH)

**PubH 3120. Family and Community Health.** Focuses on health aspects of various population groups within the community. Particular emphasis placed on guidelines for optimal family health. (3 cr) (Sp)

**PubH 3310. Occupational Health and Safety.** Covers the principles of occupational health and safety, including regulatory standards. Emphasizes on-the-job health and safety problems from the occupational health and safety professional and management view. Prerequisite: Chem 1220. (3 cr) (F)

**PubH 3610. Environmental Management.** Introduction to environmental health, emphasizing relationships among environmental quality, public health, environmental and occupational health regulations, human health risk assessment, institutions, and engineered systems in environmental health management. Prerequisites: Chem 1210; Biol 1210 or University Studies Breadth Life Sciences course. Also taught as CEE 3610. (3 cr) (F)

**PubH 4000. Public Health Field Experience.** Field experience in the practice of public health, as appropriate to each student's area of public health emphasis: public health education, environmental health, or industrial hygiene. Prerequisite: Junior standing in public health. (3-6 cr) (F,Sp,Su) ®

**PubH 4010. Special Problems in Public Health.** Utilization of principles, tools, and techniques of public health in problem solving. Prerequisite: Junior standing in public health. (1-3 cr) (F,Sp,Su) ®

**PubH 5000. Public Health Seminar.** Participant seminar on current problems in public health. (1 cr) (F,Sp) ®

**PubH 5010. Communicable Disease Control.** Comprehensive study of communicable diseases, including etiological agents, reservoirs of infection, and mechanisms of transmission, control, and prevention. (3 cr) (F) ©

**PubH 5020. Fundamentals of Epidemiology.** Introduction to the study of the distribution and causes of communicable and noncommunicable diseases of humans and other animals. Prerequisites: A course in statistics and PubH 5010. (3 cr) (Sp) ©

**PubH 5300. Industrial Hygiene Seminar.** Participant seminar on current developments in industrial hygiene. (1 cr) (F,Sp) ®

**PubH 5310. Industrial Hygiene Chemical and Physical Hazards.** Covers anticipation and recognition of chemical health hazards at work, personal protective equipment, and all aspects of physical health hazards, especially occupational noise. Prerequisite: PubH 3310 (may be taken concurrently). (4 cr) (F)

**PubH 5320. Industrial Hygiene Chemical Hazard Evaluation.** Survey of principles and methods used to evaluate industrial chemical health hazards. Practical application in a field sampling project. Prerequisite: PubH 3310. (3 cr) (Sp)

**PubH 5330 (QI). Industrial Hygiene Chemical Hazard Control.** Covers methods to control chemical occupational health hazards, with an emphasis on the function, design, and management of local exhaust ventilation. Prerequisites: PubH 3310, Math 1210. (3 cr) (F)

**PubH 5350. Industrial Hygiene Field Experience.** Field experience in the practice of industrial hygiene. Participation in an active program serving employees in either the private or public sector. Prerequisites: PubH 5310 and 5320. (3-6 cr) (F,Sp,Su) ®

**PubH 5500 (CI). Public Health Management.** Presentation of basic organizational and financial management tools, which students will utilize in written and oral reports on an educational, environmental, or occupational health problem of their choice. Prerequisite: Senior status in public health or consent of instructor. (2 cr) (Sp)

## Zoology Courses (Biol)

**Biol 4500. Applied Entomology.** Fundamentals of insect biology, emphasizing species of economic importance. Principles and tactics of pest management. Laboratory includes survey of beneficial and harmful insects affecting humans and agriculture. Prerequisites: Biol 1210 and 1220. (3 cr) (Sp)

**Biol 5530. Insect Systematics and Evolution.** Evolution, biology, and classification of insects, including basic external morphology. Emphasizes role of phylogeny in systematics and importance of systematics in comparative biology. Prerequisite: Biol 1220. (3 cr) (F)

**Biol 5540 (QI). Invertebrate Physiology.** Physiology of invertebrates relative to structure, function, ecological strategies, and evolutionary trajectories. Laboratory investigations exploiting invertebrate diversity. Prerequisites: Biol 1220; Math 1210. (4 cr) (Sp)

**Biol 5550. Freshwater Invertebrates.** Taxonomy, ecology, and biology of major freshwater invertebrate taxa, including insects, crustaceans, molluscs, and oligochaetes. Several weekend field trips and a collection required. Prerequisite: One year of general biology or zoology, or permission of instructor. Also taught as AWER 5550. (3 cr) (Sp)

**\*\*\*Biol 5560. Ornithology.** Surveys evolution, systematics, physiology, anatomy, ecology, behavior, and identification of birds. Includes lectures, laboratory and field exercises, field trips, and an independent project. Attendance required at one Saturday and one Friday-Sunday field trip. Prerequisites: Biol 1210, 1220; Math 1050. (3 cr) (Sp)

**Biol 5570. Herpetology.** Evolution, adaptations, distribution, natural history, behavior, and identification of amphibians and reptiles of the world, with special emphasis on North American species. Two lectures and one lab. Prerequisite: Biol 1220. (3 cr) (Sp)

**Biol 5580. Mammalogy.** Evolution, adaptations, distribution, natural history, behavior, and identification of mammals of the world, with special emphasis on North American species. Two lectures and one lab. Prerequisite: Biol 1220. (3 cr) (F)

**Biol 5590 (d6590). Animal Community Ecology.** Concepts and controversies in modern community ecology emphasizing aquatic and terrestrial animals. Covers the community concept, diversity and stability, null models, relative importance of competition and predation, food webs, disturbance, metapopulations, biogeography, and new directions. Prerequisites: Biol 2220, Stat 3000. (4 cr) (Sp)

**Biol 5600. Comparative Animal Physiology.** General principles and mechanisms of gas exchange, circulation, locomotion, nutrition, and neurological and endocrine function in vertebrate and invertebrate animals. Prerequisites: Biol 1220, Chem 1220. (3 cr) (F)

**Biol 5610 (QI). Comparative Animal Physiology Laboratory.** Laboratory exercises designed to explore principles of animal physiology, using computer simulations, tissue models, and animal preparations. Emphasis placed on hypothesis design and data interpretation. Prerequisite: Biol 5600 (may be taken concurrently). (2 cr) (F)

**Biol 5620. Medical Physiology.** Cardiovascular, respiratory, endocrine, gastrointestinal, excretory, and nervous system function in the mammalian body. Emphasis on molecular mechanisms. Examples from mammalian diseases used to illustrate key concepts. Prerequisites: Biol 1220, 2000, or 5600; Chem 3700 or 5710 (may be taken concurrently). (3 cr) (Sp)

**\*\*Biol 6510. Insect-Plant Interactions.** Ecology, evolution, and physiology of the interactions between insects and plants, including herbivory, defenses/compensations of plants to insect attack, pollination, and other mutualisms. (2 cr) (F)

**\*\*\*Biol 6520. Ecological Vertebrate Physiology.** Physiological responses and adaptations of vertebrates to physical, chemical, and biological environments.

Bioenergetics at the species level. Three lectures. Prerequisites: One course in physiology and one course in ecology. (3 cr) (F)

**Biol 6590 (d5590). Animal Community Ecology.** Concepts and controversies in modern community ecology emphasizing aquatic and terrestrial animals. Covers the community concept, diversity and stability, null models, relative importance of competition and predation, food webs, disturbance, metapopulations, biogeography, and new directions. For graduate (6000-level) credit, additional reading, recitation, and/or writing will be required. Prerequisites: Biol 2220, Stat 3000. (4 cr) (Sp)

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

\*\*\*This course is taught alternating years. Check with department for information about when course will be taught.

# Department of *Business Administration*

## *College of Business*

**Interim Head: Associate Professor Alan A. Stephens**, corporate finance and investments  
Office in Business 811, (435) 797-2362

**Associate Dean for Business Graduate Studies: Professor C. R. Michael Parent**, marketing research and strategy  
**Assistant Director of Master of Business Administration Program: Chalon Keller**  
Office in Business 302, (435) 797-2360

**FAX** (435) 797-2634

**E-mail** busadm@b202.usu.edu

**WWW** <http://www.bus.usu.edu/ba/>

**Professors** *Drew Dahl*, financial institutions and international finance; *Peter M. Ellis*, production and operations research; *J. Robert Malko*, corporate and energy utility finance; *Philip R. Swensen*, corporate finance, investments, and managerial economics; **Professors Emeritus** *Allen D. Kartchner*, production and operations research; *Paul A. Randle*, corporate finance and valuation analysis; **Associate Professors** *J. Brian Atwater*, “theory of constraints,” quality management, lean manufacturing; *Kenneth R. Bartkus*, promotion management; *Cathy L. Hartman*, consumer behavior and environmental sustainability; *Vijay R. Kannan*, supply chain and quality management, cellular manufacturing; *Edwin R. Stafford*, marketing management, strategy, environmental sustainability; **Instructor** *Stacey B. Hills*, marketing research, strategy, and product management; **Senior Lecturer** *Madeline S. Thimmes*, production and corporate finance

**Degrees offered:** Bachelor of Science (BS) and Bachelor of Arts (BA) in Business Administration, Finance, Marketing, and Production Management. The Department of Business Administration participates in the College of Business MBA (Master of Business Administration) degree (see pages 160-161).

## *Undergraduate Programs*

### *Objectives*

The Department of Business Administration offers programs to prepare men and women for administrative position in business, government, and other institutions. Specialized training is provided within specific functional fields for business, as well as training directed at understanding the broader aspect of business as it functions within our free enterprise environment. Training is specifically provided in three areas: (1) **Finance**, leading to careers in banking, brokerage activities and investment, and positions as financial analysts in industry; (2) **Marketing**, involving positions in sales, advertising, retailing, distribution, and other similar activities; and (3) **Production Management**, leading to careers in manufacturing, including supply-chain management, production planning, quality management and project management.

### *College of Business Requirements*

All students with majors in the Business Administration Department must satisfy the College of Business requirements, provided on pages 83-84. Academic advising about these requirements is available in the College of Business Student Service Center, Business 308.

### *Majors*

**Departmental Core.** For all majors within the Department of Business Administration, students must complete the following courses: BA 3400, 3500, 3700; Econ 3400; MHR 3110, and MHR 4880 or 4890. In addition, students must complete at least

one-half credit of BA 3250. Students may take 3000-level courses before completing the College of Business prespecialization core; however, students will be restricted from enrolling in 4000-level courses until they have completed the prespecialization core and received advanced standing. See pages 83-84 for details.

**Finance Major.** Finance deals with planning the use of money, whether it is for the purchase of investment products, capital acquisitions, or for the day-to-day financial needs of a firm. In addition to completing the departmental core, students majoring in finance must take BA 4450, 4460; Econ 4010, 4020; and three finance electives. Students must choose two of the following: BA 4300, 4410, 4420, 4430. The third elective may be selected from the required finance electives or from BA 3080; Acct 3310, 3410; PFP 5060, 5070, 5080; Econ 4030, 5030, 5330, 5600.

**Marketing Major.** Modern marketing consists of a system of activities designed to help the marketer understand and influence buyer and seller behavior. Within the socio-economic and political environment, the marketer must plan, price, promote, and distribute want-satisfying goods and services to society. The following courses, designed to prepare students in all areas of marketing, must be taken in addition to the departmental core: BA 4510, 4530, 4540, 4550, 4590. Because of prerequisite requirements, some of these courses will need to be taken during the junior year.

**Production Management Major.** Production management involves the planning, directing, and controlling of activities related to the production of goods and services. Required courses include: BA 3080, 4720, 4750, 4790, 5730, and two production electives. Production electives include: Acct 3310; BIS 3100; Econ 4010, 5670; MHR 3710, 4630.

**Business Administration Major.** A major in business administration is available for those students who have a special career objective that does not fit the other majors. A written proposal is designed by the student and submitted to the department head for approval. This proposal will include a written justification and a list of courses totaling at least 21 credits. For instructions, students should contact the departmental advisor.

### *Minors*

The Department of Business Administration offers three minors. A grade point average of 2.50 in the five or six courses of a minor is required. Many of the courses listed under each minor have prerequisites.

**Marketing Minor.** Acct 2010; MHR 3110; BA 3500, 4510, 4550; and either BA 4530 or 4540.

**Finance Minor.** BA 3400, 3500, 4450, 4460; and one of the following: BA 4300, 4410, 4420, 4430.

**Production Minor.** BA 3500, 3700, 4720; and two of the following: BA 3080, 4750, 4790, 5730.

**Other Minors.** The College of Business sponsors two minors, a general business minor and an international business minor. Information on these minors can be obtained from the College of Business Student Service Center, Business 308.

### *Other Degree Options*

**Dual Majors.** Dual majors are available in accounting, human resources, management, business information systems, and economics. See the applicable department for information.

**Second Bachelor's Degrees.** Second bachelor's degrees are available for all four majors. For information, contact the College of Business Student Service Center, Business 308.

### *Additional Information*

Advising sheets for majors, minors, second bachelor's degrees, and the Business Administration major are available from the Department of Business Administration, Business 815, and from the College of Business Student Service Center, Business 308.

## *Graduate Programs*

For information about the **Interdepartmental Curriculum for the Master of Business Administration (MBA)**, see pages 160-161. Master's degrees are also offered by the following departments in the College of Business: Accountancy, Business Information Systems, and Economics. A Human Resources Management specialization is available in the interdepartmental Master of Social Sciences (MSS). For further information, refer to the appropriate sections of this catalog.

## *Business Administration Courses (BA)*

**BA 1000. Business Orientation.** Orients freshmen and transfer students to College of Business programs, academic and student services, professional organizations, and career possibilities. Also taught as Acct 1000, BIS 1000, Econ 1000, and MHR 1000. (0.5 cr) (F,Sp)

**BA 1350. Introduction to Business.** Investigation of the role of business in contemporary society, including an introduction to the general problems of business operation. (3 cr) (F) ©

**BA 2250. Introductory Internship.** Introductory-level experience in a career-related position approved by the Cooperative Education Office. One credit for every 75 hours of internship experience, with a maximum of 9 credits. A maximum of 12 credits of 2250 and 4250 combined can be counted toward the minimum degree requirements for the College of Business. (1-9 cr) (F,Sp,Su) ®

**BA 3080 (QI). Operations Research.** Quantitative methods for resource allocation: linear programming, queuing theory, simulation, project management, etc. Prerequisites: Stat 2300 or 3000. (3 cr) (F,Sp) ©

**BA 3250. Discussions With Business Leaders.** Students attend Partners in Business Program seminar sessions to examine new methods for improving performance in organizations. Repeatable to a maximum of 1.5 credits. (0.5 cr) (F,Sp) ®

**BA 3400 (QI). Corporate Finance.** How corporations raise and manage capital. Study of modern financial principles, methods, policies, and institutions. Corporate organization, creation, and reorganization. Prerequisites: Math 1050; Acct 2010; choose one statistics course from: Stat 1040, 2300, 3000, Psy 2800. (3 cr) (F,Sp,Su) ©

**BA 3460. Fundamentals of Personal Investing.** Examination of investment vehicles available to personal investor. Principal emphasis on corporate and government securities. Credit cannot be used toward requirements for finance major. (3 cr)

**BA 3500. Fundamentals of Marketing.** Overview of marketing function, emphasizing concepts and terminology. Includes basic marketing activities of product management, pricing, distribution, promotion, marketing research, and consumer behavior. (3 cr) (F,Sp,Su) ©

**BA 3700. Production/Operations Management.** Managerial aspects of production planning, procurement, inventory control, production control, quality control, layout, methods improvement, performances, standards, and basic industrial processes. Prerequisite: Stat 2300 or 3000. (3 cr) (F,Sp,Su) ©

**BA 4250. Advanced Internship.** Advanced or middle-level internship experience in a career-related position approved by the Cooperative Education Office. One credit for every 75 hours of internship experience, with a maximum of 9 credits. (1-9 cr) (F,Sp,Su) ®

**BA 4300. International Finance.** Overview of international financial management, including international financial markets, exchange rate behavior, and financing international trade. (3 cr) (F,Sp)

**BA 4410. Financial Institutions.** Role of domestic and international financial institutions in supplying services to consumers, businessmen, and government. Prerequisite: BA 3400. (3 cr) (F,Sp)

**BA 4420. Insurance.** Studied from the standpoint of insurance services consumers, course explores types of life, property, and casualty insurance contracts; nature and uses of life and property insurance; and the organization, management, and government supervision of insurance companies. Prerequisite: BA 3400. (3 cr) (F)

**BA 4430. Real Estate Finance.** Covers theory, principles, and techniques of real estate investment, emphasizing present value and cash-flow approaches to real estate investment decisions. Prerequisite: BA 3400. (3 cr) (Sp)

**BA 4450. Financial Policy.** Analyzes working capital management, capital budgeting, capital management, and other short-term and long-term financial decisions. Prerequisite: BA 3400. (3 cr) (F,Sp)

**BA 4460. Investments.** Provides an understanding of security analysis and portfolio management. Market operations; risk and return; stock, bond, and option analysis; and portfolio theory and creation. Prerequisite: BA 3400. (3 cr) (F,Sp)

**BA 4510. Buyer Behavior.** Marketing analysis of the decision processes of individuals, households, businesses, and not-for-profit institutions. Builds on concepts from psychology, sociology, anthropology, and economics. Prerequisites: BA 3500; Psy 1010 or Soc 1010 or USU 1340. (3 cr) (F,Sp) ©

**BA 4530. Marketing Research.** Management of marketing research function. Basic vs. decisional research, survey research, cost vs. value of information, research design, experimentation, and analysis techniques. Prerequisites: BA 3500; choose one of the following statistics courses: Stat 1040, 2300, 3000, Psy 2800. (3 cr) (F,Sp)

**BA 4540. Marketing Institutions.** Examination of strategic decision-making by institutions involved in the marketing channel. Primary emphasis on retail institutions. Explores types of marketing intermediaries, vertical integration, channel member power and conflict, and international channel management issues. Prerequisite: BA 3500. (3 cr) (F,Sp) ©

**BA 4550. Promotion Management.** Examines role of promotion concepts in development of a communication strategy. Based on an introduction to the nature of communications, course covers advertising, personal selling, and sales promotion, emphasizing the competitive and strategic value of communications in both the marketplace and society. Prerequisite: BA 3500. (3 cr) (F,Sp)

**BA 4590. Global Marketing Strategy.** Analytical approach to strategic marketing problems facing the firm competing in global markets. Emphasizes key analytical and decision-making frameworks concerning the global marketing environment and the marketing mix and their impact on the firm's performance. Prerequisites: BA 4540, 4550. (3 cr) (F,Sp) ©

**BA 4720. Production Planning and Control.** Planning and control of production processes and materials flow. Prerequisite: BA 3700. (3 cr) (F)

**BA 4750. Production Simulation.** Computer simulation of production environment, including scheduling, routing, labor capacity, inventory, and delivery. Emphasizes just-in-time concepts. Prerequisite: BA 3700. (3 cr) (Sp)

**BA 4790. Operations/Supply Chain Strategy.** Role of operations/supply chain management in development of competitive advantage for a business firm. Prerequisite: BA 4720. (3 cr) (Sp)

**BA 4800. Independent Research and Reading.** (1-3 cr) ©

**BA 4950H. Senior Honors Thesis/Project.** Creative project that will then be written up, and presented, as a Senior Thesis as required for an Honors Plan. (3 cr) (Sp)

**BA 5730. Management of Quality.** Develops methods and procedures for design, implementation, and control of total quality management programs in both product and service organizations. Prerequisites: BA 3700; Stat 2300 or 3000. (3 cr) (F)

**BA 6160. Integrative Pre-MBA Core.** Integrates financial reporting, analysis, and markets; domestic and global economic and legal environments; creation and distri-

bution of goods and services; and human behavior in organizations. Upon completion, students without undergraduate degrees in business are prepared to enter advanced MBA core. Also taught as Acct 6160, BIS 6160, Econ 6160, and MHR 6160. (18 cr) (Su)

**BA 6180. Intrasession MBA Workshop.** Intensive workshops designed to enhance the MBA experience. (0.5-1 cr) ©

**BA 6350. Managerial Economics.** Application of concepts and theories, based on managerial economics, to business problems. Addresses cost theory, pricing, market structures, and forecasting. (3 cr)

**BA 6420. Financial Problems.** Corporate finance case course, dealing with problems in working capital management, capital budgeting, cost of capital problems, and corporate restructuring. (3 cr) (F,Su)

**BA 6440. Financial Decision Making.** Presentation of financial modelling techniques impacting firm decisions. (3 cr) (Sp)

**BA 6520. Marketing Strategy.** Advanced case approach to current marketing management problems. Emphasizes concepts, research, techniques, decision making, and marketing strategy development. (3 cr) (Sp,Su)

**BA 6540. Special Topics in Marketing.** Selected topics in marketing pursued in depth. Topics and instructors vary semester to semester. Current topics include: Marketing Communications and Supplemental Aspects of Electronic Commerce, The Changing Environment of Marketing Institutions, and Buyer Behavior. Prerequisite: BA 6520. (3 cr) (Sp)

**BA 6560. Market Analysis and Decision Making.** Develops skills necessary to plan and implement an effective marketing strategy. Focuses on role of marketing information in managerial decision making. Uses marketing cases and/or simulation games throughout the course. (3 cr) (F,Sp)

**BA 6720. Operations Management.** Study of basic process functions in managing a production or service organization, such as inventory control, production control, procurement, quality control, production planning, forecasting, etc. (3 cr) (F,Su)

**BA 6740. Decision Making in Operations Management.** Selected topics in operations management pursued in depth. Topics and instructors vary from semester to semester. Prerequisite: BA 6720. (3 cr) (Sp)

**BA 6860. Research in Business Decision Sciences.** Requires students to develop and complete a research project based on principles of business decision science. (3 cr) (F,Sp)

**BA 6900. Independent Research and Reading.** (1-3 cr) (F,Sp,Su) ©

**BA 6960. Professional Paper.** A paper of professional quality prepared by each student. Designed to demonstrate the ability to complete a major business-related project and to effectively present the results. (3 cr) (F,Sp,Su)

**BA 6970. Thesis.** (1-6 cr) (F,Sp,Su) ©

**BA 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ©

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© Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

## Interdepartmental Curriculum for

# Master of Business Administration (MBA)

**Associate Dean for Business Graduate Studies:** Professor C. R. Michael Parent

**Assistant Director:** Chalon Keller

Business Graduate Studies Office in Business 302, (435) 797-2360

**FAX** (435) 797-3995

**E-mail** mparent@b202.usu.edu

**WWW** <http://www.bus.usu.edu/>

**Professors** *Caryn L. Beck-Dudley*, business law and social responsibility; *Basudeb Biswas*, international trade and economic development; *Drew Dahl*, financial institutions; *Peter M. Ellis*, production and operations research; *Christopher Fawson*, public finance and econometrics; *Thomas S. E. Hilton*, business information systems; *L. Dwight Israelsen*, comparative systems and economic history; *Richard L. Jenson*, information systems and managerial accounting; *I. Richard Johnson*, financial, managerial, advanced, and agency accounting; *W. Cris Lewis*, regional-urban and managerial economics; *J. Robert Malko*, corporate and energy utility finance; *Glenn M. McEvoy*, organizational behavior, human resources, and management; *C. R. Michael Parent*, marketing research and strategy; *Richard L. Ratliff*, auditing, financial, internal audit, and principles; *Clifford R. Skousen*, governmental, international, managerial, and financial accounting; *David B. Stephens*, business strategy and labor relations; *Philip R. Swensen*, finance; **Associate Professors** *Kenneth R. Bartkus*, promotion management; *Gaylen N. Chandler*, human resources, management, and entrepreneurship; *D. Richard Cutler*, statistics; *David R. Daines*, business law, employment law, and social responsibility; *Steven H. Hanks*, business strategy, management, and entrepreneurship; *Cathy L. Hartman*, consumer behavior and environmental sustainability; *Jeffrey J. Johnson*, information systems; *Ross E. Robson*, management; *Edwin R. Stafford*, marketing; *Alan A. Stephens*, corporate finance and investments; **Assistant Professor** *E. Vance Grange*, accounting

**Degree Offered:** Master of Business Administration (MBA)

## Graduate Program

### Objectives

The MBA program is an interdepartmental program administered by the College of Business. The MBA program is designed to provide students with an understanding and analytical tools necessary for effective and efficient management in today's complex business world. The curriculum prepares students with a working knowledge of the fundamental business functions and a sensitivity to the legal, ethical, social, technological, and international forces in the business environment. The MBA program's focus is the development of the analytical, communication, interpersonal, and leadership skills needed for a successful career in a variety of organizations. The MBA program is accredited by AACSB International—The Association to Advance Collegiate Schools of Business.

### Admission Requirements

For consideration for admission to the MBA program, applicants must submit all undergraduate transcripts, Graduate Management Admissions Test (GMAT) scores (the GRE is also accepted), and three letters of recommendation from qualified professionals, at least one of whom must be an academic. TOEFL scores are required for candidates from abroad, with a minimum of 550 deemed acceptable. International students with a prior degree from an English-speaking university are exempted from the TOEFL exam.

Applications are screened throughout the year by the MBA committee. No applications will be considered until all required information arrives in the School of Graduate Studies at Utah State University. In addition, the student desiring to pursue the MBA degree must have been accepted as a matriculated student before he or she will be permitted to register for 6000-level courses that will be part of the student's advanced program. Full-time business experience is also preferred. Personal interviews with faculty representatives are encouraged. Students who wish to be considered for financial aid must submit applications by **March 15** for the coming academic year.

Students with or without an undergraduate degree in business may enter the MBA program. However, before taking advanced core, specialization, or elective courses, basic competencies in business that have not been acquired through prior courses or experience must be developed by completing prerequisite courses as outlined in the business core described below under *Degree Requirements*. Applicants not meeting minimum requirements may be allowed to correct deficiencies concurrently with graduate coursework. Before entering the program, each student must meet with an advisor to plan his or her course of study.

### Degree Requirements

**Business Core.** The MBA Business Core curriculum provides skills and knowledge in statistics, written communication, computer literacy, mathematics, information systems, economics, accounting, finance, marketing, management, and organizational behavior. Students who have completed a bachelor's degree at an

other university must have coursework equivalent to the core subject matter areas of the AACSB for direct entry into the advanced program.

**Accelerated Business Core.** Students who have not completed a bachelor's degree accredited by the AACSB may choose to gain the necessary basic business competencies by attending the 18-credit Accelerated Business Core (ABC), which is offered during summer semester only. The ABC is a uniquely efficient and effective way of delivering the basic program curriculum. It is a single, team-taught course covering the topics and functions, which form the context and offer perspectives in business. The ABC enables students from nonbusiness backgrounds to prepare quickly and similarly for the Advanced Program Courses.

Alternatively, students may acquire the necessary basic competencies by completing courses satisfying the common body of knowledge requirement: Acct 2010; Acct 2020 or 6010; BA 3080 or 3700; BA 3400, 3500; BIS 2450; Econ 1500, 2010; MHR 2990, 3110; Math 1100; and Stat 2300. Students may not be required to take courses which duplicate prior academic or industrial training and are required to meet with the director or assistant director of the MBA program to plan their course of study.

The advanced required courses, along with specializations or electives, consist of 30 credits. Students must complete the advanced course requirements listed below. In addition, students may choose to complete the course of study for a General MBA or select among several specializations, which are also described below.

**Advanced Required Courses (18 credits).** Students must complete MHR 6890 to fulfill the integrative component of the MBA. Students must also successfully complete at least *four* of the following *five* courses to fulfill advanced course requirements: Acct 6350; BA 6420, 6520, 6720; MHR 6500. In addition, students must complete *one* of the following courses to fulfill the quantitative methods requirement: Acct 6500, BIS 6440, or Econ 6330. (Stat 5100 may be used to fulfill the quantitative methods requirement with prior approval from the College of Business Graduate Programs Office.)

**Course of Study for General MBA (12 credits).** Working with the MBA director or assistant director, students select a minimum of three electives (9 credits). One approved 5000-level course may be used. In addition, students must complete an approved College of Business graduate course (3 credits) which meets the Graduate School's research requirement. Electives taken outside of the College of Business may require the completion of prerequisite courses.

### ***Specializations (12 credits)***

Students may select a specialization in one of several areas listed below or an approved course of study to receive a general MBA. Classes taken as part of the MBA advanced required courses cannot be used as part of a specialization. One course in each specialization will be designated as research intensive to meet the University's research requirement.

**Accounting.** Students admitted to the USU MBA Program may earn an Accounting Specialization by completing the MBA curriculum, 18 credits, and at least 12 approved credits in ac-

counting. To qualify for this specialization, students must complete, or have previously completed, the equivalent of Acct 3110, 3120, 3310, 3410, 5210 (or 6210), 5220 (or 6220), 5400 (or 6400), and 6510. At least 9 credits must be taken in accounting courses numbered above 6010. Students may substitute Acct 6030 for both Acct 3410 and 5400 (or 6400). Students may also substitute Acct 6040 for both Acct 5210 (or 6210) and 5220 (or 6220). The USU Graduate School research requirement may be satisfied by completing Acct 6410 or 6610 or any approved 6960 course within the College of Business.

**Agribusiness Management.** This specialization consists of Econ 6030, 6040, 6300; and either Econ 6500 or 6700. Econ 6330 should be taken to satisfy the quantitative methods requirement.

**Business Analysis and Decision Making.** This specialization consists of BA 6440, 6540, 6740, and an approved elective which must satisfy the Graduate School's research requirement.

**Business Information Systems.** This specialization requires students to complete BIS 6700 and three of the following courses: BIS 6200, 6330, 6410, 6500, and 6750.

**Entrepreneurship.** This specialization consists of MHR 6410, 6430, 6470, and an approved elective.

**Human Resource Management.** This specialization requires students to complete MHR 6690 and to select any three of the following courses: MHR 6510, 6550, 6630, 6670, and 6760.

**International Economics.** This specialization consists of Econ 5150, 5400, 6910; and PolS 6220. Econ 6330 should be taken to satisfy the quantitative methods requirement.

**Manufacturing Management.** This specialization includes BA 5730, 6740; and MHR 6350, 6370.

**Personal Financial Planning.** This specialization consists of PFP 6060, 6070, 6080, and an approved elective. Students must have completed (or complete as part of their graduate work): BA 3460 or 4460, and Acct 3410 or 6030. This specialization satisfies requirements to sit for the national Certified Financial Planner (CFP) examination.

**Quantitative Economic Analysis.** This specialization consists of Econ 5310, 6300, 6330; and Stat 5100.

### ***Financial Assistance***

Graduate assistantships, scholarships, and fellowships are available to outstanding students. Graduate assistantships and scholarships generally range between \$1,000 and \$3,000 for nine months. Application for assistantships must be made by **March 15**. A recipient of a graduate appointment is usually eligible for a waiver of the out-of-state portion of his or her tuition.

## ***MBA Courses***

For descriptions of MBA courses, see individual departmental course listings.

Department of

# *Business Information Systems*

College of Business

**Head: Professor** *Lloyd W. Bartholome*, business information technology and education, business communications  
Office in Business 711, (435) 797-2342, e-mail [lbart@b202.usu.edu](mailto:lbart@b202.usu.edu)

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**Professors** *Dennis LaBonty*, business information systems; *James Calvert Scott*, business education, business communications; *John F. Vinsonhaler*, business information systems; **Professors Emeritus** *Charles M. Lutz*; *H. Robert Stocker*; *William A. Stull*; **Associate Professors** *Jeffrey J. Johnson*, business information systems; *David H. Olsen*, business information systems; *David J. Paper*, business information systems; **Assistant Professors** *Robert J. Mills*, business information systems; *Jean A. Pratt*, business information systems; **Senior Lecturers** *Donald R. Briel*, Executive in Residence, information systems; *Susan M. Jones*, business information systems, business communications; *Marianna Larsen*, office systems support, business communications; *Craig J. Peterson*, business information systems; *Dana H. Swensen*, business information systems, business communications; **Lecturer** *Malia L. Young*, marketing education, business communication, information systems

**Degrees offered:** Associate of Applied Science (AAS) in Office Systems Support (two-year degree); Bachelor of Science (BS), Bachelor of Arts (BA), and Master of Science (MS) in Business Information Systems; BS and BA in Business Information Technology and Education; BS and BA in Marketing Education; Master of Education (MEd) in Secondary Education with specialization in Business Education; participates in the Interdepartmental Doctor of Philosophy (PhD) in Education and Doctor of Education (EdD) with a specialization in Business Information Systems

**Undergraduate emphases:** *Business Information Systems BS, BA*—Management Information Systems, Electronic Commerce, Office Systems Management; *Business Information Technology and Education BS, BA*—Business Teacher License, Training and Development; *Marketing Education BS, BA*—Marketing Teacher License, Training and Development. **Graduate specializations:** *Business Information Systems MS*—Business Education, Business Information Systems, Electronic Commerce, Management Information Systems, Marketing Education, and Training and Development

**Distance Learning:** The Bachelor of Science (BS) and Bachelor of Arts (BA) in Business Information Systems are offered throughout the State of Utah through the USU satellite Distance Learning Program. The MS in Business Information Systems is also offered through Distance Learning. For more information, contact the nearest USU Extension Center.

## *Undergraduate Programs*

### *Objectives*

The Department of Business Information Systems offers two major educational thrusts in undergraduate as well as graduate programs. The Business Information Systems major is designed to prepare individuals for positions as managers in business information systems, including information managers, information supervisors, network managers, worldwide web designers, electronic

commerce developers, systems analysts, applications programmers, systems trainers, and office systems managers by pursuing a bachelor's degree program in Business Information Systems.

The second major thrust is designed to prepare individuals as teachers and supervisors of business and marketing subjects at the secondary and postsecondary grade levels in the educational system or as teacher-trainers in private industry. Students may earn a bachelor's degree in Business Information Technology and Education or Marketing Education.

A comprehensive two-year Associate of Applied Science Degree in office systems support subjects is also available. In addition, the department provides service courses for many other groups of students.

The department has a modern microcomputer laboratory in seven separate rooms with more than 200 microcomputers. Students take microcomputer classes as part of their College of Business requirements, Computer and Information Literacy (CIL) examination preparation, and elective programs.

## Requirements

**College of Business Requirements.** All bachelor's degree students majoring in Business Information Systems programs must satisfy the College of Business entrance requirements provided on pages 83-84. Academic advising about these requirements is provided by the College of Business Student Service Center, Business 308. Business Information Systems majors must also follow College of Business prespecialization requirements for advanced standing, detailed on pages 83-84. Prespecialization requirements for Business Information Technology and Education and Marketing Education majors are as follows: Acct 2010, 2020; BIS 1000, 2450, 2550; Econ 1500, 2010; MHR 2990; and Psy 1010.

**Teacher Licensure.** Persons planning to teach must also be admitted to the teacher licensure program in the College of Education. A cumulative college grade point average of 2.75 is required to be admitted to the College of Education, to student teach, and to graduate in Business Information Technology and Education or Marketing Education with a teaching license. Detailed information may be obtained from the Department of Secondary Education and/or the College of Education.

**Two-year Associate of Applied Science Degree.** Students indicating an interest in the Office Systems Support Associate of Applied Science Degree can be accepted directly into the program upon admission to the University. Students who desire to transfer to a four-year program offered by the College of Business must meet the requirements specified for bachelor's degree programs.

**Competency-based Placement Program.** Students who have acquired knowledge and skills that are not represented on their collegiate transcripts of credit are allowed to demonstrate competency by challenging related courses. Placement in a skills-oriented sequence can be accomplished by discussion with an advisor. Challenge of courses is done by successfully completing an examination similar to a final course test.

Students with potential for demonstrating competence have two options, one of which must be chosen prior to examination. One option is to challenge for credit (*P/D+*, *D*, *F* option) according to University established procedures; results of the test are recorded on the student's transcript. There is a fee for this option. A second option is to waive without credit required classes, if competence at the *B* level is demonstrated.

## Program Requirements

**Bachelor's Degree in Business Information Systems.** The Information Systems program at Utah State University offers a common core of courses through two departmental majors: **Business Information Systems** and **Computer Science**. The curricula of the individual departments differ *substantially* in emphasis.

The **Business Information Systems major, Management Information Systems (MIS) emphasis**, is offered in the Business Information Systems Department, College of Business. The Bachelor of Science or Bachelor of Arts program is designed for students interested in business careers as information specialists, systems analysts, network managers, applications programmers, and information systems managers in business and industry. BIS majors take required courses in analysis and design, Internet management, telecommunications, decision support systems, spreadsheet and database applications, and information systems projects. All graduates are required to complete a common core of business subjects. The College of Business is accredited by the American Assembly of Collegiate Schools of Business. The department also offers a Master of Science in Business Information Systems with an area of emphasis in Management Information Systems.

The **Computer Science major with an Information Systems emphasis** is located in the College of Science and is designed for students interested in a career as a Computer Scientist with a background in Information Sciences and Systems. Majors in this emphasis are trained in all phases of the analysis, design, and implementation of Information Systems. As part of this emphasis, students also receive training in the theory and application of information. Students select an application area such as Business, Accounting, or Economics. Other application areas can be developed by working closely with an advisor. This program of study leads to a Bachelor of Science, Bachelor of Arts, or Master of Science degree in Computer Science. See page 196 for additional details.

**General requirements for all Business Information Systems majors are:** Acct 2010, 2020; BA 3400, 3500, 3700; BIS 1000, 1400 (or Computer and Information Literacy Examination), 2450, 2550, 3100, 3250, 3500, 4250; Econ 1500, 2010, 3400; MHR 2990, 3110; MHR 4880 or 4890; Math 1050, 1100; Stat 2300; Psy 1010 or Soc 1010; and University Studies requirements.

Students must choose a management information systems emphasis, an electronic commerce emphasis, or an office systems management emphasis.

The **management information systems** emphasis provides knowledge and skills for business systems analysts, applications programmers, information managers, web masters, and other business information systems positions.

Required classes for the management information systems emphasis are: BIS 2300, 3330, 4330, 5100, 5110, 5300, 5400; BIS 5050 or 5650 or 5700; CS 1700, 1710; and one of the following classes: CS 1720, 3410, or 3510; plus 6 credits outside the College of Business related to the major. It is strongly recommended that students take BIS 5050, 5450, and 5650. See advisor for current checklist of requirements.

The **electronic commerce** emphasis provides knowledge and skills for students who wish to work in the electronic economy using high-speed Internet networks and applications, while providing competitive tools for all Internet-driven electronic commerce. This expertise includes business-to-business electronic commerce, as well as business-to-consumer electronic commerce. Students gain expertise in establishing and designing websites from the technical point of view, as well as expertise in electronic commerce from a strategic business point of view.

Required classes for the electronic commerce emphasis are: BIS 3330, 4330, 5050, 5300, 5450, 5650, 5700; BA 4510 or 4540 or 4550; CS 1700, 1710; and CS 1720 or 3410.

The **office systems management** emphasis provides knowledge and skills for office managers, administrative assistants, and other practitioners who assist with analysis, design, and use of computerized information from a user's perspective.

Required classes for the office systems management emphasis are: BIS 1420, 2300, 2400, 2520, 2600, 5450, and 5700, plus 13 credits of approved upper-division classes outside the College of Business related to the major. BIS 3330, 4350, 5300, and 5400 are strongly recommended. See advisor for current checklist of requirements.

**Bachelor's Degree in Business Information Technology and Education.** A composite major in Business Information Technology and Education is designed for students desiring to qualify for a license to teach business subjects in grades 7-12 or to teach in business and industry. Required courses include: Acct 2010, 2020; BA 3500; BIS 1000, 1400 (or Computer and Information Literacy Examination); BIS 2250 or 4250; BIS 2300, 2400, 2450, 2520, 2550, 3100, 3140, 4550, 5400; BIS 5300 or 5450 or 5700; Econ 1500, 2010; MHR 2990, 3110; Psy 1010; and other University Studies courses required by the University. Required English classes are Engl 1010 and 2010. Students must also complete at least one of the following emphases:

**1. Business Teacher License Emphasis:** BIS 3000, 3300, 3400, 4300, 4400, 5500, 5600; InsT 5200; ScEd 3100, 3210, 4200, 4210, 5300; and SpEd 4000.

**2. Training and Development Emphasis:** BIS 4250, 4350, 5450; InsT 5220; and 12 additional credits chosen from the following: MHR 3710, InsT 5210, 5230, 5240, 5250, 5260, 5300, 5400, 5900.

Those who do not wish to receive a license to teach in the public schools may select an emphasis in Training and Development for business and industry.

**Bachelor's Degree in Marketing Education.** A composite major in marketing education is designed for students desiring to qualify for a license to teach marketing and distributive education subjects in the public secondary schools or in business and industry. Required courses for students wishing to receive a license to teach include: Acct 2010, 2020; BA 3500, 4510, 4540, 4550; BIS 1000, 1400 (or Computer and Information Literacy Examination), 1420, 2250, 2300, 2400, 2450, 2550, 3140, 4550; Econ 1500, 2010; MHR 2990, 3710; Psy 1010. Two fashion merchandising classes, HEnv 1120 and 4070, may be substituted for BA 4540 and MHR 3710. Students must also complete at least one of the following emphases:

**1. Marketing Teacher License Emphasis:** BIS 3000, 3300, 3400, 4300, 4400, 5500, 5600; InsT 5200; ScEd 3100, 3210, 4200, 4210, 5300; and SpEd 4000.

**2. Training and Development Emphasis:** BIS 4250, 4350, 5450; InsT 5220; and 12 additional credits chosen from the following: MHR 3710, InsT 5210, 5230, 5240, 5250, 5260, 5300, 5400, 5900.

Those who do not wish to receive a license to teach in the public schools may select an emphasis in Training and Development for business and industry.

Students must also complete Engl 1010 and 2010, as well as Econ 1500 and BIS 3140, which may be counted toward their University Studies requirements.

**Graduation Requirements.** To be recommended by the department for graduation with a bachelor's degree, BIS majors must have a minimum GPA of 2.5 in courses required for their major. Business Information Systems majors must have an overall GPA of 2.5. Business Information Technology and Education and Marketing Education majors must have an overall GPA of 2.75. This includes transfer credit. The College of Business requires that at least 60 semester credits be taken in courses taught outside the College of Business. Up to 9 semester credits of economics and 6 semester credits of statistics can be considered as courses taught outside the College of Business. At least 50 percent of the business credits required for a business degree must be taken on the Utah State University campus or at a designated residence center.

Communications Literacy requirements are Engl 1010 and 2010 plus two Communications Intensive courses.

**Office Systems Support Associate of Applied Science Degree.** This program is designed for students desiring two years (a minimum of 65 semester credits) of college to prepare for positions as office supervisors and other office and information systems support personnel. Emphasis is placed on job skills. Requirements are: Acct 2010; BIS 1000, 1400, 1420, 1550, 2250, 2300, 2400, 2450, 2520, 2550, 2600. In addition, students are required to complete a minimum of 9 credits in business-related areas as approved by their advisor.

A minimum of 18 credits of University Studies must be taken. Required University Studies classes are: 6 credits of communications literacy (Engl 1010 and 2010), 3 credits of quantitative literacy (Math 1050 or 1100), and 9 credits of breadth requirements.

Students who initially enroll for the two-year Associate of Applied Science degree may readily change to a four-year bachelor's degree program and complete the requirements for the business information systems major, business information technology and education major, or another major in the College of Business.

**Minors.** The Department of Business Information Systems is authorized to award teaching minors in Business Information Technology and Education, Marketing Education, and Business Computer and Information Systems. A minor in Business Information Systems and a minor in Electronic Commerce are also authorized.

Requirements for the *Business Information Technology and Education teaching minor* are Acct 2010; BIS 1400 (or Computer and Information Literacy Examination), 1420, 2300, 2450, 3000, 3300 or 4300, 3400, 4400, 5400; BIS 5300 or 5450 or 5700; and Econ 1500.

A *teaching minor in Marketing Education* consists of the following courses: Acct 2010; BA 3500; BIS 1400 (or Computer and Information Literacy Examination), 1420, 2300, 3000, 3300 or 4300, 3400, 2400 or 3550, 4400; Econ 1500; BA 4510 or 4550.

Requirements for the *Business Computer and Information Systems teaching minor* are: BIS 1400 (or Computer and Information Literacy Examination), 1420, 2300, 2400, 2450, 3000, 3100, 3300 or 4300, 3400, 3500, 5300, 5400.

The minors listed above are **teaching minors** and are available only to those working toward a teaching license.

Students wishing to *minor in Business Information Systems* must complete the following courses: BIS 2300, 2450, 3100, 3330, 3450 or 3500; CS 1700 or 3410 or 3510. In addition, they must choose one course from the following: Acct 4500; BIS 4330, 5100/5110 (take both), 5150, 5300, 5400, 5700; CS 1700 or 3410

(if not taken in *required* section) or 3510. The following courses are also required for nonbusiness majors: Acct 2010, 2020; BIS 1400.

Requirements for the *Electronic Commerce minor* are: BIS 2400, 3330, 3450 or 3500, 5300, 5700; BA 4510 or 4540 or 4550. Students whose majors are *not* in the College of Business must take the following courses, in addition to those listed above, in order to complete an Electronic Commerce minor: Acct 2010, BIS 2450, and BA 3500.

## Student Organizations

The Department of Business Information Systems sponsors or co-sponsors four student organizations. Each group provides unique experiences that can complement and enrich formal coursework. Leadership development and human relations skills are among the personal attributes enhanced by involvement in the various organization activities.

**Association for Computing Machinery (ACM).** ACM, a professional society for the information systems industry, sponsors a student chapter at USU. The goals of ACM are to: (1) provide leadership experiences for undergraduate and graduate business information systems majors; (2) help student members plan their careers and find employment by introducing them to practicing systems professionals; and (3) foster a professional attitude among business information systems majors so that they will contribute to their field.

**Phi Beta Lambda (PBL)** is a cocurricular student organization. The organization's goal is to provide opportunities to develop business career competencies and to promote civic and personal responsibility. Membership is open to all students interested in business.

**Delta Epsilon Chi (DEX)** is a cocurricular organization designed for marketing education and marketing majors. The major goal of DEX is to help students prepare for careers in marketing or marketing education. DEX provides students with opportunities to compete in marketing events at the state and national levels. Membership is open to all students interested in business and marketing.

**Delta Pi Epsilon (DPE)** is a national honorary fraternity for graduate students. Purposes of the organization include enhancement of research, scholarship, service, and cooperation in the profession. Election to membership requires review by members and faculty of the Department of Business Information Systems.

## Graduate Programs

### Master of Science

Students applying for admission to the Master of Science program in Business Information Systems must take the GMAT test. A score at the 40th percentile or better on the GMAT is required for admission. Undergraduate GPA should be 3.0 or above. Meeting minimum requirements does not guarantee admission.

The MS requires a minimum of 33 credits. A minimum of 24 credits of academic work must be in classes numbered 6000 and above. Twelve or more credits should be in the area of specialization. Students with bachelor's degrees outside of business may be required to complete additional coursework.

Students in the master's program pursue the *Plan C* option, where a research paper is completed in a special research class. Those who wish to pursue the *Plan A* thesis option must have permission from their committee to do so.

All MS degrees in the BIS Department require the following core: BIS 6150, 6440, 6810.

The specialization in **Management Information Systems (MIS)** is for students who wish to work as systems analysts, application programmers, network managers, information managers, information center managers, and trainers in business information systems.

Students are expected to have a background in business information systems. Required courses are BIS 6120, 6200, 6330, and BIS 6400 *or* 6700, in addition to the departmental core. Students who choose the Plan A option must complete 6 credits of BIS 6970. Students may take credits in Business Information Systems, Computer Science, Instructional Technology, Business Administration, Accounting, Economics, or other approved electives to complete the 9 credits of electives required.

The specializations in **Business Education, Marketing Education, and Training and Development** are designed for those who are teaching in an area of business or who wish to work in training and development in business and industry. Required courses for the Business Education or Marketing Education specialization are BIS 6350, 6450, 6700, 6720, 6730, and 6770. Students must complete 15 credits of electives chosen from the following list (or select others with committee approval): BIS 6250, 6350, 6400, 6600, 6720, 6730, 6770.

Required courses for the Training and Development specialization are BIS 6250, 6350, and 6450. Students must complete 15 credits of electives chosen from the following list (or select others with committee approval): BIS 6120, 6330, 6410.

For a current checklist of requirements, students should contact their departmental graduate advisor.

The USU MS in Business Information Systems is the **only** master's program in Business Information Systems in the state of Utah. Graduates are placed in the West and throughout the nation.

### Master of Education

Students desiring admission to the MED program must also meet the requirements of the Secondary Education Department.

The MEd degree in secondary education with specialization in business education has a master's project requirement as part of the program. The program is devised specifically for the practicing secondary school teacher of business or marketing education. Students complete a core area in secondary education, as well as requirements in business education and subject-matter-oriented courses. The program is also designed to prepare people to teach in public secondary schools.

### ***Doctor of Philosophy and Doctor of Education***

Applicants for admission to the College of Education PhD or EdD programs with a specialization in Business Information Systems must take the GRE. Scores on the verbal and quantitative test must be at or above the 40th percentile. No minimum score is required on the analytical section (required by the Educational Testing Service).

The Department of Business Information Systems cooperates with other departments in offering the interdepartmental Doctor of Philosophy (PhD) and Doctor of Education (EdD). Within the Business Information Systems specialization, emphases can be pursued in business education, marketing education, business information systems, and business communications. Other subject-matter emphases are also available. The PhD is a research-based degree. The EdD degree is a practitioner's degree. Both degrees require dissertations. Graduates secure positions teaching business subjects or business-teacher education in colleges and universities or in business and industry. Former graduates are currently in various positions in higher education, including higher education administration; in teacher education instruction; and in business and industry.

### ***Additional Information***

Specific details about each of the foregoing degree programs are outlined in policy and procedure documents available through the department. All requirements are subject to change; check with the department for current requirements.

The business and marketing teacher education programs, at the undergraduate and graduate levels, are ranked highly and respected throughout the nation, with faculty who are nationally and internationally recognized.

All students must meet admission requirements as specified by the School of Graduate Studies (see pages 72-73).

### ***Research***

Faculty in the Department of Business Information Systems are active in research and scholarly endeavors. Current and published research topics include business communications; international communications; improvement of instruction in teaching; business information systems as related to business and industry; curriculum for business schools; business reengineering; electronic commerce; group decision support systems; microcomputer applications; use of microcomputers in various subjects, including accounting and business communications; cooperative education; issues in higher education; and other areas related to business information systems, marketing education, and business education.

### ***Financial Assistance and Assistantships***

Funds for scholarships are provided through the School of Graduate Studies and administered in the department. Those interested in scholarships should contact the graduate director or the department head.

Each year several high-quality graduate teaching assistants are needed. These assistants generally teach classes in keyboarding, word processing, business communications, and microcomputer applications. Those who are interested in teaching assistantships must apply through the department head. They must have had teaching experience or be willing to take teaching methods classes, as well as the School of Graduate Studies-sponsored teaching assistant workshop, prior to receiving an assistantship.

### ***Career Opportunities***

Business Information Systems is one of the fastest growing fields in business and industry. Follow-up studies show that information systems positions pay excellent salaries, and the placement rate of students is almost 100 percent. Currently, there is also a great demand for business teachers in public education.

## ***Business Information Systems Courses (BIS)***

**BIS 1000. Business Orientation.** Orients freshmen and transfer students to College of Business programs, academic and student services, professional organizations, and career possibilities. Also taught as Acct 1000, BA 1000, Econ 1000, and MHR 1000. (0.5 cr) (F,Sp)

**BIS 1110. Keyboarding.** For students with no previous keyboarding experience. Designed so student can touch type and learn basic concepts related to word processing and document formatting. (2 cr) (F,Sp)

**BIS 1400. Microcomputer Applications in Business.** Using microcomputers at school and work. How to operate a PC. Includes operating systems, word processing, Internet, graphics, database, and spreadsheet applications. Includes preparation for University Studies Computer and Information Literacy examination. Prerequisite: Ability to keyboard at a minimum of 25 wpm. (3 cr) (F,Sp,Su)

**BIS 1410. Special Topics.** Selected topics related to using computers in business. (1-3 cr) (F,Sp,Su) ®

**BIS 1420. Word Processing Applications.** Word processing software instruction designed for office applications. Emphasizes creating business documents and improving keyboarding skills. Assumes ability to keyboard by touch at a minimum of 50 wpm. (3 cr) (F,Sp)

**BIS 1550 (CI). Business Correspondence.** Development and application of effective business writing skills, emphasizing business correspondence. Includes thorough review of grammar, spelling, and punctuation related to business correspondence. (3 cr) (F,Sp)

**BIS 2250. Introductory Internship.** Introductory-level experience in a career-related position approved by the Cooperative Education Office. One credit for every 75 hours of internship experience, with a maximum of 9 credits. A maximum of 12 credits of 2250 and 4250 combined can be counted toward the minimum degree requirements for the College of Business. (1-9 cr) (F,Sp,Su) ®

**BIS 2300. Business Data Communications and Networking.** Emphasizes business data communications in a LAN and WAN networking environment. Includes network protocols, cable technology, telecommunications standards, security issues, and general telecommunications management issues. Prerequisite: BIS 1400 or CIL exam. (3 cr) (F,Sp,Su)

**BIS 2400. Web Design for Business Applications.** Design, development, and evaluation of business documents for electronic media utilizing the worldwide web. Prerequisite: BIS 1400 or CIL exam. (3 cr) (F,Sp,Su)

**BIS 2450. Spreadsheets and Databases for Business.** Concepts related to integration of microcomputer spreadsheets and databases into business. Use of spreadsheets and databases to accomplish business operations. Prerequisite: Computer competency exam or equivalent. (3 cr) (F,Sp,Su)

**BIS 2520. Integrating Office Technology.** Advanced applications of office technology for production of business documents, emphasizing efficient use of word processing, graphics, and desktop publishing. Prerequisites: BIS 1420, 2550. (3 cr) (F,Sp,Su)

**BIS 2550 (CI). Business Communication.** Development and application of effective oral and written business communication skills. Language/mechanics, grammar, and document formatting. Prerequisite: Engl 1010. (3 cr) (F,Sp,Su)

**BIS 2600. Office Procedures.** Finishing course which integrates office knowledge and skills. Applies administrative activities which are part of the office process. Prerequisites: BIS 2520; BIS 1550 or 2550. (3 cr) (F,Sp)

**BIS 3000. Principles of Business and Marketing Education.** Covers principles of business and marketing education, including professionalism, historical overview of the field, student organizations, advisory committees, applied technology education, and school-to-careers program. (1 cr) (F,Sp)

**BIS 3100 (DSS). Business Information Systems.** Survey of business uses of information technology, emphasizing vocabulary, concepts, career emphases, and systems components. Includes general systems theory and business functional information subsystems (e.g., accounting, management, finance, and marketing). (3 cr) (F,Sp,Su)

**BIS 3140 (QI). Managing Personal Finances.** Management of personal business affairs, including insurance, investments, installment buying, and estate planning. Emphasizes personal business affairs as related to economic developments in the public and private sectors. Prerequisite: Math 1030 or Math 1050 or Stat 1040. (3 cr) (Sp) ©

**BIS 3250. Discussions With Business Leaders.** Students attend Partners in Business Program seminar sessions to examine new methods for improving performance in organizations. Repeatable to a maximum of 1.5 credits. (0.5 cr) (F,Sp) ®

**BIS 3300. Clinical Experience I.** First business/marketing clinical practicum (40 hours minimum) in middle and secondary schools; must be taken concurrently with BIS 3400 methods class. Required at Level I. Prerequisite: Program admission. (1 cr) (F,Sp)

**BIS 3330. Database Management.** Theory and application of designing, developing, and maintaining database systems. Principles of management of data resources to support effective information systems in organizations. Prerequisites: BIS 3100 and one programming language. (3 cr) (F,Sp,Su)

**BIS 3400. Methods of Teaching Keyboarding and Microcomputing.** Psychological principles and methodology for teaching keyboarding, word processing, microcomputing, and accounting. Includes equipment and laboratory needs, classroom management, and lesson planning. Prerequisite: BIS 1420. (3 cr) (F)

**BIS 3450. Business Applications Using Visual Basic.** Designed to teach nontechnical students to solve business problems with Visual Basic. After students learn key elements of Visual Basic, advanced features of Microsoft Access (which require some knowledge of Visual Basic) are introduced. This course is *not* for BIS majors who have had C++. Prerequisite: BIS 2450. (3 cr) (F,Sp,Su)

**BIS 3500. Integrated Projects Using Visual Basic.** Creation of applications to solve typical business problems or support common functions, such as inventory control, accounts receivable, or personnel management. Students create working systems using widely-used Windows software. Prerequisites: BIS 2450 and CS 1700. (3 cr) (F,Sp,Su)

**BIS 3550. Principles of Selling.** Focuses on the sales process, including prospecting, qualifying customers, planning and delivering the sales presentation, overcoming objections, closing the sale, and satisfying the customer's needs. (2 cr) ©

**BIS 4250. Advanced Internship.** Advanced or middle-level internship experience in a career-related position approved by the Cooperative Education Office. One credit for every 75 hours of internship experience, with a maximum of 9 credits. (1-9 cr) (F,Sp,Su) ®

**BIS 4300. Clinical Experience II.** Second business/marketing clinical practicum (40 hours minimum) in middle and secondary schools; must be taken concurrently with BIS 4400 methods class. Required at Level 2. Prerequisites: Program admission and completion of Level 1. (1 cr) (F,Sp)

**BIS 4330 (d6330).<sup>1</sup> Database Implementation.** Application of database concepts using industrial database products. Includes structured query language (SQL) development, database programming development, front- and back-end interface development, web database design, database administration basics, and integration of database tools within a project context. Prerequisite: BIS 3330 or equivalent. (3 cr) (F,Sp)

**BIS 4350. Introduction to Training and Development.** Introductory course in training and development. Examines various roles of the human resource manager in the training domain. Students learn systems approach to developing and implementing training programs in business. (3 cr) (Sp)

**BIS 4400. Business Education and Marketing Education Methods.** Instructional methods for conceptual business and marketing classes. Includes methods for advising student organizations, school to careers programs, and relationships between general and applied technology education. Prerequisites: Econ 1500, MHR 2990, BIS 3140, Acct 2010. (3 cr) (Sp)

**BIS 4550 (CI). Principles of International Business Communications.** Culture-general and culture-specific study of business communication in the diverse world of international business from both theoretical and applied perspectives. (3 cr) (Sp)

**BIS 4950H. Senior Honors Thesis/Project.** Creative project that will then be written up, and presented, as a Senior Thesis as required for an Honors Plan. (3 cr) (Sp)

**BIS 5050 (d6050). Creating Internet Commerce Sites with Visual Interdev and SQL Server.** Explores design, development, and operation of corporate information centers (corporate interfaces for customers and employees), Internet commerce sites (direct sales to customers), and AI problem-solving sites (with an expert system to help the user with tasks). Prerequisites: BIS 3100, 3330, and 3500. (3 cr) (F,Sp)

**BIS 5100. Systems Design and Implementation.** Management, evaluation, documentation, maintenance, and reengineering of business information systems projects. Prerequisite: BIS 3330. (3 cr) (F,Sp)

**BIS 5110. Systems Design Laboratory.** Required laboratory for BIS 5100, allowing students to complete assigned team projects. (1 cr) (F,Sp)

**BIS 5150. Management Support Systems.** Survey of information technology to support management activities, including decision support systems, executive information systems, group support systems, electronic meeting systems, and expert systems. Prerequisite: BIS 3100. (3 cr)

**BIS 5300. Advanced Data Communications.** Principles of data communications, local and wide-area networks, hardware, software, media standards, management, and business applications. Management and strategic use of local-area networks (LANs) and wide-area networks (WANs) to solve business problems. Prerequisites: BIS 2450 and 3100. (3 cr) (F,Sp)

**BIS 5400 (d6400). Local Area Network Management for Business.** Application of networking concepts related to the management of local area networks. Includes topics related to setup, management, and maintenance of local area networks and installation of electronic mail handling systems. Prerequisite: BIS 3100. (3 cr) (F,Sp,Su)

**BIS 5450 (d6450). Designing Graphical User Interfaces for Electronic Commerce.** Integration of specialized web-design software, current multimedia technology (e.g., video/audio streaming, computerized slide shows, graphic animations, digital graphics) and web-design principles to create graphical user interfaces for e-commerce sites. Prior completion of BIS 2400 recommended. (3 cr) (F,Sp)

**BIS 5500. Business/Marketing Teaching Seminar.** Capstone seminar focused upon student business teaching issues, professional development, and principles of effective instruction, emphasizing reflective teaching. Must be taken concurrently with BIS 5600. Prerequisites: Level 1 and Level 2 completion; student teaching placement. (2 cr) (F,Sp)

**BIS 5600. Business/Marketing Student Teaching.** A 10-week culminating student teaching experience in which students assume full-time teaching responsibilities under the direction of cooperating teachers in major and minor fields. Must be taken concurrently with BIS 5500. Prerequisites: Level 1 and Level 2 completion; student teaching placement. (8 cr) (F,Sp)

**BIS 5640 (d6640). E-Commerce Data Interchange Using XML.** Designed to build e-commerce applications using XML (Extensible Markup Language) as the underlying technology. Students will also learn to parse XML documents, use Extensible Style Sheet language, and use XSQL (an Oracle technology) to tie XML with its database. Prerequisites: BIS 3100, 3330, and 3500. (3 cr)

**BIS 5650 (d6650). Advanced Website Development.** Creation of static and dynamic HTML pages, CGI, Perl, and Java script. Students create websites using Access or Oracle as the database backend. This technical course maintains a business focus as a transaction-oriented commercial site. Prerequisites: BIS 3100, 3330, and 3500. (3 cr) (F,Sp,Su)

**BIS 5660 (d6660). The Adult Business Learner.** Focuses on the adult business learner, the concept of the "learning organization," and the different types of postsecondary institutions that provide adult training and education in business. (3 cr)

**BIS 5700 (DSS). Internet Management and Electronic Commerce.** Familiarizes students with concepts and technologies relating to business and the Internet. Focuses on the new business environment that has evolved through the Internet, as well as associated technologies and strategies. Prerequisite: BIS 1400 or Computer and Information Literacy Examination. Some programming experience is helpful. (3 cr) (F,Sp)

**BIS 5800 (d6800). Security of Business Information Systems.** In-depth exploration of security issues in business information systems. Includes workstation, workgroups, intranet, and wide-area network security. Covers development of security policies and procedures. Includes information necessary to pass Certified Information Systems Security Professionals exam. Prerequisite: BIS 3500 or graduate admission. (3 cr) (F,Sp,Su)

**BIS 5950. Independent Readings.** Designed for individual student projects as approved by the department. (1-5 cr) (F,Sp,Su) ®

**BIS 6050 (d5050). Creating Internet Commerce Sites with Visual Interdev and SQL Server.** Explores design, development, and operation of corporate information centers (corporate interfaces for customers and employees), Internet commerce sites (direct sales to customers), and AI problem-solving sites (with an expert system to help the user with tasks). Prerequisites: BIS 3100, 3330, and 3500. (3 cr) (F,Sp)

**BIS 6110. Workshop.** Intensive workshops. (1-3 cr) (F,Sp,Su) ®

**BIS 6120. Business Information Systems Development.** Business information systems development, including analysis, design, and implementation. Students develop a working prototype to solve a real-world information systems problem. (3 cr) (Sp)

**BIS 6150. Communication for Business.** In-depth study of the process for preparing written business communications and related oral presentations. Preparation of reports relevant to student's major. Prerequisite: BIS 2550 or equivalent. (3 cr) (F,Su)

**BIS 6160. Integrative Pre-MBA Core.** Integrates financial reporting, analysis, and markets; domestic and global economic and legal environments; creation and distribution of goods and services; and human behavior in organizations. Upon completion, students without undergraduate degrees in business are prepared to enter advanced MBA core. Also taught as Acct 6160, BA 6160, Econ 6160, and MHR 6160. (18 cr) (Su)

**BIS 6180. Intrasession MBA Workshop.** Intensive workshops designed to enhance the MBA experience. (0.5-1 cr) ®

**BIS 6200. Business Data Communication Systems.** Introduction to business data communications, including concepts, network architecture, data communication soft-

ware and hardware, distributed information systems, and business communication system services. (3 cr) (F)

**BIS 6250. Graduate Internship.** Graduate-level internship in business, industry, or government position approved by department. Requires written learning objectives, performance evaluation, and a final internship written report. Requires 75 hours internship per 1 semester credit. (1-6 cr) (F,Sp,Su) ®

**BIS 6330 (d4330). Database Implementation.** Application of database concepts using industrial database products. Includes structured query language (SQL) development, database programming development, front- and back-end interface development, web database design, database administration basics, and integration of database tools within a project context. Prerequisite: BIS 3330 or equivalent. (3 cr) (F,Sp)

**BIS 6350. Managing Business Training Programs.** Examines various management topics in the training and development field, including program development, implementation, and evaluation. Discusses the various roles of training program managers. (3 cr) (F)

**BIS 6400 (d5400). Local Area Network Management for Business.** Application of networking concepts related to the management of local area networks. Includes topics related to setup, management, and maintenance of local area networks and installation of electronic mail handling systems. Prerequisite: BIS 3100. (3 cr) (F,Sp,Su)

**BIS 6410. Human-Computer Interface Design.** Integrates aspects of industrial psychology, work physiology, human environments, job analysis, and hardware/software engineering in the study of designing effective, efficient input/output interfaces for business information systems. (3 cr) (Sp)

**BIS 6440. Information and Decision Making.** Case-based approach to learning role of information technology when making quantitative and qualitative analyses, including statistical techniques to solve business problems through the use of information technology. Prerequisite: At least one graduate or undergraduate class in statistics. (3 cr) (Sp,Su)

**BIS 6450 (d5450). Designing Graphical User Interfaces for Electronic Commerce.** Integration of specialized web-design software, current multimedia technology (e.g., video/audio streaming, computerized slide shows, graphic animations, digital graphics) and web-design principles to create graphical user interfaces for e-commerce sites. Prior completion of BIS 2400 recommended. (3 cr) (F,Sp)

**BIS 6500. Developing Business Information Systems with Advanced Software Concepts.** Creation of custom applications to solve typical business problems or support common functions, using Visual Basic programming and OLE Automation with MS Office software. Prerequisite: Knowledge of database and spreadsheet software. (3 cr) (F,Sp,Su)

**BIS 6550. International Business Communication.** Culture-general and culture-specific study of business communication in the diverse world of international business, from both theoretical and applied perspectives. (3 cr) (F,Su)

**BIS 6600. Business Teaching Internship.** Graduate-level business teaching experience at approved corporate, secondary, or post-secondary sites. (1-3 cr) (F,Sp,Su) ®

**BIS 6640 (d5640). E-Commerce Data Interchange Using XML.** Designed to build e-commerce applications using XML (Extensible Markup Language) as the underlying technology. Students will also learn to parse XML documents, use Extensible Style Sheet language, and use XSQL (an Oracle technology) to tie XML with its database. Prerequisites: BIS 3100, 3330, and 3500. (3 cr)

**BIS 6650 (d5650). Advanced Website Development.** Creation of static and dynamic HTML pages, CGI, Perl, and Java script. Students create websites using Access or Oracle as the database backend. This technical course maintains a business

focus as a transaction-oriented commercial site. Prerequisites: BIS 3100, 3330, and 3500. (3 cr) (F,Sp,Su)

**BIS 6660 (d5660). The Adult Business Learner.** Focuses on the adult business learner, the concept of the “learning organization,” and the different types of postsecondary institutions that provide adult training and education in business. (3 cr)

**BIS 6700. Information Systems Strategies for Electronic Commerce.** A management-oriented treatment of general information systems principles and topics relating to information systems strategies for electronic commerce, such as business models, mass customization, market research, security and assurance, entrepreneurship, intelligent agents, virtual corporations, electronic payments, and customer service. (3 cr) (F)

**BIS 6720. Instruction and Training in Business and Marketing Education.** Designed for experienced training and educational personnel. Focuses on ways to improve instructional techniques and approaches. Compares traditional teacher/trainer-style teaching to student-centered teaching and training. (3 cr) (Su)

**BIS 6730. Teaching Methods in Business Education, Marketing Education, and Information Systems.** Advanced methodology for teaching business, marketing, and information system subjects, including techniques for teaching word processing, keyboarding, Internet, basic business, accounting, marketing, economics, and other business subjects in cognitive, psychomotor, and affective instructional domains. Taught online. (3 cr)

**BIS 6750. Business Process Reengineering Using Information Technology.** Examines methodologies and state-of-the-art thinking in the area of business process reengineering. Designed to help students understand how organizations manage change in contemporary global business environments by utilizing the latest information systems and technology techniques. (3 cr)

**BIS 6760. The Administration and Organization of School-to-Careers Programs in Business.** Covers the philosophy of the school-to-careers movement in the U.S., as well as how to organize and administer such a program. Includes discussion of the school-based, linking, and work-based components of such a program. (3 cr)

**BIS 6770. Competency-based Instruction.** Business teachers learn how to develop competency-based instruction by completing a CBI project. (3 cr) (F,Sp,Su)

**BIS 6800 (d5800). Security of Business Information Systems.** In-depth exploration of security issues in business information systems. Includes workstation, workgroups, intranet, and wide-area network security. Covers development of security policies and procedures. Includes information necessary to pass Certified Informa-

tion Systems Security Professionals exam. Prerequisite: BIS 3500 or graduate admission. (3 cr) (F,Sp,Su)

**BIS 6810. Introduction to the Research Process.** Essential scientific research concepts of theory development and data collection. The technology of research, including writing and funding proposals, experimental and study design, and project management. Includes a hands-on research project conducted by the student. (3 cr) (Sp,Su) ®

**BIS 6950. Independent Readings.** Specialized projects for graduate students. (1-3 cr) (F,Sp,Su) ®

**BIS 6970. Master’s Paper.** Master’s-level thesis or Plan B research credit. (1-6 cr) (F,Sp,Su) ®

**BIS 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

**BIS 7250. Graduate Research Internship.** For doctoral students desiring to improve their research capability. Prior approval required. Repeatable to a maximum of six credits. (1-3 cr) (F,Sp,Su) ®

**BIS 7330. School-Based Internship.** Internship for doctoral candidates preparing to be school supervisors. Repeatable to a maximum of 9 credits. (3-9 cr) (F,Sp,Su) ®

**BIS 7610. Critical Analysis of Issues.** Examines critical analysis/thinking techniques, creative problem solving, and the identification of issues and trends in the field. (3 cr)

**BIS 7950. Independent Readings.** Independent readings for graduate students. Repeatable to a maximum of 6 credits. (1-3 cr) (F,Sp,Su) ®

**BIS 7970. Doctoral Dissertation.** Doctoral-level dissertation research credit. (1-12 cr) (F,Sp,Su) ®

**BIS 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

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<sup>1</sup> Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

Department of

# Chemistry and Biochemistry

College of Science

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**Degrees Offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), Doctor of Philosophy (PhD) in Chemistry; MS and PhD in Biochemistry; BS and BA in Chemistry Teaching; BS and BA in Composite Teaching—Physical Science (Chem)

**Undergraduate emphases:** BS—Professional Chemistry, Biochemistry, Chemical Education, Life Science; **Graduate specializations:** Chemistry—Analytical Chemistry, Inorganic Chemistry, Organic Chemistry, Physical Chemistry

## Undergraduate Programs

### Objectives

Chemistry is a subject that addresses the properties of materials and the transformations that they undergo. Especially important are aspects of energy and structure related to chemical reactivity. Consequently, students of many disciplines take courses in chemistry to learn about the behavior of the substances they will use or reference. The Department of Chemistry and Biochemistry offers a wide variety of courses for those whose majors and/or anticipated careers require a knowledge of chemistry. These areas of study include nutrition, engineering, biology, agriculture, natural resources, medicine, law, and education, to name a few. Many students also choose chemistry as an elective course to better prepare themselves as citizens in a technological world.

The **Bachelor of Science Degree** entails considerable specialization in chemistry and related areas. The BS emphases require a common core of courses, but allow for a different concentration of advanced work according to the interests and career objectives of the student. The **BS with Professional Chemistry Emphasis** and **BS with Biochemistry Emphasis** degrees meet the requirements for certification by the American Chemical Society (ACS). The

certified degree emphases provide excellent preparation for immediate entry into the job market or for graduate school in chemistry, biochemistry, chemical engineering, molecular biology, nutrition, food science, materials science, and a wide variety of other fields. ACS certification in **Chemical Education** is available to students who complete an ACS-certified program, together with the Professional Education program in secondary education. The **BS with Life Science Emphasis** degree is popular for students wishing to go on to medical or dental graduate programs. The life science emphasis is particularly appropriate for **premedical** and **predental** students who want a strong base for understanding the nature of chemical reactions in the body and the behavior of the drugs they will prescribe, or who want an attractive alternative should they decide ultimately not to pursue medical or dental school. The **Chemistry Teaching Major** or the **Composite Teaching Major in Physical Science** are available to those who want a career in secondary education. The BA degree is an excellent choice for students with an interest in studying **law** or **business** and who have an interest in science.

The core of the program utilizes year-long sequences of classes. The first-year sequence introduces the basic principles of chemistry, as well as most of the major concepts of the science. The second year explores in greater depth the characteristics of

carbon-based compounds that serve as the backbone for the chemistry of life; for most drugs and medicines; for petroleum; for most fibers, paints, and plastics; and for many other commercial products. The third year examines in greater depth the models, theories, and mathematical interpretation of the structures, rates of change, energetics, and other properties of chemicals. In addition, one-semester courses examining the chemistry of life processes, the behavior of inorganic substances, and the analysis of the composition of substances are required. Many of the sequences have associated laboratory courses where students get hands-on practice. Here they synthesize compounds, measure physical properties, analyze samples, and determine structural features of compounds, using modern techniques and instrumentation. The requirements of the BS and BA degrees in chemistry, along with University and University Studies requirements, are summarized here. The specific requirements for the teaching major and for the composite teaching major in physical science are also included.

Students are also urged to study these requirements and to visit with their advisor on a regular basis about progress toward the completion of their degrees or for any questions regarding complementary courses and career goals.

### General Requirements

**Admission Requirements.** First-year students admitted to USU in good standing qualify for admission to this major. Transfer students from other institutions need a 2.2 transfer GPA, and students transferring from other USU programs need a 2.0 total GPA for admission to this major in good standing.

Students interested in studying chemistry should take high school mathematics courses that will enable them to start calculus during their first semester at USU. High school coursework in chemistry and physics is also desirable. AP credit in chemistry may be counted toward the degree. For details, contact the departmental advising faculty.

No Chem prefix course may be applied toward graduation with any major in chemistry with an earned grade of less than C-. Except for Chem 4800 and 4990, no Chem prefix course may be taken on a *Pass/Fail* basis. No Chem prefix course may be repeated more than one time to improve the grade to a C- or better. A student dropped from the chemistry program for failure to meet this standard may appeal to the departmental Curriculum Committee for readmission.

### Chemistry Core Curriculum

In addition to the University Studies requirements for graduation, chemistry majors take a series of core courses spread across a traditional four-year period. The completion of the chemistry core also covers the College of Science requirements for graduation.

**First Year:** Chem 1210, 1220, 1230, 1240; Math 1210, 1220.

**Second Year:** Chem 2310, 2320, 2330, 2340, 3510, 3520, 3600, 3610; Phyx 2210, 2220; Math 2210.

**Third Year:** Chem 3060, 3070, 3080, 3090, 5700; Math 2250 or Stat 3000 (optional for Chemistry Teaching Major).

**Fourth Year:** Chem 4990.

### Chemistry Requirements

**Professional Chemistry Emphasis (ACS Certified).** In addition to the chemistry core, Chem 5520, 5530, 5640, 5650; and 6 advanced electives, as approved by the department, are required.

**Biochemistry Emphasis (ACS Certified).** In addition to the chemistry core, Chem 5640, 5650, 5710, 5720; Biol 1210; and 6 advanced electives, as approved by the department, are required.

**Chemical Education Emphasis (ACS Certified).** In addition to the chemistry core, Chem 5520 and 5530, or Chem 5640 and 5650, or Chem 5710 and 5720; teaching licensure courses as specified by the Department of Secondary Education (35 cr.); and teaching minor from outside the Department of Chemistry and Biochemistry (12-16 cr.) are required.

**BS Degree with Honors.** This option can be met by completing any ACS certified program and by meeting the following requirements: Minimum GPA of 3.50 in chemistry courses; overall GPA of 3.30; 13 credits of honors work as follows: 3-6 credits of Chem 4800H (Research Problems), 3 credits chosen from Chem 2320H, 3070H, 5640H, or 5700H, 1 credit of Chem 4990H (Undergraduate Seminar), and 3-6 credits selected from Honors courses numbered 3000 or above in chemistry or related subjects, as appropriate. Three credits may be selected from chemistry courses numbered 6000 or above. Students must be admitted to Honors through the Honors Program Office.

**BS in Chemistry, Life Science Emphasis.** In addition to the chemistry core, Biol 1210; Biol 1220 or 2000; Biol 3200 or 3300; and Chem 5710, 5720 are required.

**BA in Chemistry:** In addition to the chemistry core, Chem 5520 or 5640; and two years of foreign language are required.

**Chemistry Teaching Major:** In addition to the chemistry core (minus the Math 2250 or Stat 3000 courses), Sci 4300, teacher licensure courses offered by Secondary Education (35 cr.), and a teaching minor from outside the Department of Chemistry and Biochemistry (12-16 cr) are required. An overall 2.75 GPA in a minimum of 60 semester credits of approved University coursework is required for admission into the Secondary Teacher Education Program (STEP). A minimum overall GPA of 2.75 is required for graduation. Specific for admission to this program, a student must have at least a 2.75 GPA in Chem 1210, 1220, 1230, and 1240.

**Composite Teaching Major in the Physical Sciences.** This degree is available through the Chemistry and Biochemistry or Physics departments. Students with a Composite Teaching Major in Physical Sciences should plan their programs carefully in order to meet the upper-division requirement for graduation. An overall 2.75 GPA in a minimum of 60 semester credits of approved University coursework is required for admission into the Secondary Teacher Education Program (STEP). A minimum overall GPA of 2.75 is required for graduation.

Specific for admission to this program, a student must have at least a 2.75 GPA in the following chemistry and physics courses: Chem 1210, 1220, 1230, 1240; Phyx 2110, 2120, or Phyx 2210, 2220 (preferred). *This program does not include many aspects of the Chemistry Core.*

**Required Courses:** Chem 1210, 1220, 1230, 1240; Chem 2300 or 2310; Chem 2330; Phyx 1000; Phyx 1030 or 3030; Phyx 2110

and 2120, or Phyx 2210 and 2220; Math 1210, 1220; Stat 3000; Sci 4300; Biol 1010; Geol 1150; Bmet 2000; and teacher licensure courses from Secondary Education (35 cr.). A teaching minor is optional for the Composite Teaching Major in the Physical Sciences.

**Chemistry Minor.** In addition to Chem 1210, 1220, 1230, and 1240, 10 additional credits in Chemistry prefix courses at the 2000 level or higher are required.

**Chemistry Teaching Minor.** In addition to Chem 1210, 1220, 1230, 1240, Chem 2300 or 2310, and Chem 2330, 3 additional credits selected from the following are required: Chem 2320 (if Chem 2310 has been previously selected), Chem 3060, *both* Chem 3510 and 3520, Chem 3600, Chem 3650, or Chem 3700.

### *Career Opportunities*

Chemistry degree holders work in a wide variety of professions, from physicians, lawyers, and professors to research/development, sales, or production in the chemical, oil, pharmaceutical, metals, electronic, and biochemical industries. Government at all levels employs chemists, including the federal Departments of Defense, Health and Human Services, Agriculture, and Interior. A graduate with a bachelor's degree often begins work in chemical analysis or sales or may assist senior chemists in research and development. A graduate with a teaching major or chemistry education emphasis may teach in public schools. A graduate degree is usually needed to direct research or teach at the university level. Degree holders from the Department of Chemistry and Biochemistry have had excellent success in obtaining support for graduate studies, often at very prestigious institutions, and in obtaining employment directly following graduation. For further information, students should contact their advisor.

## *Graduate Programs*

### *Admissions Requirements*

See the general admission requirements for the School of Graduate Studies (pages 72-73). All applicants should have a bachelor's degree or master's degree in chemistry or biochemistry from an accredited institution. Appropriate undergraduate preparation is expected; applicants not fully prepared may be admitted with the condition that appropriate undergraduate courses are taken as necessary.

Applications are especially encouraged during the spring semester for expected admission in the following fall semester. However, the Graduate Recruiting and Admissions Committee screens applications throughout the year. Detailed information about the graduate programs and faculty research activities can be found on the Internet at <http://www.chem.usu.edu>.

### *Degree Programs*

**Master of Science.** To earn an MS in chemistry or biochemistry, a student must meet the general requirements of the School of Graduate Studies (see pages 76-77), conduct research under the direction of a major professor and write a thesis acceptable to a supervisory committee (Plan A) or write a review-of-literature paper (Plan B), and pass an oral examination that is principally a defense of the thesis or the Plan B paper.

Qualified undergraduate chemistry majors at USU may apply in the third year for admission to the MS program. Students may be admitted to this MS program if they have a *B* average in chemistry, physics, and mathematics courses, and have completed the one-year sequences in general, organic, and physical chemistry (including labs), two courses in analytical or inorganic chemistry, two semesters of physics, math through Math 2210, and at least 15 credits of their University Studies requirements.

Students should consult with the chairman of the Graduate Recruiting and Admissions Committee to be certain of their eligibility for this program. The chairman will then submit an application to the department head and to the School of Graduate Studies for approval. Students must earn a satisfactory grade on the GRE exam before the completion of the MS degree. All requirements for the BS degree must be completed within two semesters of admission. The MS coursework cannot include coursework counted toward the BS degree.

**Doctor of Philosophy.** To earn the PhD in chemistry or biochemistry, a student must successfully complete a core curriculum of courses and other courses as approved by a supervisory committee. In addition, preliminary examinations (both oral and written) must be passed and research in a field of specialization must be conducted. The final requirement is the writing and defense of a dissertation before the student's supervisory committee.

**Biochemistry Course Requirements.** Every MS and PhD student in the biochemistry program must complete Chem 6730, 6740, 6750, and 6760. In addition, all students must register for at least 2 credits of Chem 6720 in the first semester of residence to participate in research training. Both MS and PhD students must complete a total of at least 15 credits in coursework, exclusive of seminar and research credit. The Program of Study is approved by the student's supervisory committee. A total of 30 credits is required for the MS degree, and a total of 90 credits is required for the PhD. Beginning students who already hold an MS degree need 60 credits to complete the PhD program.

**Chemistry Course Requirements.** Every MS and PhD student in the chemistry program must complete the courses required for their specialization: *Analytical*—Chem 7600, 7610; *Inorganic*—Chem 6500, 6510; *Organic*—Chem 6300, 7300, 7310; or *Physical Chemistry*—Chem 6000, 6010, 7020. Both MS and PhD students must complete a total of at least 15 credits in coursework, exclusive of seminar and research credit. The Program of Study is approved by the student's supervisory committee. A total of 30 credits is required for the MS degree and a total of 90 credits is required for the PhD. Beginning students who already hold an MS degree need 60 credits to complete the PhD program.

### *Financial Assistance*

The department offers financial support to students in the form of teaching assistantships, research assistantships, and fellowships. All applications for admission to the School of Graduate Studies constitute an application for financial assistance; it is not necessary to file a separate request. Teaching assistantships are the principal means of support for first-year students. Inquiries about current support levels should be directed to the department main office. The department is responsible for the first nine months of stipend and tuition, with the remaining summer stipend and tuition usually being paid from faculty research funds. Teaching assistants devote no more than 12 contact hours per week directing undergraduate laboratories, leading recitation sec-

tions, and assisting students with questions during the regular fall and spring semesters. Research assistantships, funded from individual faculty research grants, support students conducting research related to the grant projects. Although first-year students are not normally supported as research assistants, well-prepared students may be eligible for research support at the discretion of their major professor.

Fellowships are awarded by the University to outstanding students solely on the basis of merit. The department encourages students with strong academic records to apply for the University fellowships and national awards, and will provide assistance in obtaining and submitting the appropriate forms. Additionally, several graduate awards are given each year to honor exemplary performance in research and teaching.

The College of Science recently established the Willard L. Eccles Foundation Science Fellowship. The \$15,000 per year, three-year stipend is competitively awarded to highly qualified science applicants. Students applying to the graduate program will be considered for this fellowship, and will be sent the necessary information. Application deadline for this fellowship is March 1.

## Chemistry and Biochemistry Courses (Chem)

**Chem 1010 (BPS). Introduction to Chemistry.** For nonscience majors. Includes basic chemical concepts and a survey of the various branches of chemistry. Heavy emphasis on everyday applications to problems involving environmental pollution, radioactivity, energy sources, and human health. No prerequisites. (3 cr) (F,Sp) ©

**Chem 1110. General Chemistry I.** For nonscience majors. Progression made from the basic tenets of general chemistry to introduction to organic chemistry, with ascent in terms of practical importance and sophistication. Prerequisite: Math ACT score of at least 23, or Math 1050 or higher. (4 cr) (F,Sp)

**Chem 1120 (BPS). General Chemistry II.** Continuation of Chem 1110. Continued coverage of organic chemistry, along with introduction to biochemistry. Prerequisite: Chem 1110. (4 cr) (Sp)

**Chem 1130. General Chemistry Laboratory.** Laboratory course designed to accompany Chem 1110. Covers basic aspects of general chemistry. (1 cr) (Sp)

**Chem 1210. Principles of Chemistry I.** First of a two-semester sequence, covering fundamentals of chemistry. Designed for science and engineering students. Prerequisite: Math ACT score of at least 25, or Math 1050 or higher. High school chemistry recommended. (4 cr) (F,Sp)

**Chem 1220 (BPS). Principles of Chemistry II.** Continuation of Chem 1210. Prerequisite: Chem 1210. (4 cr) (F,Sp,Su)

**Chem 1230. Chemical Principles Laboratory I.** Laboratory course designed to be taken concurrently with Chem 1210. Experiments cover acids/bases, thermochemistry separations, molecular weights, gases, and spectroscopy. Prerequisite: Chem 1210 (may be taken concurrently). (1 cr) (F,Sp)

**Chem 1240. Chemical Principles Laboratory II.** Continuation of Chem 1230. Normally taken concurrently with Chem 1220. Experiments cover elementary kinetics, electrochemistry, gravimetric analysis, chromatography, and equilibria. Prerequisite: Chem 1230. (1 cr) (F,Sp)

**Chem 2300. Principles of Organic Chemistry.** Shape, bonding, nomenclature, stereochemistry, physical properties, and reactivity of organic molecules is covered for a range of molecules, beginning with simple alkanes and finishing with some of the more complex abiotic and biotic organic molecules known today. Prerequisite: Chem 1210. (3 cr) (F)

**Chem 2310. Organic Chemistry I.** First of a two-semester sequence, covering physical properties, nomenclature, mechanisms of reactions, and biological relevance of organic and bioorganic molecules. Prerequisite: Chem 1220. (4 cr) (F,Sp)

**Chem 2320. Organic Chemistry II.** Continuation of Chem 2310. Prerequisite: Chem 2310 or Chem 2300 and permission of instructor. (4 cr) (Sp)

**Chem 2330. Organic Chemistry Laboratory I.** Laboratory course designed to accompany Chem 2310. Covers basic aspects of experimental organic chemistry. Prerequisites: Chem 1210 and 1230. (1 cr) (F,Sp)

**Chem 2340. Organic Chemistry Laboratory II.** Continuation of Chem 2330. Prerequisite: Chem 2330. (1 cr) (Sp)

**Chem 3060 (QI). Physical Chemistry.** Chemical thermodynamics. Laws of thermodynamics. Changes of state. Chemical equilibrium. Introduction to quantum mechanics. Schrodinger equation. Exactly-soluble problems. Prerequisites: Chem 1220, Math 2210, Phys 2220. (3 cr) (F)

**Chem 3070 (QI). Physical Chemistry.** Chemical applications of quantum mechanics, periodic table, and chemical bonding. Spectroscopy. Statistical thermodynamics. Chemical kinetics. Rate laws. Reaction mechanisms. Theories of reaction rates. Prerequisite: Chem 3060. (3 cr) (Sp)

**Chem 3080 (CI). Physical Chemistry Laboratory I.** Experimental work to accompany Chem 3060. Corequisite: Chem 3060. (1 cr) (F)

**Chem 3090 (CI). Physical Chemistry Laboratory II.** Continuation of Chem 3080. Experimental work to accompany Chem 3070. Corequisite: Chem 3070. (1 cr) (Sp)

**Chem 3510. Intermediate Inorganic Chemistry.** Survey of basic structure, bonding, and reactivity across the periodic table. Prerequisite: Chem 1220. (2 cr) (Sp)

**Chem 3520. Inorganic Chemistry Laboratory.** Covers basic aspects of inorganic synthesis and compound characterization. Corequisite: Chem 3510. (1 cr) (Sp)

**Chem 3600 (QI). Quantitative Analysis.** Basic theory and laboratory practice in analytical chemistry, including introduction to multiple equilibria and chemical separation methods. Prerequisites: Chem 1230, 1240, Math 1050. (3 cr) (F)

**Chem 3610. Quantitative Analysis Laboratory.** One three-hour laboratory per week. Must be taken concurrently with Chem 3600. Prerequisites: Chem 1230, 1240, Math 1050. (1 cr) (F)

**Chem 3650 (DSC). Environmental Chemistry.** Survey of issues and chemical nature of environmental problems, including air, soil, and water pollution. Prerequisite: Chem 1010 or 1120 or 1220. (3 cr) (Sp)

**Chem 3700. Introductory Biochemistry.** Brief survey of the chemistry of biologically important compounds and their role in microbial, animal, and plant metabolism. Prerequisite: Chem 2300 or 2310. (3 cr) (Sp)

**Chem 3710. Introductory Biochemistry Laboratory.** Laboratory course designed to accompany Chem 3700. Corequisite: Chem 3700. (1 cr) (Sp)

**Chem 4250. Cooperative Experience.** Planned work outside the University. Specific experience must receive prior approval for credit to be earned. Consult advisor or department head for details. (1-2 cr) (F,Sp,Su) ©

**Chem 4800 (CI). Research Problems.** Directed undergraduate research. Departmental permission required. (1-2 cr) (F,Sp,Su) ®

**Chem 4990 (CI). Undergraduate Seminar.** Writing and speaking skills necessary for presenting scientific information. (1 cr) (F,Sp) ®

**Chem 5160. Methods in Biotechnology: Cell Culture.** Techniques and fundamental knowledge for culturing mammalian and insect cells. Students will learn maintenance, growing, genetic engineering of cells, cytotoxicity, hybridoma creation, cloning, etc. Extensive laboratory experience is provided. Also taught as ADVS 5160, Biol 5160, NFS 5160, and PSB 5160. (3 cr) (Sp)

**Chem 5240. Methods in Biotechnology: Protein Purification Techniques.** Reviews basic methods of protein purification, including scaled-up use of 100L fermenter, large-scale centrifugation, diafiltration, chromatography, and use of BioCAD. Prerequisite: Chem 3700. Also taught as ADVS 5240, Biol 5240, NFS 5240, and PSB 5240. (3 cr) (Sp)

**Chem 5260. Methods in Biotechnology: Molecular Cloning.** Laboratory-oriented course designed to teach molecular biology techniques such as DNA cloning, genetic probes, polymerase chain reaction, and DNA sequencing. Prerequisite: Chem 3700 or 5710; or Biol 3200; or permission of instructor. Also taught as ADVS 5260, Biol 5260, NFS 5260, and PSB 5260. (3 cr)

**Chem 5520. Advanced Inorganic Chemistry.** Advanced treatment of the structure/bonding/reactivity relationships across the periodic table. Prerequisites: Chem 3070, 3510. (2 cr) (F)

**Chem 5530. Advanced Synthesis Laboratory.** Laboratory course in advanced synthetic techniques, including vacuum lines, inert atmosphere, Schlenk manipulations, liquid ammonia solvent, and tube furnace reactions. Prerequisites: Chem 2340, 3070, 3520. (2 cr) (Sp)

**Chem 5640. Instrumental Analysis.** Theory and application of physicochemical methods of analysis. Chromatography. Selected electrochemical and optical methods. Prerequisites: Chem 3080, 3610. (3 cr) (Sp)

**Chem 5650. Instrumental Analysis Laboratory.** Laboratory course to accompany Chem 5640. Two three-hour labs per week. Prerequisites: Chem 3080, 3610. (2 cr) (Sp)

**Chem 5700. General Biochemistry I.** General biochemistry for science majors, including proteins, enzymes, catalysis, bioenergetics, and catabolic metabolism. Prerequisite: Chem 2320. (3 cr) (F)

**Chem 5710. General Biochemistry II.** Continuation of Chem 5700. General biochemistry for science majors, including anabolic metabolism, DNA, RNA, and protein synthesis. Prerequisite: Chem 5700. (3 cr) (Sp)

**Chem 5720. General Biochemistry Laboratory.** Prerequisite: Chem 5710 (may be taken concurrently). (1 cr) (Sp)

**Chem 6000. Advanced Physical Chemistry.** A first-year graduate course in physical chemistry. Prerequisites: Chem 3070, Math 2250. (3 cr) (F)

**Chem 6010. Quantum Chemistry.** Quantum mechanics applied to chemical problems. Theory of atoms and molecules. Prerequisites: Chem 3070, Math 2250. (3 cr) (Sp)

**Chem 6300. Advanced Modern Organic Chemistry.** Covers topics in molecular structure, reaction mechanisms of organic molecules, and physical organic chemistry. Prerequisites: Chem 2320, 3070. (3 cr) (F)

**Chem 6500. Reactivity and Mechanisms in Inorganic Chemistry.** Inorganic reactions and mechanisms relevant to areas of main group, transition metals, and bioinorganic and organometallic chemistry. Prerequisite: Chem 5520. (3 cr) (Sp)

**Chem 6510. Chemical Applications of Group Theory.** Introduction to symmetry point groups and theorems of group theory for application to structure, bonding, and spectroscopy. Some familiarity with linear algebra is recommended. Prerequisite: Chem 3070. (1 cr) (F)

**Chem 6600. Modern Chemical Analysis.** Methodology and statistical treatment of chemical data, experimental design, quality control, and chemical separations. Prerequisite: Chem 5640. (3 cr) (Sp)

**Chem 6720. Advanced Biochemistry Laboratory.** To obtain advanced laboratory skills, students complete specific laboratory experiments in research laboratories of departmental faculty members. (2 cr) (F,Sp) ®

**Chem 6730. Principles of Enzymology.** Mechanisms of enzyme action, emphasizing recent advances in enzymology, including theory and modern experimental approaches to elucidation of mechanism. Prerequisite: Chem 5700 or equivalent. (3 cr) (F)

**Chem 6740. Principles of Protein and Nucleic Acid Structure.** Fundamental elements of protein and nucleic acid structure and function. Recent advances in the area of protein and nucleic acid structure having direct implications to their function. Methods for macromolecular structure determination. Prerequisite: Chem 5700 or equivalent. (3 cr) (Sp)

**Chem 6750. Principles of Metabolic Regulation.** Integration and regulation of mammalian metabolism. Communication among cells and tissues, molecular mechanisms of signal transduction (including protein phosphorylation and proteolytic activation), activation of transcription factors, and regulation of gene expression. Prerequisite: Chem 5700 or equivalent. (3 cr) (Sp)

**Chem 6760. Principles of Bioenergetics.** Global biological energy cycles including carbon, nitrogen, and sulfur cycles; respiration; electron transfer; and energy transduction. Prerequisite: Chem 5700 or equivalent. (3 cr) (F)

**Chem 6910. Special Problems in Chemistry and Biochemistry.** Selected problems in chemistry and biochemistry. Registration permitted only with written permission from department head. (1-4 cr) (F,Sp,Su)

**Chem 6970. Thesis Research.** Research for MS degree. (1-10 cr) (F,Sp,Su) ®

**Chem 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

**Chem 7000. Chemical Kinetics.** Theory of reaction rates with application to current research. Prerequisite: Chem 6000. (3 cr) (F)

**Chem 7010. Chemical Thermodynamics.** Study of interconversion of heat, work, and other forms of energy. Prerequisite: Chem 3070. (3 cr) (F)

**Chem 7020. Statistical Mechanics.** Statistical mechanics with applications to research problems of current interest. Prerequisite: Chem 6010. (3 cr)

**Chem 7030. Special Topics in Physical Chemistry (Topic).** Covers special areas of current interest and activity in physical chemistry. Prerequisite: Chem 6000. (3 cr) (F,Sp) ®

**Chem 7300. Reactions and Synthesis in Modern Organic Chemistry.** Reactions of modern organic chemistry and their application to organic synthesis. Prerequisite: Chem 6300. (3 cr) (Sp)

**Chem 7310. Molecular Structure/Spectroscopy of Organic Compounds.** Modern methods of predicting and determining molecular structure of organic compounds using advanced computational and spectroscopic tools. Prerequisite: Chem 6300. (3 cr) (F)

**Chem 7330. Special Topics in Organic Chemistry (Topic).** Covers special areas of current interest and activity in organic chemistry. Prerequisite: Chem 6300. (3 cr) (F,Sp) ®

**Chem 7500. Coordination Chemistry.** Theory and spectroscopy of transition metal coordination complexes. Prerequisites: Chem 3070, 6500, 6510. (3 cr) (Sp)

**Chem 7510. Bioinorganic Chemistry.** Advanced systematic study of metallo-biochemical structure and function. Prerequisite: Chem 6500. (1-3 cr) (F)

**Chem 7530. Special Topics in Inorganic Chemistry (Topic).** Topics of current interest in inorganic chemistry. Prerequisite: Chem 6500. (3 cr) (Sp) ®

**Chem 7600. Analytical Spectroscopy.** Practical description of spectroscopy-based analysis, emphasizing instrumentation and methods. Prerequisites: Chem 5640, graduate standing, or instructor's permission. (3 cr) (Sp)

**Chem 7610. Chemical Separations.** Survey of theory and practice of modern chemical separations, including extractions, chromatography, distillation, and phase separations. Prerequisite: Chem 5640 or instructor's permission. (3 cr) (F)

**Chem 7620. Electrochemistry.** Survey of electrochemistry with emphasis on electrochemical analysis. Prerequisite: Chem 5640. (3 cr) (F)

**Chem 7640. Special Topics in Analytical Chemistry (Topic).** Topics may include electronics from the scientist's perspective, laser-based spectroscopy, mass spectrometry, and chemometrics. Prerequisite: Chem 6600. (1-3 cr) (F,Sp) ®

**Chem 7770. Special Topics in Biochemistry (Topic).** Topics of current interest in biochemistry. (2-3 cr) ®

**Chem 7800. Seminar.** Graduate seminar. (1 cr) (F,Sp,Su) ®

**Chem 7970. PhD Dissertation Research.** (1-12 cr) (F,Sp,Su) ®

**Chem 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

# Department of Civil and Environmental Engineering

## College of Engineering

**Head: Professor Loren R. Anderson**, geotechnical engineering  
Office in Engineering Laboratory 211, (435) 797-2932

### Undergraduate Division Heads:

**Civil Engineering: Professor Kevin C. Womack**, structural mechanics

**Environmental Engineering: Professor R. Ryan Dupont**, hazardous waste management, bioremediation

### Graduate Program Division Heads:

**Environmental Engineering: Professor R. Ryan Dupont**, hazardous waste management, bioremediation

**Geotechnical Engineering: Associate Professor Joseph A. Caliendo**, geotechnical engineering

**Structural Engineering: Professor Kevin C. Womack**, structural mechanics

**Transportation Engineering: Professor Prianka N. Seneviratne**, transportation systems analysis and modeling

**Water Engineering: Professor David G. Tarboton**, hydrology and water resources

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**WWW** <http://www.engineering.usu.edu/Departments/cee/>

**Professors** *A. Bruce Bishop*, engineering systems and planning; *David S. Bowles*, risk assessment, hydrology, water resources engineering; *William J. Doucette*, environmental analytical chemistry; *William J. Grenney*, Advanced Center for Transportation Studies; *Thomas B. Hardy*, ecological system modeling, statistical analysis; *Daniel H. Hoggan*, hydrologic and hydraulic modeling; *Jagath J. Kaluarachchi*, surface and groundwater, flow and contaminant transport; *Marian W. Kemblowski*, subsurface hydrology and transport processes; *Mac McKee*, water resources planning and analysis; *William J. Rahmeyer*, hydraulics, hydraulic structures, scour and erosion; *Ronald C. Sims*, hazardous waste management; *David K. Stevens*, treatment process analysis; *Muzz Yener*, structural engineering and mechanics; **Research Professor** *Darwin L. Sorensen*, aquatic microbiology; **Professors Emeriti** *Jay M. Bagley*, hydrology, water resources; *W. O. Carter*, structures; *Calvin G. Clyde*, fluid mechanics and groundwater; *Irving S. Dunn*, geotechnical engineering; *Gordon H. Flammer*, hydraulics; *Trevor C. Hughes*, water resources systems analysis; *C. Earl Israelsen*, hydrology, hydraulics, water resources, erosion control; *Roland W. Jeppson*, numerical modeling; *Fred W. Kiefer, Jr.*, geotechnical engineering; *Elliot Rich*, structural engineering; *J. Paul Riley*, water resources systems, hydrology; *J. Paul Tullis*, hydraulics, hydraulic structures, and hydromachinery; *Reynold K. Watkins*, geotechnical engineering; **Adjunct Professors** *Lloyd H. Austin*, water resources; *George G. Goble*, deep foundations and structural dynamics; *Jeffrey R. Keaton*, geotechnical engineering, engineering geology; *Upmanu Lall*, climate modeling, statistical hydrology, water resource systems; *Neil Parrett*, performance and safety of dams; *Norman E. Stauffer, Jr.*, engineering hydrology and computer modeling; *Daniel A. Stone*, environmental chemistry; **Associate Professors** *Marvin W. Halling*, structural dynamics, earthquake engineering; *Sonia S. Manuel-Dupont*, technical writing; *Randal S. Martin*, environmental engineering (air pollution); *Michael J. McFarland*, environmental engineering; *J. Derle Thorpe*, engineering materials, measurements; *Gilberto E. Urroz-Aguire*, hydraulics, hydraulic structures; **Adjunct Associate Professors** *Ronald Christiansen*, water law; *Danny Marks*, snow hydrology; *Eva C. Nieminski*, water quality; *Mufeed M. Odeh*, physical and mathematical modeling of hydraulic systems; *Anthony Turhollow*, transportation; **Assistant Professors** *James A. Bay*, geotechnical engineering; *Anthony Chen*, traffic engineering and network planning; *Laurie S. McNeill*, environmental engineering (drinking water); **Research Assistant Professors** *Sanjay Chauhan*, dam safety, risk assessment, hydrologic modeling; *Joan E. McLean*, fate and behavior of metals in subsurfaces; *Robert T. Pack*, geomatics and engineering geology; *Judith L. Sims*, fate and behavior of organic chemicals; *Blake P. Tullis*, hydraulics, hydraulic structures, and hydromachinery; **Adjunct Assistant Professors** *Steve Barfuss*, hydraulics; *Arnfinn J. Emdal*, geotechnical; *Jon S. Ginn*, environmental; *Michael C. Johnson*, hydraulics; **Affiliate Faculty** *Robert W. Hill*, professor, Biological and Irrigation Engineering; *John E. Keith*, professor, Economics; *Jack Keller*, professor emeritus, Biological and Irrigation Engineering; *Wynn R. Walker*, professor, Biological and Irrigation Engineering

**Degrees offered:** Bachelor of Science (BS) in Civil Engineering; BS in Environmental Engineering; Master of Engineering (ME), Master of Science (MS), Civil Engineer (CE) and Doctor of Philosophy (PhD) in Civil and Environmental Engineering

**Graduate specializations:** Environmental Engineering, Fluid Mechanics and Hydraulic Engineering, Geotechnical Engineering, Hazardous Waste Management, Structural Engineering and Mechanics, Transportation Engineering, Water Engineering, Water Resources Engineering and Hydrology

# Undergraduate Programs

## Objectives

Civil and Environmental Engineering is concerned with planning, designing, constructing, and operating various physical works; developing and utilizing natural resources in an environmentally sound manner; providing the infrastructure which supports the highest quality of life in the history of the world; and protecting public health and renovating impacted terrestrial and aquatic systems from the mismanagement of toxic and hazardous wastes. The Department of Civil and Environmental Engineering offers Bachelor of Science degrees in Civil Engineering and in Environmental Engineering. Both degrees are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET).

The objectives of the undergraduate programs in Civil Engineering and Environmental Engineering are to graduate engineers who have a broad educational background and experiences in engineering, the sciences, and the humanities; who have passed the Fundamentals of Engineering examination; and who are prepared to enter graduate school, other professional training, or the workplace as effective professionals. These graduates will understand the significance of life-long learning and will be qualified to become professional engineers and contribute significantly to the engineering profession and society as a whole.

## Outcomes

Graduates with a BS degree in Civil Engineering from Utah State University will have:

1. Proven themselves proficient in mathematics; the sciences; and the structures, geotechnical, hydraulics, and transportation areas of civil engineering.
2. Demonstrated the ability to solve engineering problems, utilizing fundamental engineering principles, as well as the latest technologies and engineering tools, in the process of engineering analysis and design. They will have done this as individuals and as members of multidisciplinary teams.
3. Shown a capacity for investigation and experimentation into physical (engineering) phenomena, along with the ability to analyze and interpret engineering data in at least two of the following areas of civil engineering: structures, geotechnical, hydraulics, and transportation.
4. Demonstrated the capability to communicate verbally, in writing, and through the use of engineering communication media. They will also have shown the capacity to present the outcomes of their problem solving and design projects for groups of engineers and lay persons.
5. Exhibited an understanding of the role civil engineering plays in our modern global society, that much is to be learned from the past and applied to the present, and that a responsible engineer is ethical and will continue to increase his or her knowledge throughout his or her lifetime.

Graduates with a BS degree in Environmental Engineering from Utah State University will have:

1. Knowledge of basic science and engineering principles fundamental to the practice of environmental engineering including: mathematics, biology, chemistry, soil science, physics, fluid and solid mechanics, hydrology, and engineering economics.

2. Knowledge of environmental engineering practice in the areas of water supply and treatment; environmental systems dynamics; environmental chemistry and analysis; wastewater, air quality, and solid and hazardous waste management; and public health and industrial hygiene.

3. Advanced knowledge of science and engineering principles in two of the following program emphasis areas: water, solids, natural systems, and public health.

4. Integration of advanced science and engineering principles in a multidisciplinary team environment for the solution of a comprehensive design problem in one of the program emphasis areas incorporating: applicable design standards; state-of-the-practice design tools; real-life economic, social, regulatory, political, ethical, and business design constraints; and applicable considerations for contemporary issues, such as product manufacturability, process sustainability, health and safety concerns, and system constructability.

5. Experience in written and oral communication using state-of-the-practice presentation methods throughout the course of their Professional Program in Environmental Engineering which include: laboratory reports and presentations, research paper presentations, design proposal and progress reports and presentations, and final design project presentations to both technical and lay audiences.

6. Experience in one of the environmental engineering practice areas in the design and conduct of experiments; collection, analysis, and interpretation of data; and modeling and representation of experimental results and presentation of experimental findings.

## Assessment

The Civil and Environmental Engineering Department employs several methods to assess the quality of the two BS programs offered by the department. Assessments are made prior to graduation by measuring the performance of students in each class. In addition, the results of the FE exam, senior exit interviews, and faculty reviews of student portfolios are used. Post-graduate assessment of Civil and Environmental Engineering graduates is also conducted up to six years after graduation. Assistance from outside reviewers is also obtained in making the assessment.

## Requirements

**Admission Requirements.** Admission requirements for the Department of Civil and Environmental Engineering are the same as those described for the University on pages 48-51. Students in good standing may apply for admission to the department. In addition, students must maintain the academic requirements outlined for the College of Engineering on pages 91-92.

**Bachelor of Science Degrees.** The Department of Civil and Environmental Engineering offers two Bachelor of Science degrees: one in Civil Engineering and one in Environmental Engineering. The four-year programs leading to these two degrees are listed below. During the first two years, students are in a pre-engineering program. Students must successfully complete the pre-engineering program or, in the case of transfer students, substantially equivalent coursework at another institution before they are accepted into the professional program. Transfer students may apply for permission to take upper-division courses in cases where postponement of these courses will prolong the student's time to graduate.

Design is a cornerstone of engineering that requires creative thinking, technical knowledge, the ability to organize and solve complex problems, and teamwork. Engineering design activities begin during the first two years and progress in-depth as each student's proficiency increases. These design activities culminate in a major senior design course, which integrates past engineering coursework into a focused, realistic design project. An important feature of the senior design experience is that students work in teams to complete the project.

The student who is majoring in or planning to major in Civil Engineering or Environmental Engineering needs to be aware of the College of Engineering requirements concerning admission to the college, pre-engineering program, admission to professional engineering programs, University Studies, and other academic requirements. Additional information concerning these items is given in the College of Engineering write-up on pages 90-92. It is the responsibility of the student to be aware of these rules and regulations. **Passing the Fundamentals of Engineering Exam is required for graduation.**

The Civil and Environmental Engineering Department strongly recommends that students have a high-end calculator, such as an HP-48 or HP-49 calculator, that has the capabilities to do units, matrices, and programs in BASIC. Although not a requirement at this time, CEE students are strongly encouraged to have a modern desktop or laptop personal computer. Since computer technology is changing rapidly, students should seek advice from a knowledgeable professional on hardware and software requirements before purchasing a computer.

### **Undergraduate Course Requirements for Civil Engineering**

**Preengineering Program (freshmen and sophomore years):** CEE 1880, 2240, 2870, 3030; Engr 1010, 2000, 2020, 2040, 2200, 2210; ITE 2270; Chem 1210; Engl 1010, 2010; Geol 1150; Math 1210, 1220, 2250; Phyx 2200 (or High School AP Physics), 2220; University Studies courses (see College of Engineering University Studies requirements).

**Professional Engineering Program (junior and senior years):** CEE 3010, 3080, 3210, 3430, 3500, 3510, 3610, 3640, 3870, 4200, 4300; Civil Engineering Design Elective, one course chosen from: CEE 3780, 5070, 5230, 5350, 5460, 5540; Design project consisting of CEE 3880, 4870, and 4880; Technical electives (15 credits) chosen from: CEE 3670, 3780, 5010, 5050, 5070, 5080, 5100, 5190, 5220, 5230, 5240, 5350, 5430, 5440, 5450, 5460, 5470, 5540, 5550, 5560, 5690, 5700, 5860, 5870, 5880, 5900, MAE 2060, 2400; University Studies courses (see College of Engineering University Studies requirements).

### **Undergraduate Course Requirements for Environmental Engineering**

**Preengineering Program (freshman and sophomore years):** CEE 1880, 2240, 2890; Engr 1010, 2000, 2020, 2040, 2200; ITE 2270; MAE 2400; Biol 1210, 3300; Chem 1210, 2300; Engl 2010; Math 1210, 1220, 2250; Phyx 2200 (or High School AP Physics), 2220; University Studies courses (see College of Engineering University Studies requirements).

**Professional Engineering Program (junior and senior years):** CEE 3030, 3430, 3500, 3510, 3640, 3670, 3780, 3870, 3890, 4200, 5610, 5860; PubH 3310; Environmental Engineering Design Elective, one class chosen from: CEE 5690, 5740, 5810,

5880; Design project consisting of CEE 3890, 4790, 4890. Technical Electives (5 credits), with one course chosen from Area 1, 2, or 3, and one course chosen from Area 4 or 5: *1—Solids:* CEE 5670, 5680, 5730, 5830, 5870, 5880; *2—Water:* CEE 5430, 5620, 5730, 5810; *3—Air:* Bmet 4300, CEE 5710, 5750, 5790, 5870; *4—Natural Systems:* AWER 4500, 4530, CEE 5690, 5700, 5740; *5—Occupational Safety and Health:* PubH 5310, 5320, 5330, CEE 5670, 5710, 5790. University Studies courses (see College of Engineering University Studies requirements).

### **Additional Information**

For more information about Bachelor of Science requirements and the sequence in which courses should be taken, see major requirement sheet, available from the Civil and Environmental Engineering Department.

Departmental honors can be earned by completing 20 credits of upper-division honors engineering courses. Students should work with the department in selecting appropriate courses.

### **Concurrent BS/Master's Program**

The concurrent BS/Master's program allows engineering students to begin taking graduate-level classes during their senior year. This permits them to complete requirements for *both* the BS degree *and* the master's degree concurrently during two years. Students in this program have a greater selection of graduate courses, since many graduate courses are taught during alternate years. In addition, the student's senior design project could be a start for a graduate design project or thesis. After completing their BS degree, students in the program can earn a master's degree in only one additional year. Both the BS and the master's degree can generally be earned with 150 total credits, although students should note that a Plan C MS requires 3 extra credits. Finally, students with a master's degree can expect a much higher starting salary following graduation. (For more information, see *College of Engineering* section of this catalog, page 92.)

## **Graduate Programs**

The ME degree emphasizes professional practice and coursework. A minimum of 30 credits of technical and scientific coursework is required. The MS degree emphasizes research and the preparation of a significant publication. A minimum of 30 credits, 6 to 9 of which shall be thesis research, is required for an MS. In special cases, as decided by the student's supervisory committee, a second MS is available with a Plan B option, which requires 30 credits, including 3 to 6 credits of CEE 6970, Thesis Research. The CE degree, which prepares students for professional engineering careers, requires 60 credits beyond the bachelor's degree, or 30 credits beyond the master's degree, including a technical engineering report. The PhD degree represents high scholarly achievement demonstrated by independent research and competence in an area of specialization approved by the student's supervisory committee.

### **Admission Requirements**

See general admission requirements, pages 72-73. Admission committees consider GRE scores and experience, undergraduate record and curriculum, and formal recommendations. A student without an undergraduate civil and environmental engineering background may be required to complete selected undergraduate courses prior to admission as a fully matriculated graduate student.

## Graduate Program Divisions

The graduate program in the Department of Civil and Environmental Engineering is administered through five academic divisions, as described below.

**Structural Engineering.** The structural engineer is involved in the design, construction, repair, and retrofit of all types of structures: buildings, bridges, dams, and many others. The safety of the structures we occupy and utilize every day is the responsibility of structural engineers. They must be able to evaluate the loads placed on a structure, determine their effects on the structure, and select the appropriate materials and structural elements, or repair strategy, to withstand these loads. Today's structural engineer is using new space materials in the design of new structures or the retrofit of older structures.

Mathematics, physics, and materials science constitute a foundation for structural engineering. Structural analysis and design are added to this foundation and become the focus of the structural engineering program. Graduate students in the structures program also engage in structural mechanics, numerical methods, structural dynamics, geotechnical engineering, and the study of new structural materials. Current research in the structures area is focusing on the dynamic characteristics of structures, their potential response to earthquakes, and new seismic retrofit measures, using advanced composite materials, for older structures. Materials research is focusing on cementitious materials and constitutive modeling.

**Geotechnical Engineering.** Engineering studies of soils are concerned with the physical and engineering properties of soils and how these are related to engineering projects.

Traditional geotechnical engineering includes the application of engineering principles to the analysis and/or design of building foundations, earth embankments, retaining walls, drainage systems, earthquake motion, buried structures, and other systems involving soil and rock. Engineers and architects cannot ignore the problems of investigating properties of soils in connection with engineering construction. Undergraduate and graduate courses offered by the department provide the basic knowledge necessary for the design of foundations and various types of earth structures. Fundamental concepts and their application are emphasized so that the student will be properly trained for his or her initial job, as well as being prepared to understand future development in this field.

The Geotechnical Engineering Division, in cooperation with the Environmental Engineering Division, is offering a new program in Geoenvironmental Engineering. This new program uses the strengths of both divisions to provide a program involving the geotechnical aspects of hazardous waste management, the investigation of hazardous waste sites, and the design of hazardous waste containment systems.

The geotechnical division has a strong research program. Current research projects in this division include studies on liquefaction, seismic slope stability, pile foundations, landslides, mechanically stabilized embankments, risk analysis of dams, finite element analysis of soil-structure systems, and the long-term properties of clay soils used in hazardous waste containment systems.

**Water Engineering.** The water engineering program is a multidisciplinary graduate program in the College of Engineering and is intended to enable engineers and scientists interested in water to obtain graduate degrees in the areas of fluid mechanics and hydraulics, hydrology, groundwater, and water resources engi-

neering. Core courses and departmental offerings cover these fundamental areas, as well as essential numerical and statistical methods. The water engineering faculty are committed to a strong academic program. The curriculum offered is one of the most comprehensive offered in the U.S. Elements of ongoing research projects are routinely and effectively incorporated into the classes. The program combines training, research, and experience to understand the water issues and water resources management challenges in the United States and internationally. Graduate students can supplement departmental offerings by selecting courses in Mathematics and Statistics; Computer Science; Aquatic, Watershed, and Earth Resources; Environment and Society; Forest, Range, and Wildlife Sciences; Economics; Political Science; Geology; Biological and Irrigation Engineering; Mechanical and Aerospace Engineering; Plants, Soils, and Biometeorology; Biology; Chemistry and Biochemistry; and Physics. This ensures that graduates are well-grounded in the fundamentals, but have a breadth of training and are prepared to contribute professionally to the solution of multidisciplinary local, national, and international water problems. Graduate students in the water program have the opportunity for research support through the Utah Water Research Laboratory (UWRL) while working on theses or dissertations. Excellent laboratory and computing facilities are available. Strong, continuous state and federal research funding keeps the research topics and facilities current. Specialty areas within the program comprise fluid mechanics and hydraulics, hydrology, groundwater, and water resources engineering.

*Fluid mechanics and hydraulic engineering* covers both fundamental principles and theory and their applications in a variety of engineering fields. Elementary fluid mechanics, based on fundamental principles of conservation of mass, energy, and momentum, is the logical core for all water-related engineering programs. Consequently, other specialties in water engineering study fluid mechanics. Students specializing in fluid mechanics and hydraulics emphasize theoretical fluid mechanics, hydraulic design, numerical methods, and laboratory hydraulic techniques. A good variety and balance of courses supporting research in theoretical fluid mechanics, open channel hydraulics, hydraulic design, transients, sedimentation, municipal water system design, and cavitation are available at the graduate level. Graduates in fluid mechanics and hydraulics find employment in a broad range of professional engineering fields, including consulting, university teaching and research, and state and federal government agencies.

*Hydrology* is a branch of geoscience concerned with the origin, distribution, movement, and properties of waters of the earth. The hydrologic cycle encompasses the atmosphere, the land surface, lakes and oceans, and the subsurface. Complex, interacting processes at varied time and space scales describe the hydrologic cycle. The concepts and practice of hydrology derive from an integration of field observations, laboratory investigations, and conceptual, mathematical, chemical, statistical, and probabilistic models.

The hydrology program at USU has strength in both theoretical and applied aspects of modern hydrology. Past and present research focuses on a broad spectrum of hydrologic problems. These range from climate modeling, rainfall processes, floods, droughts, terminal lake analyses, soil erosion, and stream water quality models to groundwater contamination characterization and remediation and watershed analyses. A particular emphasis of the program is on an understanding of the global water and energy cycles at nested scales from the hemisphere to the continent to the watershed from a holistic perspective that recognizes the two-way linkages between water reservoirs and fluxes through oceans, atmosphere, land surface and subsurface, and biota.

*Groundwater engineering* is concerned with the transport of fluids in the subsurface environment. It encompasses the theory of flow in porous media; groundwater hydrology and hydraulics; fate and transport of contaminants in subsurface; and analytical, numerical, and stochastic modeling of such processes. Emphasis is placed on the quantitative analysis of physical and chemical principles governing these processes and on the application of these principles to practical field problems, with all their difficulties related to the complex structure of subsurface formations. Examples of such problems include groundwater supply and management, subsurface cleanup technologies, and analysis and remediation of groundwater contamination. These problems are of a multidisciplinary nature, and their solutions require a multidisciplinary approach, involving, among others, soil and water chemistry, chemical engineering, and economics. The groundwater professional is an important team player in solving such problems.

The groundwater emphasis has a strong research component. Current research activities cover a well-balanced variety of topics, from theoretical (e.g., stochastic analysis of transport of contaminants in groundwater) to practical problems (e.g., design of cleanup technologies for gasoline-contaminated sites).

*Water Resources Engineering* prepares engineers to be lead members in water resources planning teams, often charged with coordinating the information and concepts supplied from other disciplines. This need for breadth requires considerable flexibility in the training and arrangement of degree programs.

Water resources engineers draw principles from hydrology, fluid mechanics, hydraulics, environmental engineering, economics, ecology, political science, and other disciplines in the design and operation of projects and nonstructural methods for water resources planning and management. They need a sound understanding of how water storage, delivery, and other management systems function; of criteria used in evaluating and selecting among alternatives; of the techniques of operations research that can be used in systems design; and of the institutional aspects of decision-making in the public sector. A focus area of the program is to develop decision support systems for sustainable water quantity and quality management in the United States and in developing regions of the world. Evolving information sources and tools, such as spatial data sets encoded in geographical information systems, climate forecasts, and cognitive models of the human decision process and societal group dynamics, are being integrated in representative institutional contexts.

An internationally-recognized specialized program has been developed in dam safety risk assessment. Students take classes in dam engineering; hydrology and hydraulics; geotechnical engineering; geology; decision analysis; risk assessment; probability and statistics; and natural resources economics, planning, and management. Students work on practical applications, as well as research projects, for improving the state-of-the-art.

**Environmental Engineering.** The Division of Environmental Engineering is a multidisciplinary graduate program in the College of Engineering and provides coursework and research experience to enable engineers and scientists interested in the environment to obtain graduate degrees relating to potable water and waste treatment, toxic and hazardous wastes management, air quality management, natural systems engineering, and environmental impact assessment. The program provides an interdisciplinary educational approach to fundamental principles that can be

applied to environmental phenomena. Research and training projects are a part of the program and provide the student with appropriate research experience leading to a thesis or dissertation.

*Hazardous Waste Management.* This specialization has been developed within the broader scope of the environmental engineering program to provide an integrated approach for students with a BS in engineering or natural sciences to deal with the complex issues of toxic and hazardous waste. Aspects of toxic/hazardous waste management, including characterization, treatment, disposal, control, monitoring, and environmental impacts, are dealt with in this program.

*Natural Systems Engineering* is the study of the interaction of engineered systems with nature, emphasizing impacts to aquatic ecosystems. Techniques include assessment of aquatic habitat through computer simulation and model verification, quantification of aquatic habitat using remote sensing systems, and data analysis and display through integrated statistical and GIS approaches. These tools are used to evaluate impacts on threatened and endangered species, habitat enhancement, instream flow assessments, fish habitat, stream sediment, and hydraulic features.

A *bioprocess engineering* program has been developed as a cooperative effort between the Division of Environmental Engineering and the Biological and Irrigation Engineering Department. This program provides students with specialized coursework and research experience in areas of bioreactor processing of environmental materials and engineering scale-up of biologically-based environmental reactions. Areas of specialization include waste to energy, fermentation, composting, and industrial waste (agricultural and chemical) reuse, recycling, and technologies based on biological processes, as well as engineering optimization of aquatic habitats.

**Transportation Engineering.** The graduate program in Transportation offers education and research opportunities in intermodal transportation systems planning, design, and management. It is designed to enable aspiring planners, engineers, and managers to obtain advanced degrees while specializing in infrastructure management, traffic network analysis, facility design, traffic operations, transportation economics and finance, and project appraisal. Up-to-date computer and laboratory facilities, as well as the Transportation Division's close links with local and state transportation agencies, enable students to gain hands-on experience and practical perspectives.

Past and present research undertaken by the Transportation Division faculty and researchers range from microscopic traffic flow simulation, dynamic route assignment, network reliability, and traffic accident modeling to rail system productivity, public transit service scheduling, and intermodal passenger terminal planning. The focus remains on efficient and effective intermodal solutions to transportation problems.

Transportation Division course offerings expose students to the theoretical and practical aspects of goods and passenger transportation. State-of-the-art analytical tools and new research findings are introduced into the courses through periodic revision of notes, examples, problem sets, and computer software. Students are encouraged to design their own programs of study according to their personal and professional goals. Due to the multidisciplinary nature of transportation, students are encouraged to include in their program of study course offerings from other programs in CEE, as well as from Mathematics and Statistics, Environment and Society, Economics, Business Administration, and Sociology.

## Financial Assistance

Both departmental and formal grant support are available to graduate students and are awarded on a competitive basis. Students requesting financial support should apply to the department by March 15 for the coming academic year.

A number of fellowships are available through the University and the department. Teaching assistantships are available through the department and research assistantships are available through the Utah Water Research Laboratory and departmental faculty members who have ongoing projects or who hold special research grants from the University, private companies, or state and federal agencies.

Acceptance to pursue graduate studies in the Civil and Environmental Engineering Department does not guarantee the student financial assistance. Inasmuch as funds are limited, the assistantships are awarded by the department to cover specific teaching assignments and by the faculty members to provide for research as funds are available.

## Civil and Environmental Engineering Courses (CEE)

**CEE 1880. Civil and Environmental Engineering Orientation and Computer Applications.** Orients students to programs of the Department of Civil and Environmental Engineering, professional and academic advising, student services, professional societies, and engineering careers. Laboratory activities emphasize problem solving using computer applications, such as spreadsheets and the HP48 Scientific Calculator. (1 cr) (Sp)

**CEE 2240. Engineering Surveying.** Experience with a wide variety of common surveying equipment, including use and operation of levels, theodolites, total station equipment, and GPS. Prior to graduation, computer applications and field exercises prepare students for civil engineering employment early in their careers. (3 cr) (F,Su)

**CEE 2250. Cooperative Practice I.** Planned work experience in industry. Detailed program must have prior approval. Written report required. Prerequisite: Preprofessional enrollment in either the Civil or Environmental Engineering program. (3 cr) (F,Sp,Su)

**CEE 2870. Sophomore Seminar.** Supervised discussion and review of problems encountered by professional engineers. (1 cr) (Sp)

**CEE 2890. Environmental Engineering Sophomore Seminar.** Introduces students to the field of environmental engineering, emphasizing design, ethics, and leadership in the environmental engineering profession. Emphasizes creative thinking, organizational skills, team work, professional ethics, and social responsibility. Prerequisite: Sophomore standing in environmental engineering. (1 cr) (Sp)

**CEE 3010. Mechanics of Materials.** Includes principal stresses, combined loading and stresses, deflection of beams by direction integration, moment-area, conjugate beams and superposition, and deflection of frames and trusses by energy methods, columns, cables, and arches. Includes laboratories to demonstrate the mechanical behavior of materials. Prerequisites: Engr 2000 and 2040. (3 cr) (F)

**CEE 3030. Uncertainty in Engineering Analysis.** Principles of probability and statistics applied specifically to problems in civil and environmental engineering, including transportation, water quality, waste treatment, hydrology, and materials. (2 cr) (F,Sp)

**CEE 3080. Design of Reinforced Concrete Structures.** Design of reinforced concrete structural elements, simple and continuous reinforced beams, columns, joints,

and one-way slabs. Includes concrete materials laboratory. Prerequisite: CEE 3010. (3 cr) (Sp)

**CEE 3210. Introduction to Transportation Engineering.** Introduction to basic concepts of roadway geometric design, and intersection and highway capacity analysis. Other topics include: traffic flow characteristics, traffic studies, signal design, and transportation project evaluation. Prerequisite: CEE 3030. (3 cr) (Sp)

**CEE 3430. Engineering Hydrology.** Processes and practical problems in: surface and groundwater hydrology, the hydrological cycle, rainfall-run-off and flood analysis, regional groundwater flow and well hydraulics, and the design of water supply systems. Prerequisite: CEE 3500 or AWER 3700 or Soil 5650. (3 cr) (Sp)

**CEE 3500. Civil and Environmental Engineering Fluid Mechanics.** Explores fluid properties, hydrostatics, fluid dynamics similitude, energy and momentum principles, closed conduit flow, open channel flow, and flow measurement. Includes laboratory exercises in flow measurement, open channel flow, pipe friction, physical modeling, and data collection. Prerequisites: Math 1220; Math 2210 or 2250; Engr 2000. (3 cr) (F,Sp)

**CEE 3510. Civil and Environmental Engineering Hydraulics.** Unsteady flow in open channel and closed circuits, nonuniform flow in open channels, combined energy losses in pipelines, and distribution in pipe networks. Includes laboratory and computer exercises in data collection, pipe networks, and unsteady and nonuniform flow. Prerequisite: CEE 3500. (2 cr) (F,Sp)

**CEE 3610. Environmental Management.** Introduction to environmental health, emphasizing relationships among environmental quality, public health, environmental and occupational health regulations, human health risk assessment, institutions, and engineered systems in environmental health management. Prerequisites: Chem 1210; Biol 1210 or Breadth Life Sciences course. Also taught as PubH 3610. (3 cr) (F)

**CEE 3640. Water and Wastewater Engineering.** Engineering analysis and design of processes for treatment of water and wastewater. Major topics include water quality evaluation; physical, chemical, and biological treatment systems; design of facilities for production of drinking water and for treatment and reclamation of municipal and industrial wastewater; and management of residuals from water and wastewater treatment facilities. Laboratory evaluation of physical and chemical treatment technologies. Computer applications for process modeling and analysis. Prerequisite: CEE/PubH 3610. (4 cr) (Sp)

**CEE 3670. Transport Phenomena in Bio-Environmental Systems.** Core course in both biological and environmental engineering. Students develop a detailed understanding of the principles, concepts, modes, and methods of calculating heat and mass transfer. Emphasis given to contaminant and nutrient flux, along with their state transformations, in order for the biological or environmental engineer to evaluate options for production, clean-up, and control of bio-environmental systems. Prerequisites: CEE 3500 and MAE 2400. Also taught as BIE 3670. (3 cr) (Sp)

**CEE 3780. Solid and Hazardous Waste Management.** Introduction to integrated management of municipal and industrial solid waste; household, commercial, and industrial hazardous waste; and resource recovery and recycling principles. Three lectures augmented by weekly laboratory to provide students with experience in wet laboratory, computer modeling, and field trip experiences related to modern solid and hazardous waste management principles. Prerequisite: Junior standing in environmental engineering. (3 cr) (F)

**CEE 3870. Professional/Technical Writing in Civil and Environmental Engineering.** Gives CEE students intensive practice with oral and written communication in business and technical CEE writing. Requires concurrent enrollment in CEE/PubH 3610. (2 cr) (F)

**CEE 3880. Civil Engineering Design I.** Introduction to senior engineering students' integrated design experience. Design project is identified and proposal for its com-

pletion during the senior year is produced. Emphasizes project scheduling, and completion of design proposal. Prerequisite: CEE 3870. (1 cr) (Sp)

**CEE 3890. Environmental Engineering Design I.** Introduction to senior environmental engineering students' integrated design experience. Design project identified and proposal for its completion during the senior year is produced, under mentoring of course instructor. Emphasizes project identification, project scoping, manpower and materials budgeting, project scheduling, and completion of design proposal. Prerequisites: CEE/PubH 3610; CEE 3640 and CEE/BIE 3670 (must be taken concurrently). (1 cr) (Sp)

**CEE 4200. Engineering Economics.** Applications of the mathematics of finance to engineering decision making. Prerequisite: Senior year of engineering or instructor's consent. (2 cr) (F)

**CEE 4300. Engineering Soil Mechanics.** Physical and mechanical properties of soils. Topics include: classification, permeability, soil stresses and settlement analysis, soil strength, slope stability, lateral earth pressures, introduction to foundations, numerical solutions, and computer applications. Prerequisites: CEE 3500 (taken concurrently) and Engr 2040. (4 cr) (Sp)

**CEE 4790 (CI). Environmental Engineering Design II.** Provides senior environmental engineering students with integrated design experience in two-semester sequence. Design projects proposed in CEE 3890 completed under mentoring of course instructor. Emphasizes team work, scheduling, design calculations, and completion of design report. Prerequisites: CEE 3890 and concurrent enrollment in environmental engineering technical elective course during fall semester. (2 cr) (F)

**CEE 4870 (CI). Civil Engineering Design II.** Provides senior engineering students with integrated design experience in two-semester sequence. Design projects proposed in Junior Design Proposal placed on team work, scheduling, design calculations, and completion of design report. Prerequisite: CEE 3880; senior design technical elective should be taken concurrently. (2 cr) (F)

**CEE 4880 (CI). Civil Engineering Design III.** Provides senior engineering students with integrated design experience in two-semester sequence. Design projects started in CEE 4870 will be completed with presentation, report, and defense of design project. Prerequisite: CEE 4870. (2 cr) (Sp)

**CEE 4890 (CI). Environmental Engineering Design III.** Provides senior environmental engineering students with integrated design experience in two-semester sequence. Completion of design projects begun in CEE 4790, with presentation, report, and defense. Prerequisite: CEE 4790. (2 cr) (Sp)

**CEE 4930. Independent Study.** Laboratory design or research project on problem selected by student. Requires review of literature, preparation of proposal describing project, completion of design or research project, and preparation of report. (1-3 cr) (F,Sp,Su) ®

**CEE 5010. Matrix Analysis of Structures and Introduction to Finite Elements.** Analysis of structures using matrix methods. Application of software based on the stiffness method to practical analysis problems. Introduction of Finite Element method based on stiffness approach and mathematical derivation of simple finite elements, along with application to practical problems. Prerequisite: CEE 3010. (3 cr) (F)

**CEE 5020. Finite Element Methods in Solid Mechanics I.** Introduction to finite element methods and their application to the analysis and design of mechanical engineering systems. Prerequisite: MAE 3040. Also taught as MAE 5020. (3 cr) (F)

**CEE 5050. Design of Wood and Masonry Structures.** Design of beams, columns, joints, walls, and diaphragms in both wood and masonry materials. Current design codes will be utilized. Prerequisite: CEE 3080. (3 cr) (Sp)

**CEE 5060. Mechanics of Composite Materials I.** Stress-strain relations for nonisotropic composites, such as fiber-reinforced plastic laminates, properties and their uses, strength and life determination, and methods for design using composite

materials. Prerequisite: MAE 3040 or CEE 3010. Also taught as MAE 5060. (3 cr) (F)

**CEE 5070. Structural Steel Design.** Structural steel design using load and resistance factor design (LRFD) method. Focuses on design of structural beams, columns, and connections utilizing steel design codes. Prerequisite: CEE 3080. (3 cr) (F)

**CEE 5080 (d6080).<sup>1</sup> Numerical Methods in Elasticity.** Elasticity theory, stress and strain analysis, and yield criteria. Governing equilibrium, kinematic, and compatibility equations. Generalized Hooke's law. Classical solutions of flex and torsion problems. Energy methods. Introduction to finite difference, finite element, and boundary element methods. Computer applications. Prerequisite: CEE 3010. (3 cr) (F)

**CEE 5100. Infrastructure Evaluation and Renewal.** Evaluation of existing structural systems and techniques to improve their performance. Focuses on structures which are seismically deficient. Prerequisites: CEE 3080, 5070. (3 cr) (Sp)

**CEE 5190 (d6190). Geographic Information Systems for Civil Engineers.** Introduction to GIS concepts addressing data structures, spatial entities, and queries. Topics include location referencing methods, data collection techniques, current applications, and institutional and organizational issues. (3 cr) (F)

**CEE 5220 (d6220). Traffic Engineering.** Topics covered include characteristics, measurements, and analysis of volume, speed, density, and travel time; capacity and level of service analysis; signalization and traffic control devices. (3 cr) (Sp)

**CEE 5230 (d6230). Geometric Design of Highways.** Principles of highway location and planning, with full consideration of economic, environmental, and other impacts. Capacity analysis of intersections and highways, passing-lane design, and risk-cost based horizontal and vertical alignment design. Introduction to design software through coursework and term projects. Prerequisite: CEE 3210. (3 cr) (F)

**CEE 5240 (d6240). Urban and Regional Transportation Planning.** Examination of travel demand forecasting, data collection, and survey data analysis techniques. Focuses on transportation-land use interactions and impact of market-based policies on travel demand. Theories and applications of traditional and advanced trip distribution, mode choice, and route assignment models. (3 cr) (F)

**CEE 5250. Environmental Engineering Cooperative Practice.** Applied environmental employment with primary focus of work experience related to one of the environmental engineering specialty areas. Prerequisites: Senior status and permission of instructor. (2 cr) (F,Sp,Su)

**CEE 5350 (d6350). Foundation Analysis and Design.** Applications of theories studied in soil mechanics. Design considerations for various foundation types, including shallow foundations, driven piles, drilled shafts, walls, soil anchorages, and mechanically-stabilized earth support systems. Field investigation techniques and computer applications. Prerequisite: CEE 4300. (3 cr) (F)

**CEE 5380 (d6380). Earthquake Engineering.** Covers wide variety of earthquake engineering topics, including seismology and earthquake source characterization, strong ground motion, seismic hazard analysis, wave propagation, soil dynamics, ground response, local site effects, liquefaction, seismic slope stability, soil improvement, vibrational analyses, and structural seismic design. Prerequisite: CEE 4300. (3 cr) (Sp)

**CEE 5430 (d6430). Groundwater Engineering.** Basics of contaminant transport and fate in soil water and vapor, design of groundwater recovery systems, and subsurface contamination remediation, including interceptor wells, well fields, stream-aquifer interactions, soil vapor extraction, separate phase recovery, biodegradation of soluble plumes, and air emissions. (3 cr) (F)

**CEE 5440 (d6440). Geographic Information Systems in Water Resources.** Principles and operation of geographic information systems. Spatial hydrologic modeling done by developing a digital representation of the environment in the GIS, then adding functions simulating hydrologic processes. Includes term project on use of GIS in water resources. (3 cr) (F)

**CEE 5450 (d6450). Hydrologic Modeling.** Case studies of hydrologic modeling and decision methods: (1) Real-time flood warning; (2) extended streamflow prediction; (3) probabilistic water resource management; and (4) physical modeling of ungaged basins. Prerequisite: CEE 3430. (3 cr) (Sp)

**CEE 5460 (d6460). Water Resources Engineering.** Engineering design course covering a wide range of topics, including: surface and groundwater hydrology, statistical analysis, water law, hydroelectric power, water supply, irrigation, flood control, wastewater, drainage, dams and reservoirs, pipelines, open channels, and planning. (3 cr) (F)

**CEE 5470 (d6470). Sedimentation Engineering.** Explores river response, sediment transport, sediment and watershed yield, flow resistance, scour and erosion, and floodplain management. Prerequisite: CEE 3500. (3 cr) (Sp)

**CEE 5540 (d6540). Fluid Mechanics.** Intermediate-level fluid mechanics course, including fluid properties, governing equations, and applications. Brief study of viscous flows, including laminar and turbulent flow solutions. Detailed study of potential flow, including use of complex variable analysis and numerical solutions, and two- and three-dimensional flows. (3 cr) (F)

**CEE 5550 (d6550). Hydraulics of Closed Conduits.** Includes design and operation of piping systems; economics; feasibility and impact of pipelines; pipe, pump, and valve selection; transient and cavitation analysis; and pipeline operation and filling. Prerequisites: CEE 3500 and 3510. (3 cr) (Sp)

**CEE 5560 (d6560). Environmental Hydraulics.** Design of hydraulic structures, spillways, energy dissipators, fish passage, reservoir operation, ocean outfalls, and pumping stations. Includes principles of design and impact of structures on the environment, and the environmental properties and hydraulics of fluids. Prerequisite: CEE 3500. (2 cr) (F)

**CEE 5610 (d6610). Environmental Quality Analysis.** Familiarizes students with various methods used for analysis of chemical parameters in environmental samples (water, soil, and air). Provides students with skills enabling them to make proper selection/evaluation of analytical procedure and evaluate data generated. Prerequisite: Chem 1210. (3 cr) (F)

**CEE 5620. Aquatic Chemistry.** Provides students with understanding of principles of aquatic chemistry, emphasizing chemical equilibria, acid-base reactions, complex formation, oxidation-reduction reactions, complex formation, and dissolution chemistry. Prerequisites: Chem 1210, CEE 3640. Also taught as Soil 5620. (3 cr) (F)

**CEE 5670. Hazardous Chemicals Handling and Safety.** Provides students with necessary skills and knowledge for working safely in areas associated with hazardous chemicals. Topics covered include: regulations, exposure routes, toxicology, chemical and physical hazards, personal protective equipment, sampling, monitoring, decontamination, and emergency response procedures. Prerequisite: Chem 1210. (2 cr) (Sp)

**CEE 5680 (d6680). Soil Based Hazardous Waste Management.** Engineering management of hazardous wastes present in the vadose zone, including extraction, containment, and biological, chemical, and physical destruction technologies. Aspects include engineering characterization, problem definition, treatment, and monitoring. Analysis and design emphasized through problems, examinations, and report writing. Prerequisites: CEE/PubH 3610, CEE 3640, 3870, CEE/BIE 3670. (2 cr) (Sp)

**CEE 5690 (d6690). Natural Systems Engineering.** Application of modeling tools commonly utilized in water resources systems for assessment of environmental impacts associated with engineered systems. Topics include: water resources modeling; physical, chemical, and biological process effects; assessment methods; data integration techniques; and impact assessment. Taught second half of fall semester. Prerequisites: CEE/PubH 3610, CEE 3500, 3510, 3640. (2 cr) (F)

**CEE 5700 (d6700). Field Sampling Techniques for Natural Systems Engineering.** Provides students with hands-on approach to utilizing several of the most commonly applied spatial and temporal sampling techniques for data acquisition in support of natural systems modeling. Explores standard and advanced surveying techniques for water quality, stream geomorphology, and hydraulics, utilizing levels,

total stations, laser levels, GPS, and hydroacoustic technologies. Integrative sampling strategies across spatial and temporal scales emphasized for multi-disciplinary studies. Taught first half of fall semester. Prerequisite: CEE 5690/6690. (2 cr) (F)

**CEE 5710. Pollution Prevention and Industrial Ecology.** Explores pollution prevention and waste minimization concepts, focusing on implementation of these concepts in design of production processes and products. Discussion of pollution prevention/waste minimization concepts, energy and materials conservation, Life Cycle Analysis, materials and process audits, industrial process design for waste minimization and energy conservation, packaging, and ISO 14000. Prerequisites: CEE/BIE 3670, CEE 3780, MAE 2400. (2 cr) (Sp)

**CEE 5720 (d6720). Natural Systems Modeling.** Provides hands-on approach to utilizing several of the most commonly applied modeling tools employed to estimate physical, chemical, and biological impacts of existing and proposed water resource systems. Focuses on utility and limitation of specific modeling approaches, while also stressing integrative multi-disciplinary nature of impact assessment frameworks. Prerequisite: CEE 5690/6690. (3 cr) (Sp)

**CEE 5730 (d6730). Analysis and Fate of Environmental Contaminants.** Provides students with understanding of methods used in analysis of environmental samples for organic contaminants. Examines various properties and processes determining the fate of organic contaminants in the environment. Taught first half of spring semester. Prerequisites: Chem 1210, 2300, CEE/Soil 5620. (3 cr) (Sp)

**CEE 5740. Natural Systems Engineering Laboratory.** Computer modeling techniques applied to water resources systems for assessment of environmental impacts associated with engineering activities. Corequisite: CEE 5690. Taught second half of fall semester. (1 cr) (F)

**CEE 5750. Air Quality Measurements.** Laboratory-based course designed to familiarize participants with federally-approved reference measurement techniques for ambient and source air pollutants. Also provides understanding of temporal and spatial pollutant behavior. (2 cr) (Sp)

**CEE 5760. Hydraulic Structures Field Course.** Week-long course, with one day of in-class lectures and four days of field trips. Introduces students to field applications of hydraulic structures design. Field trips may involve backpacking to remote areas. (1 cr) (F,Su)

**CEE 5790. Accident and Emergency Management.** Introduction to fundamentals of accident, hazard, and emergency management. Topics include legislation; chemical safety fundamentals; fire, explosion, and spill fundamentals; contaminant air transport fundamentals; hazard and risk assessment; dispersion applications; and hazard and risk management applications. (3 cr) (Sp)

**CEE 5810 (d6810). Biochemical Engineering.** Fundamentals of bioreactor design and bioengineering. Emphasizes mathematical models of microbial and enzymatic processes in environmental and industrial biotechnology. Prerequisites: BIE 3200 and BIE/CEE 3670; or BIE/CEE 3670, CEE/PubH 3610, and CEE 3640. Also taught as BIE 5810/6810. (3 cr) (F)

**CEE 5830 (d6830). Management and Utilization of Biological Solids and Wastewater.** Focuses on production, management, and disposal of biosolids and wastewater generated in food processing and wastewater treatment. Emphasizes beneficial use of biosolids and wastewater for agricultural production, forest enhancement, and land reclamation. Prerequisite: BIE/CEE 3670. Also taught as BIE 5830/6830. (3 cr) (F)

**CEE 5860. Air Quality Management.** Introduction to air quality management. Explores sources and effects of conventional and toxic air pollutants, control techniques, and air dispersion modeling. Three lectures augmented by weekly laboratory, providing students with experience in wet laboratory, computer modeling, and field trip experiences related to conventional and toxic air pollution management principles. Prerequisites: CEE 3640, 3780, CEE/BIE 3670, MAE 2400. (3 cr) (F)

**CEE 5870. Hazardous Waste Incineration.** Provides introduction to hazardous waste incineration principles. Topics include: thermodynamics, stoichiometry,

thermochemistry, chemical kinetics, energy recovery, pollution control systems, and incinerator design principles. Prerequisites: CEE/BIE 3670, CEE 3780, MAE 2400; CEE 5860 (may be taken concurrently). (2 cr) (Sp)

**CEE 5880. Remediation Engineering.** Physical, chemical, and biological principles associated with remediation of hazardous waste contaminated soil, water, sediments, and air. Topics include: source removal and source control, product recovery, chemical treatment methods, biological remediation concepts, in situ processes, ex situ processes, and integrated process design. Prerequisites: CEE 3430, 3640, 3780, CEE/PubH 3610. (3 cr) (F)

**CEE 5900. Cooperative Practice II.** A planned work experience in industry. Detailed program must have prior approval. Written report required. (3 cr) (F,Sp,Su)

**CEE 6010. Finite Element Methods in Solid Mechanics II.** Advanced theory and applications of finite element methods to both static and dynamic solid mechanics problems. Prerequisite: MAE 5020. Also taught as MAE 6010. (3 cr) (Sp)

**\*\*CEE 6020. Structural Stability.** Elastic and inelastic buckling of columns; analysis of beam columns, thin-walled beams of open cross-section. Stability analysis of frame and plate structures. Large deflection theory. Historical notes on stability of structures. Computer applications. Prerequisite: CEE 3010. (3 cr) (F)

**\*CEE 6030. Structural Optimization.** Introduction to optimization techniques for linear and nonlinear, univariable, and multivariable functions with or without constraints. Computer applications, and applications to structural design. Prerequisite: CEE 3010 or instructor's consent. (3 cr) (Sp)

**\*CEE 6040. Structural Reliability.** Elements of probability theory and its application to structural engineering and mechanics. Statistical distribution of loads. Uncertainties in material parameters and their effects in design. Reliability-based safety analysis and computer applications. Prerequisite: Instructor's consent. (3 cr) (F)

**\*\*CEE 6050. Experimental Methods in Structural Engineering.** Experimental techniques used in research and design in structural engineering and mechanics. Structural models. Theory and practical applications. Development of principles used to design research projects. Prerequisite: Instructor's consent. Also taught as MAE 6050. (3 cr) (Sp)

**CEE 6070. Mechanics of Composite Materials II.** Second course in composite materials. Stress-strain states of laminated composite structures, including interlaminar stresses, failure criteria, and hygrothermal stresses. Prerequisite: MAE 5060. Also taught as MAE 6070. (3 cr) (Sp)

**CEE 6080 (d5080). Numerical Methods in Elasticity.** Elasticity theory, stress and strain analysis, and yield criteria. Governing equilibrium, kinematic, and compatibility equations. Generalized Hooke's law. Classical solutions of flex and torsion problems. Energy methods. Introduction to finite difference, finite element, and boundary element methods. Computer applications. Prerequisite: CEE 3010. (3 cr) (F)

**CEE 6090. Theory of Plates and Shells.** Introduction to plate and shell theories. Development of bending and buckling of plates and shells through classical theory. Prerequisite: MAE 3040 or CEE 3010. Also taught as MAE 6090. (3 cr) (Su)

**CEE 6130. Structural Dynamics and Seismic Design.** Development and solutions for equations of motion for single- and multi-degree-of-freedom systems. Dynamic analysis by Modal Superposition and Response Spectra. Design of structures for seismically active areas. Also taught as MAE 6130. (3 cr) (Sp)

**CEE 6180. Dynamics and Vibrations.** Fundamentals of two-dimensional and three-dimensional rigid body dynamics, including Newtonian, Lagrangian, and Leavit Energy Methods. Equations of motion, mode shapes, and natural frequencies for continuous media and multi degree-of-freedom systems. Prerequisite: MAE 5300 or CEE 6130. Also taught as MAE 6180. (3 cr) (F)

**CEE 6190 (d5190). Geographic Information Systems for Civil Engineers.** Introduction to GIS concepts addressing data structures, spatial entities, and queries.

Topics include location referencing methods, data collection techniques, current applications, and institutional and organizational issues. (3 cr) (F)

**CEE 6200. Pavement Design.** Analysis and design of flexible and rigid pavements for highways and runways, including the design of overlays. Equal emphasis on current practice and advanced concepts of pavement management. Prerequisite: CEE 3010. (3 cr) (F)

**CEE 6210. Transportation Systems Analysis.** Introduces systems approach to analysis of transportation services and infrastructure. Focuses on basic and advanced concepts, including operations research techniques, simulation, and artificial intelligence. Topics include facility sizing and location, financial and economic analysis of investment projects, and privatization. Prerequisite: CEE 3030 or equivalent. (3 cr) (F)

**CEE 6220 (d5220). Traffic Engineering.** Topics covered include characteristics, measurements, and analysis of volume, speed, density, and travel time; capacity and level of service analysis; signalization and traffic control devices. (3 cr) (Sp)

**CEE 6230 (d5230). Geometric Design of Highways.** Principles of highway location and planning, with full consideration of economic, environmental, and other impacts. Capacity analysis of intersections and highways, passing-lane design, and risk-cost based horizontal and vertical alignment design. Introduction to design software through coursework and term projects. Prerequisite: CEE 3210. (3 cr) (F)

**CEE 6240 (d5240). Urban and Regional Transportation Planning.** Examination of travel demand forecasting, data collection, and survey data analysis techniques. Focuses on transportation-land use interactions and impact of market-based policies on travel demand. Theories and applications of traditional and advanced trip distribution, mode choice, and route assignment models. (3 cr) (F)

**CEE 6250. Transportation Data/Safety Analysis.** Statistical analysis of transportation data, including safety and risk assessment. Regression and multivariate analysis, such as discriminant analysis, canonical correlation, and factor analysis. In-depth study of selected methodologies for analyzing transportation safety and designing counter measures. Prerequisite: CEE 3210 or equivalent. (3 cr) (Sp)

**CEE 6260. Public Transportation.** Principles of planning, design, and operation of transit systems in urban and rural areas. Determination of optimal route alignments, schedules, and station/stop spacings. Exploration of innovations in financing and pricing, including cost-cutting techniques. (3 cr) (Sp)

**CEE 6270. Traffic Operations Analysis.** Traffic flow fundamentals, macroscopic and microscopic models of traffic flow, shock wave analysis, car following principles, queuing systems, and simulation. (3 cr) (Sp)

**CEE 6290. Transportation Network Analysis.** Analytical approaches and algorithms to the formulation and solution of the equilibrium assignment problem for transportation networks. Emphasis on user equilibrium, comparison with system optimal stochastic user equilibrium, origin-destination matrix estimation, and network design problems. (3 cr) (F)

**CEE 6300. Earth Structures.** Design and construction of earth and rockfill dams, embankments, excavations, and retaining structures. Prerequisites: CEE 4300, 5350/6350. (3 cr) (Sp)

**CEE 6310. Environmental Geotechniques.** Geotechnical aspects of environmental systems, with concentration on waste containment facilities. Prerequisite: CEE 4300. (3 cr) (F)

**CEE 6320. Deep and Shallow Foundations.** Analysis, design, and construction of deep and shallow foundations. Prerequisites: CEE 4300, 5350/6350. (3 cr) (Sp)

**CEE 6330. Ground Reinforcement, Improvement, and Treatment.** Theory, design, and construction methods for ground reinforcement, improvement, and treatment applications. Prerequisites: CEE 4300, 5350/6350. (3 cr) (F)

**CEE 6340. Laboratory and Field Methods in Geotechnical Engineering.** Subsurface investigation, field testing and instrumentation, and laboratory testing. Prerequisites: CEE 4300, 5350/6350. (3 cr) (F)

**CEE 6350 (d5350). Foundation Analysis and Design.** Applications of theories studied in soil mechanics. Design considerations for various foundation types, including shallow foundations, driven piles, drilled shafts, walls, soil anchorages, and mechanically-stabilized earth support systems. Field investigation techniques and computer applications. Prerequisite: CEE 4300. (3 cr) (F)

**CEE 6360. Geotechnical Principles.** Theoretical soil behavior. Hydraulic conductivity, compression, and shearing properties. Prerequisites: CEE 4300, 5350/6350. (3 cr) (F)

**CEE 6370. Buried Structures.** Analysis of structural performance of buried structures (pipes, tanks, silos, etc.) using principles of mechanics of materials and finite element methods. Prerequisite: CEE 4300. (3 cr) (Sp)

**CEE 6380 (d5380). Earthquake Engineering.** Covers wide variety of earthquake engineering topics, including seismology and earthquake source characterization, strong ground motion, seismic hazard analysis, wave propagation, soil dynamics, ground response, local site effects, liquefaction, seismic slope stability, soil improvement, vibrational analyses, and structural seismic design. Prerequisite: CEE 4300. (3 cr) (Sp)

**CEE 6400. Physical Hydrology.** Fundamentals of hydrologic cycle and hydrologic processes. Precipitation, infiltration, runoff generation, evaporation and transpiration, and snowmelt. Representation of hydrologic processes in hydrologic models. Prerequisite: CEE 3430. (3 cr) (F)

**CEE 6410. Water Resource Systems Analysis.** Systems formulation of decision problems. Solution by simulation and optimization, constrained and unconstrained optimization algorithms, case studies and applications to water supply, and quality and ecosystems management. (3 cr) (Sp)

**CEE 6420. Engineering Risk Assessment and Risk Management.** Comprises both quantitative risk assessment techniques and a range of issues in risk management. Examples drawn from various civil engineering subdisciplines such as: environmental engineering, geotechnical engineering, hydraulics and hydrology, structural engineering, transportation engineering, and water resource management. (3 cr) (Sp)

**CEE 6430 (d5430). Groundwater Engineering.** Basics of contaminant transport and fate in soil water and vapor, design of groundwater recovery systems, and subsurface contamination remediation, including interceptor wells, well fields, stream-aquifer interactions, soil vapor extraction, separate phase recovery, biodegradation of soluble plumes, and air emissions. (3 cr) (F)

**CEE 6440 (d5440). Geographic Information Systems in Water Resources.** Principles and operation of geographic information systems. Spatial hydrologic modeling done by developing a digital representation of the environment in the GIS, then adding functions simulating hydrologic processes. Includes term project on use of GIS in water resources. (3 cr) (F)

**CEE 6450 (d5450). Hydrologic Modeling.** Case studies of hydrologic modeling and decision methods: (1) Real-time flood warning; (2) extended streamflow prediction; (3) probabilistic water resource management; and (4) physical modeling of ungaged basins. Prerequisite: CEE 3430. (3 cr) (Sp)

**CEE 6460 (d5460). Water Resources Engineering.** Engineering design course covering a wide range of topics, including: surface and groundwater hydrology, statistical analysis, water law, hydroelectric power, water supply, irrigation, flood control, wastewater, drainage, dams and reservoirs, pipelines, open channels, and planning. (3 cr) (F)

**CEE 6470 (d5470). Sedimentation Engineering.** Explores river response, sediment transport, sediment and watershed yield, flow resistance, scour and erosion, and floodplain management. Prerequisite: CEE 3500. (3 cr) (Sp)

**CEE 6480. Subsurface Flow and Transport Processes.** In-depth coverage of unsaturated and saturated water flow, well hydraulics, salt water intrusion, and multiphase flow applicable to groundwater resources management and remediation. Includes basics of nonreactive and reactive mass transport processes due to various pollution events, and remediation strategies. Addresses special topics related to free-product recovery and migration, and vapor phase transport as applicable to remediation of hazardous-waste contaminated subsurface. (3 cr) (Sp)

**CEE 6490. Integrated River Basin/Watershed Planning and Management.** Reviews fundamental building blocks of water resource institutions, emphasizing creation of institutions which are sensitive to a particular culture, economic, and political environment. Addresses institutional mission and regulatory roles, public participation, property and water rights, and elements of production. (3 cr) (Sp)

**CEE 6500. Open Channel Hydraulics with an Emphasis on Gradually Varied Flow.** Theory and applications of steady uniform and gradually varied flow under both subcritical and supercritical flow conditions. Solutions to multiple-network canal systems by solving systems of combined ordinary differential and algebraic equations. Method for defining natural channel systems and solving steady-state flows in them. Prerequisites: CEE 3500, 3510. (3 cr) (F)

**CEE 6510. Numerical and Statistical Methods for Civil Engineers.** Engineering applications of approximation and interpolation, solution methods for ordinary differential equations, numerical solution of partial differential equations, nonparametric and parametric probability and regression estimation, and Monte Carlo and uncertainty analysis. (3 cr) (F)

**CEE 6520. Applied Hydraulics.** Basic fluid mechanics applied to wildland watershed systems and directed at nonengineering students. Explores nature of fluid state, fluid motion, and steady uniform and varied flow in open channels, under both subcritical and supercritical conditions. Surveys concepts of boundary layers, turbulence, convection, dispersal, and wave formation in unsteady flows. Emphasizes problem formulation and solving. Prerequisites: AWER 5490/4490; Math 2280 (recommended). Also taught as AWER 6520. (3 cr) (F)

**CEE 6530. Unsteady Flows in Open Channels and Numerical Solutions of St. Venant Equations.** Derivation and physical meaning of the St. Venant equations, types of water waves, solutions to unsteady free surface flows based on the characteristics, and direct and iterative implicit methods of solution. Emphasizes solving unsteady flow problems in channel systems. Prerequisite: CEE 6500. (3 cr) (Sp)

**CEE 6540 (d5540). Fluid Mechanics.** Intermediate-level fluid mechanics course, including fluid properties, governing equations, and applications. Brief study of viscous flows, including laminar and turbulent flow solutions. Detailed study of potential flow, including use of complex variable analysis and numerical solutions, and two- and three-dimensional flows. (3 cr) (F)

**CEE 6550 (d5550). Hydraulics of Closed Conduits.** Includes design and operation of piping systems; economics; feasibility and impact of pipelines; pipe, pump, and valve selection; transient and cavitation analysis; and pipeline operation and filling. Prerequisites: CEE 3500 and 3510. (3 cr) (Sp)

**CEE 6560 (d5560). Environmental Hydraulics.** Design of hydraulic structures, spillways, energy dissipators, fish passage, reservoir operation, ocean outfalls, and pumping stations. Includes principles of design and impact of structures on the environment, and the environmental properties and hydraulics of fluids. Prerequisite: CEE 3500. (2 cr) (F)

**\*CEE 6570. Potential Fluid Flow.** Application of the principles and methods of classical hydrodynamics to the solution of problems. Closed form solution to inviscid fluid flows obtained using complex variables and conformal mappings. Prerequisite: CEE 3510 or MAE 3420. Also taught as MAE 6570. (2 cr) (F)

**CEE 6580. Intermediate Fluid Mechanics.** Survey of mathematical methods used in fluid mechanics, including: potential flow solutions (complex variables), laminar flow and turbulent flow solutions, boundary layer theory, and introduction to dispersion in fluid. (3 cr) (F)

**CEE 6600. Environmental Chemistry of Inorganic Contaminants.** Inorganics of environmental concern discussed in terms of processes affecting their behavior in soil and water systems. Laboratory-scale experiments and computer models used to evaluate this behavior. Explores remediation of environmental systems contaminated with inorganic pollutants. Taught second half of spring semester. Prerequisite: CEE/Soil 5620. (2 cr) (Sp)

**CEE 6610 (d5610). Environmental Quality Analysis.** Familiarizes students with various methods used for analysis of chemical parameters in environmental samples (water, soil, and air). Provides students with skills enabling them to make proper selection/evaluation of analytical procedure and evaluate data generated. Prerequisite: Chem 1210. (3 cr) (F)

**CEE 6620. Field Sampling and Analysis of Environmental Systems.** Explores applied field sampling, as well as field and laboratory techniques used in the monitoring of environmental media. Includes theory and practice of field site monitoring and measurement of physical, chemical, and biological processes in the environment. Prerequisite: Consent of instructor. (3 cr) (F)

**CEE 6630. Process Dynamics in Environmental Engineering Systems.** Fundamental principles used in analysis and simulation of environmental systems. Emphasizes reaction kinetics, mass transfer, reactor analysis and design, and development and solution of mathematical models to describe natural and engineered environmental systems. Taught first half of fall semester as prerequisite to CEE 6660. Prerequisites: CEE 3500, 3510. (2 cr) (F)

**CEE 6640. Physical and Chemical Environmental Process Engineering.** Principles of physical and chemical environmental engineering processes, including sedimentation, filtration, gas transfer, aeration, absorption, ion exchange, membrane processes, coagulation, flocculation, precipitation, oxidation, reduction, and disinfection. Process modeling and analysis applications in treatment of water, wastewater, industrial wastes, vapor treatment, and soil remediation. Prerequisites: CEE/Soil 5620, CEE 6630. Corequisite: CEE 6670. (3 cr) (Sp)

**CEE 6650. Biological Processes in Environmental Engineering.** Theory and design of biological processes used in environmental engineering. Stoichiometric, energetic, and kinetic analysis of biological treatment processes; modeling and design of suspended growth and fixed-film processes for treatment of municipal, industrial, and hazardous wastes; nutrient removal; and bioremediation. Prerequisites: CEE 6630, 6640, 6710. (2 cr) (Sp)

**CEE 6660. Environmental Data Analysis and Experimentation.** Data analysis and experimental design for environmental science and engineering. Graphical data analysis, parametric and nonparametric statistics, frequency distributions, hypothesis testing, propagation of variance, censored data, correlation and causation, parameter estimation, factorial experimental design and response surfaces, environmental monitoring and uncertainty. (2 cr) (F)

**CEE 6670. Environmental Process Laboratory.** Laboratory testing to demonstrate physical, chemical, and biological principles utilized in environmental engineering processes. Corequisites: CEE 6640, 6650. (2 cr) (Sp)

**CEE 6680 (d5680). Soil Based Hazardous Waste Management.** Engineering management of hazardous wastes present in the vadose zone, including extraction, containment, and biological, chemical, and physical destruction technologies. Aspects include engineering characterization, problem definition, treatment, and monitoring. Analysis and design emphasized through problems, examinations, and report writing. Prerequisites: CEE/PubH 3610, CEE 3640, 3870, CEE/BIE 3670. (2 cr) (Sp)

**CEE 6690 (d5690). Natural Systems Engineering.** Application of modeling tools commonly utilized in water resources systems for assessment of environmental impacts associated with engineered systems. Topics include: water resources modeling; physical, chemical, and biological process effects; assessment methods; data integration techniques; and impact assessment. Taught second half of fall semester. Prerequisites: CEE/PubH 3610, CEE 3500, 3510, 3640. (2 cr) (F)

**CEE 6700 (d5700). Field Sampling Techniques for Natural Systems Engineering.** Provides students with hands-on approach to utilizing several of the most

commonly applied spatial and temporal sampling techniques for data acquisition in support of natural systems modeling. Explores standard and advanced surveying techniques for water quality, stream geomorphology, and hydraulics, utilizing levels, total stations, laser levels, GPS, and hydroacoustic technologies. Integrative sampling strategies across spatial and temporal scales emphasized for multi-disciplinary studies. Taught first half of fall semester. Prerequisite: CEE 6690/5690. (2 cr) (F)

**CEE 6710. Environmental Engineering Microbial Ecology.** Principles of microbial ecology applied to engineered and natural systems. Taught first half of fall semester. Prerequisites: Biol 3300, CEE/PubH 3610. (2 cr) (F)

**CEE 6720 (d5720). Natural Systems Modeling.** Provides hands-on approach to utilizing several of the most commonly applied modeling tools employed to estimate physical, chemical, and biological impacts of existing and proposed water resource systems. Focuses on utility and limitation of specific modeling approaches, while also stressing integrative multi-disciplinary nature of impact assessment frameworks. Prerequisite: CEE 6690/5690. (3 cr) (Sp)

**CEE 6730 (d5730). Analysis and Fate of Environmental Contaminants.** Provides students with understanding of methods used in analysis of environmental samples for organic contaminants. Examines various properties and processes determining the fate of organic contaminants in the environment. Taught first half of spring semester. Prerequisites: Chem 1210, 2300, CEE/Soil 5620. (3 cr) (Sp)

**CEE 6740. Environmental Quality Modeling.** Development and application of mathematical models for conventional and toxic pollutants in environmental systems. Description of advection, dispersion, sediment transport, partitioning, interphase transfer, and transformation kinetics applied to organic and inorganic pollutants. Equilibrium, steady state, and nonsteady systems. Prerequisite: CEE 6630. (3 cr) (Sp)

**CEE 6750. Eco-Hydraulics for Natural Systems Engineering.** Provides students with advanced multi-disciplinary modeling course in the application of hydraulics and water resource modeling in light of impact assessment frameworks for natural systems modeling. Focuses on application on one-dimensional and two-dimensional hydraulic modeling as basis for examining quantitative impacts on stream and riparian ecosystems under altered flow, as well as channel conditions with particular emphasis on fish and aquatic macro-invertebrates. Prerequisite: CEE 6690/5690. (4 cr) (F)

**CEE 6800. Division of Environmental Engineering Seminar.** Environmental engineering graduate seminar for faculty and student research presentations. (1 cr) (F,Sp)

**CEE 6810 (d5810). Biochemical Engineering.** Fundamentals of bioreactor design and bioengineering. Emphasizes mathematical models of microbial and enzymatic processes in environmental and industrial biotechnology. Prerequisites: BIE 3200 and BIE/CEE 3670; or BIE/CEE 3670, CEE/PubH 3610, and CEE 3640. Also taught as BIE 6810/5810. (3 cr) (F)

**CEE 6830 (d5830). Management and Utilization of Biological Solids and Wastewater.** Focuses on production, management, and disposal of biosolids and wastewater generated in food processing and wastewater treatment. Emphasizes beneficial use of biosolids and wastewater for agricultural production, forest enhancement, and land reclamation. Prerequisite: BIE/CEE 3670. Also taught as BIE 6830/5830. (3 cr) (F)

**CEE 6840. Application of Technology Transfer for Teachers.** Focuses on application of modern instructional strategies to the transfer of technology and science to the public education setting. Part of a series of six courses. Prerequisite: Participation in an In\*Step Science Program in the public schools. (2 cr) (F,Sp,Su) ®

**CEE 6900. Directed Reading.** Prerequisite: Instructor's consent. (1-3 cr) (F,Sp,Su) ®

**CEE 6930. Special Problems.** Independent or group study of engineering problems not covered in regular course offerings. Prerequisite: Instructor's consent. (1-4 cr) (F,Sp,Su) ®

**CEE 6970. Thesis Research.** Prerequisite: Instructor's consent. (1-6 cr) (F,Sp,Su) ®

**CEE 6990. Continuing Graduate Advisement.** Prerequisite: Instructor's consent. (1-9 cr) (F,Sp,Su) ®

**CEE 7050. Plasticity.** Analysis of stresses, deformation, and collapse in devices constructed of plastic material. Prerequisite: MAE 6040 or CEE 6080/5080 or instructor's consent. Also taught as MAE 7050. (3 cr) (Sp)

**CEE 7080. Advanced Plate and Shell Theory.** Analysis of plate and shell structures by classical and numerical methods. Emphasis on numerical solutions. Prerequisite: Instructor's consent. Also taught as MAE 7080. (3 cr) (F)

**\*\*CEE 7110. Constitutive Modeling and Structural Response of Engineering Materials.** Constitutive modeling of reinforced concrete, metals, soils, and composite materials. Plasticity and endochronic theories. Finite element modeling and predictive analysis of two- and three-dimensional structures. Computer applications and implementations. Prerequisite: Instructor's consent. (3 cr) (F)

**CEE 7120. Advanced Topics in Civil Engineering.** Discussion of current research topics conducted by civil and other engineering faculty and staff at USU and elsewhere. Offered on either arranged or regular basis. Topics and times can be arranged with instructor and advisor. Prerequisite: Instructor's consent. (3 cr) (F,Sp,Su)

**CEE 7200. Planning and Design of Airports.** Aspects of airport location, financing, and marketing. Introduces demand forecasting techniques, airside and landside capacity analysis, and facility sizing techniques. Design of terminal building components, configuration, layout of concessions, and signing. Discussion of surface access issues and environmental aspects of airport development. Prerequisite: CEE 6240/5240. (3 cr) (Sp)

**CEE 7270. Travel Demand and Supply Analysis.** Fundamentals of demand and supply analysis. Theoretical aspects of travel demand modeling techniques. Modeling of performance characteristics and costs of transportation modes. Emphasis on theoretical aspects of discrete choice analysis and their applications in the modeling of transportation systems. (3 cr) (F)

**CEE 7300. Theoretical Soil Mechanics.** Advanced studies of stress distribution in soil masses, shear strength, consolidation, constitutive modeling, and finite applications. Prerequisite: CEE 6360. (3 cr) (Sp)

**\*\*CEE 7310. Fundamentals of Soil Behavior.** The influence of clay mineralogy, clay chemistry, and soil origin on the engineering properties of soil. Prerequisite: CEE 6360. (3 cr) (F)

**\*\*CEE 7320. Advanced Soil Dynamics.** Advanced studies in the response of soil structures and foundations to dynamic loads. Prerequisite: CEE 6360. (3 cr) (F)

**\*\*\*CEE 7430. Stochastic Hydrology.** Stochastic description of hydrologic variability in time, space, and space-time. Markov processes, time series synthesis and forecasting, spectral analysis, spatial interpolation and random field simulation, data imputation, and parameter estimation for physical models. Lattice and Markov chain Monte Carlo methods, simulated annealing, and Gibbs processes. Applications to rainfall, streamflow, groundwater quality and quantity, and subsurface characterization. (3 cr) (Sp)

**\*\*\*CEE 7440. Hydroclimatology.** Study of droughts and floods as determined by long-term climate fluctuations. Dynamics of low-frequency large-scale climate variability. El Niño Southern Oscillation and its hydrologic impacts. Global climate change issues. (3 cr) (Sp)

**CEE 7460. Advanced Topics in Hydrology.** Topics of prominent current interest for advanced MS and PhD students. Can be repeated for credit with consent of instructor. (3 cr) (Sp) ®

**CEE 7520. Mathematical Methods for Civil and Environmental Engineers.** Applications of advanced mathematical methods to analyze civil and environmental engineering problems, including analysis of dynamical systems, solutions to nonlinear and stochastic differential equations, Fourier analysis, and neural networks. (3 cr) (Sp)

**CEE 7580. Advanced Finite Element Analysis in Fluid Mechanics.** Application of the finite element method of analysis to problems in fluid mechanics. Use of higher order element to two- and three-dimensional flows. Prerequisites: CEE 3510, CEE/MAE 6570; or MAE 3420, 5020. Also taught as MAE 7580. (3 cr) (Sp)

**CEE 7970. Dissertation Research.** Prerequisite: Instructor's consent. (1-10 cr) (F,Sp,Su) ®

**CEE 7990. Continuing Graduate Advisement.** Prerequisite: Instructor's consent. (1-9 cr) (F,Sp,Su) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

\*\*\*This course is taught alternating years. Check with department for information about when course will be taught.

Department of

# Communicative Disorders and Deaf Education

College of Education

**Head: Professor James C. Blair**, educational audiology, education of the deaf and hard of hearing  
Office in Lillywhite 103, (435) 797-1388

**Assistant Department Head: Clinical Instructor Dee R. Child**, disorders of phonation, articulation, fluency

**FAX** (435) 797-0221

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**WWW** <http://www.coe.usu.edu/comd>

**Trustee Professor Carol J. Strong**, language development, language assessment and intervention, language disorders in school-age students, research methodology in communicative disorders, narrative assessment and literature-based language intervention; **Professor J. Freeman King**, American Sign Language, linguistics, teacher preparation; **Adjunct Clinical Professors Steven D. Gray, MD**, pediatric otolaryngologist; **Bryan R. Larsen, MD**, gastroenterologist; **Gordon S. Wood, MD**, otolaryngologist; **Associate Professors Beth E. Foley**, neuropathologies of speech and language, augmentative/alternative communication, language and literacy; **Sonia S. Manuel-Dupont**, non-discriminatory educational assessment of non-English-language background children, interpreter paraprofessional training and management, Native American language assessment, emergent literacy, ethnic literacy, developmental phonology, syntax, professional and scientific discourse analysis; **John E. Ribera**, medical audiology, amplification, hearing science, telemedicine; **Carmel Yarger**, American Sign Language, curriculum for students who are deaf and hard of hearing, deaf education; **Adjunct Associate Professor Douglas W. Laws**, clinical audiology; **Assistant Professors Donald G. Barringer**, early interventions, sensory impairments, head-start research and training; **Kim Corbin-Lewis**, diagnosis and management of voice disorders, laryngeal imaging, disorders of motor speech, dysphagia, anatomy and physiology of speech and swallow; **Mark Krumm**, pediatric audiology, telemedicine, aural rehabilitation; **Jaclyn Littledike**, orofacial anomalies, professional practice issues, and clinical supervision; **Vicki Simonsmeier**, pediatric neurogenic disorders, oral-motor/dysphagia, early intervention programs, audiology, auditory processing, clinical supervision; **Susan Watkins**, early intervention programs, sensory impaired infants and toddlers; **Clinical Assistant Professor Kenneth M. Curtis**, electronystagmography, aural rehabilitation, hearing aids, noise and hearing conservation, clinical supervision; **Clinical Instructors Chad Bingham**, pediatric brain injury, limited English proficiency, augmentative/assistive technology, clinical supervision; **Anne Elsweiler**, fluency, preschool language and articulation, clinical supervision; **Kathryn S. Gantz**, speech-language pathology; **Jan Kelley-King**, American Sign Language, deaf education; **Elizabeth Parker**, education of the deaf and hard of hearing; **Sheryl Y. Spriet**, pediatric audiology, aural rehabilitation, clinical supervision; **Susie Yoakum**, speech-language pathology, clinical supervision; **Advisor Mindy Bergeson**, deaf education

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), Master of Arts (MA), Master of Education (MEd), and Educational Specialist (EdS) in Communicative Disorders and Deaf Education

**Undergraduate emphases:** BS, BA—Clinical and Educational Audiology, Education of the Deaf and Hard of Hearing, Speech-Language Pathology. The emphasis in Education of the Deaf and Hard of Hearing includes an area of focus in Elementary Education. **Graduate specializations:** MS, MA, MEd—Clinical and Educational Audiology, Early Childhood Communicative Disorders, Speech-Language Pathology; MEd—Education of the Deaf and Hard of Hearing; EdS—Educational Audiology

## Undergraduate Programs

### Objectives

Three main objectives of the Department of Communicative Disorders and Deaf Education are (1) to train competent speech-language pathologists, educators of the deaf and hard of hearing, and clinical-educational audiologists capable of receiving state and national licensure; (2) to provide clinical services to individuals with speech-language deficits or hearing loss in the University population or in the community; and (3) to provide research opportunities for students relating to communicative problems of individuals. The programs in both Speech-Language Pathology and Clinical-Educational Audiology are fully accredited by the Council on Academic Accreditation of the American

Speech-Language-Hearing Association (ASHA). The program in Education of the Deaf and Hard of Hearing is accredited by the Council on Education of the Deaf. All department programs hold Utah State Office of Education approval and NCATE accreditation.

### Requirements

**Departmental Admissions Requirements.** Any accepted student at Utah State University may major in Communicative Disorders and Deaf Education (COMD-DE) during the freshman and/or sophomore years. However, during the first semester of the junior year, the student must formally apply for admission into the COMD-DE undergraduate professional preparation program. Application forms for admission into COMD-DE will be dissemi-

nated in class during the first semester of the junior year. As part of the application process, each student will complete the College of Education Writing Examination. The student will be accepted if cumulative grade point average is 3.0 or higher, University Studies credits are within 15 credits of completion, College of Education Writing Exam has been taken and passed, and all COM-DE courses taken to this point have grades higher than C+. Students who are accepted into the undergraduate program must maintain the acceptance standards each semester in order to continue in the major.

Transfer Students or students applying for admission into the program subsequent to the fall semester of their junior year must receive approval from the department head before beginning their matriculation in major classes.

Admission into the College of Education teacher education program is necessary before the student may take licensure courses taught in the departments of Elementary Education, Special Education and Rehabilitation, and Secondary Education, which are supportive of the major. Admission into the teacher education program is also required prior to taking the Communicative Disorders clinical practicum coursework. Application to the teacher education program typically takes place at the beginning of the graduate program.

**Bachelor's degree in Communicative Disorders and Deaf Education.** There are two tracks available within the department: (1) **communicative disorders**, which includes emphases in *audiology* and *speech-language pathology*, and (2) **education of the deaf and hard of hearing**. Though the BS or BA is available in both tracks, the student should be aware that there is no professional employment licensure in either communicative disorders or education of the deaf and hard of hearing at the bachelor's level. Majors in the **communicative disorders** track need to complete a core curriculum consisting of ComD 2400, 2910, 3100, 3120, 3400, 3500, 3650, 3700, 3910, 4100, 4400, 5070, 5100, 5140, 5200, and 5330. Majors in the **education of the deaf and hard of hearing** track need to complete a core curriculum consisting of an elementary, secondary, early childhood, or special education major, including professional breadth requirements, and deaf education requirements consisting of ComD 2500, 2910, 3910, 4910, 5630, 5640, 5650, 5660, 5670, 5680, 5730, and 6690. The undergraduate major for communicative disorders and deaf education consists of 44 semester credits of courses specified by the department, plus 4-8 semester credits of extra departmental coursework. Current national board and state educational agency licensure requirements demand more coursework than the minimum numbers required for University graduation. Students desiring supportive courses for majors in special education, elementary or secondary education, family life, psychology, or other related departments are advised to seek counsel from the departmental advisor in determining an effective minor core.

**Education of the Deaf and Hard of Hearing.** Students wishing to obtain licensure to teach the deaf and hard of hearing will need to complete the majority of the requirements for a teaching license in early childhood education, elementary education, secondary education, or special education. In conjunction with meeting the majority of requirements for licensure, the student must complete coursework leading to a bachelor's degree in Communicative Disorders and Deaf Education, with an emphasis in Education of the Deaf and Hard of Hearing. The department has an undergraduate advisor for this program.

## Course Requirements

Each student in the Communicative Disorders and Deaf Education Major must complete a component of professional training, which includes departmental and extra-departmental coursework. This professional training component includes the following courses: ComD 2400, 2500, 2910, 3100, 3120, 3400, 3500, 3650, 3700, 5070, 5100, 5200, 5330; Engl 1010, 2010; Spch 2600; Biol 1010; Biol 2000; CS 1010 or BIS 1400; Math 1010, 1050; Psy 1010, 1400; Stat 1040; and SpEd 4000.

## Additional Information

For more information concerning graduation requirements and course sequencing, see the major requirement sheet, available from the Department of Communicative Disorders and Deaf Education, or visit the departmental website:

<http://www.coe.usu.edu/comd>.

Because many of the undergraduate COMD-DE courses are taught in sequence, students should meet with a departmental advisor prior to beginning classes in the COMD-DE major to assure that the most efficient and effective schedule is followed. Students should also confer with a departmental advisor for information about changes in requirements or scheduling.

# Graduate Programs

## Admission Requirements

A bachelor's degree in Communicative Disorders or equivalent requirements must be completed before the student enters the graduate program. The time required to complete the master of science degree is determined during the first semester of study by a temporary department committee consisting of professors from the student's direct field of study.

Students seeking the MEd with a specialization in education of the deaf and hard of hearing must have either an undergraduate degree in early childhood, elementary, secondary, or special education, or an undergraduate degree from USU's program in education of the deaf and hard of hearing. Students coming into the master's degree with a degree other than deaf education will need to plan on a two-year MEd program, while those coming directly through the USU curriculum will need to plan on a one-year master's degree program.

Applications will be considered once a year between March 1 and March 15. However, students must have completed the application process to the School of Graduate Studies by February 15. No application will be considered until all the required information is submitted to the School of Graduate Studies.

## Master's Degrees

Generally, all students will complete the requirements as specified below. In some instances students will have had some of the coursework required in the graduate curriculum as part of the undergraduate training at another institution. In those cases, the program will be individualized to meet national licensure through the American Speech-Language-Hearing Association (ASHA) and state educational licensure from the State of Utah. In no instance will students amass fewer than 36 graduate credits.

At the end of their programs, all graduate students, except for those in education of the deaf and hard of hearing, must take the NTE examination in their area of specialty. This must be done before a letter of completion will be sent to the School of Graduate Studies. Students are required to list USU as a recipient of NTE test scores.

**Speech-Language Pathology.** The program in speech-language pathology is accredited by the Council on Academic Accreditation of the American Speech-Language-Hearing Association (ASHA). The Utah State Office of Education has also approved the program. Students completing the master's curriculum are eligible for licensure from ASHA and the State of Utah Board of Education and additionally have met the academic and practicum requirements for licensure from the State of Utah. As a consequence of preparation and licensure, students are prepared for employment in any setting where the services of a qualified provider of speech and language services are provided. The following courses are required for all students seeking the MS degree in speech-language pathology: ComD 6020, 6030, 6040, 6050, 6100, 6120, 6130, 6140, 6200, 6210, 6220, 6230, 6300, 6370, 6810, and 6970.

**Clinical and Educational Audiology.** The program in clinical and educational audiology is accredited by the Council on Academic Accreditation of the American Speech-Language-Hearing Association (ASHA) and is also approved by the Utah State Office of Education. Students completing the master's curriculum are eligible for licensure from ASHA and the State of Utah Board of Education, and additionally have met the requirements for licensure from the State of Utah. As a consequence of preparation and licensure, students are prepared for employment in any setting where the services of a qualified provider of audiological services are provided. The following courses are required of all students seeking the MS degree in clinical and educational audiology: ComD 6230, 6310, 6320, 6330, 6340, 6350, 6360, 6370, 6380, 6390, 6400, 6410, 6420, 6500, 6600, and 6970.

**Education of the Deaf and Hard of Hearing.** The program in Education of the Deaf and Hard of Hearing is accredited by the Council on Education of the Deaf (CED) and is also approved by the Utah State Office of Education. Students completing this program may be licensed by the Utah State Board of Education as teachers of the deaf and hard of hearing and they also meet the requirements for licensure by CED. Students who complete the curriculum are prepared to provide services as teachers of the deaf and hard of hearing in any setting in which such services are furnished. The following courses or their equivalent are required for all students seeking the MEd in education of the deaf and hard of hearing: ComD 2500, 2910, 3910, 4910, 5100, 5610, 5630, 5640, 5650, 5660, 5670, 5680, 5730/6730, 5910, 6640, 6650, 6690, 6700, 6710, 6800, 6820, 6830, and 6850.

### **Educational Specialist Degree**

The department offers an Educational Specialist (EdS) program that can be individualized to suit a candidate's need within a basic structure of educational audiology and with foci on research, supervision, and evaluation. The program is designed for those individuals who have completed the master's degree and who are practicing in educational settings. The degree requires a minimum of 30 credits beyond the master's degree and may be completed in part through coursework in the summer and extension study and research in conjunction with the individual's workplace.

### **Course Requirements**

**Graduate Courses in Speech-Language Pathology:** *Year One—First Semester:* ComD 6020, 6030, 6040, 6050, 6100, 6130; *Second Semester:* ComD 6040, 6100, 6140, 6220, 6810; *Summer:* ComD 6370, Educ 6550; *Year Two—First Semester:* ComD 6050, 6120, 6200, 6210; *Second Semester:* ComD 6300.

**Graduate Courses in Audiology:** *Year One—First Semester:* ComD 6310, 6320, 6400, 6420; *Second Semester:* ComD 6230, 6340, 6370, 6390, 6400; *Third Semester:* ComD 6330, 6350, 6360, 6400, 6970; *Year Two—First Semester:* ComD 6380, 6400, 6410, 6970; *Second Semester:* ComD 6960, 6970.

**Graduate Courses in Education of the Deaf and Hard of Hearing:** Students entering the program in Education of the Deaf and Hard of Hearing may choose one of three tracks. **Track one** is followed by students who have obtained their bachelor's degree in Communicative Disorders and Deaf Education with a focus in Education of the Deaf and Hard of Hearing; **track two** is followed by those who come into the program without the required background in Education of the Deaf; and **track three** will follow the program outlined for those who wish to focus on Early Childhood Deaf Education only. *Track 1—Fall Semester:* EIED 5150, 5250, ComD 5910, 6640, 6650, 6700, 6710; *Spring Semester:* ComD 6800, 6820, 6830, 6850; *Track 2—Fall Semester (Year 1):* ComD 2500, 5660, 5670, 5730/6730, 5740/6740; *Spring Semester (Year 1):* ComD 5610, 5630, 5640, 5650, 5680; *Fall Semester (Year 2):* ComD 5910, 6640, 6650, 6700, 6710; *Spring Semester (Year 2):* ComD 6800, 6820, 6830, 6850; *Track 3—Fall Semester:* ComD 4910, 5630, 5660, 5680.

### **Research Requirements**

Several options are available for graduate students to complete the research or special project required for the MS or MEd. These options are specified in the list of requirements available in the department office, and include for the MS the traditional Plan A experimental thesis option, as well as the Plan B integrative review option or creative project option. Declaration of an option must be made at the time the student files an Application for Candidacy form with the School of Graduate Studies. Changes in the option will necessitate a complete revision and review of the Application for Candidacy by the student's supervisory committee.

**Licensure.** Each undergraduate and graduate is advised on which classes will meet Utah State Office of Education and American Speech-Language-Hearing Association licensure requirements, as well as Utah State Professional Licensure requirements. State Office of Education licensure credentials within Utah include approval for audiology, speech-language pathology, and education of the deaf and hard of hearing. Graduation from any of these programs ensures the student may be licensed in Utah. Such licensure facilitates meeting other requirements for other states because of reciprocal agreements that exist among some state educational agencies throughout the country.

### **Practicum Opportunities**

Practicum experience at the graduate level is available in a variety of settings. The department maintains a Speech-Language-Hearing Center offering a full range of diagnostic and remedial services to individuals with speech-language or hearing disabilities. Additionally, students are assigned to off-campus practicum sites such as hospitals, schools for the deaf, long-term and rehabil-

itation care centers, clinics, physician's offices, and public schools. Placement in out-of-state practicum sites is available for those students who request it. Students may also be placed at the Center for Persons with Disabilities for experience in birth to three services. **Students must be enrolled in clinical practicum each semester of their graduate program.**

### **Financial Assistance**

Limited departmental and federal grant support is available to graduate students and is awarded on a competitive basis. The application form for financial support must be submitted to the department no later than March 1 for consideration for the coming year.

### **Career Opportunities**

Audiology graduates are prepared to work as clinical, educational, and rehabilitative audiologists. Speech-Language- Pathology graduates are prepared to work in a variety of medical and school settings. Graduates in the area of Education of the Deaf are trained to work in total communication, bilingual/bicultural, and auditory-aural settings.

### **Additional Information**

Specific details about each of the foregoing degree programs are outlined in policy and procedure documents available through the department. All requirements are subject to change; check with the department for current requirements. Additional information may be obtained by contacting the Department of Communicative Disorders and Deaf Education.

## **Communicative Disorders and Deaf Education Courses (ComD)**

**ComD 2400. Orientation and Observation.** Introduces students to the professional responsibilities required of communicative disorders and deaf education specialists in a variety of employment settings. Observation of normal/abnormal communication abilities. Language, hearing, and speech disorders. (1 cr) (F,Sp) ®

**ComD 2500. Language, Speech, and Hearing Development.** Language, speech, and hearing development throughout life and strategies for facilitating development. Requisites for human communication and language learning. Theoretical models of language acquisition and intracultural/intercultural differences. Nature, causes, and prevention of language, speech, and hearing disorders. (3 cr) (F,Sp)

**ComD 2910 (CI). Sign Language I.** Introduction to American Sign Language and deaf culture. Focuses on receptive skills, with some instruction relative to rules, grammar, and culture associated with American Sign Language. Total immersion approach is used. (3 cr) (F,Sp)

**ComD 3050. Practicum and Methods in Teaching Children who are Deaf and Hard of Hearing.** Students investigate various aspects of teaching methods through field experiences in the classroom, curriculum and effective teaching assessment, observation and reflections, and guest speakers focusing on areas of mathematics and science in the primary grades. (1-3 cr) (F,Sp) ®

**ComD 3080. American Sign Language Practicum.** Provides opportunities for practice and continued improvement of receptive and expressive skills in American Sign Language. (1 cr) (F,Sp) ®

**ComD 3100. Fundamentals of Anatomy for Speech and Language.** Basic study of the structures and functions associated with the subprocesses of speech and hearing, including respiration, phonation, resonance, articulation, neurology, and hearing. Prerequisite: Biol 2000 or 2010. (3 cr) (F)

**ComD 3120. Disorders of Articulation and Phonology.** Introduction to articulation and phonological disorders and related problems. Emphasis directed at evaluation, management, and measures of success. Principles of programming are presented. Prerequisites: ComD 2500 and 3500. (3 cr) (Sp)

**ComD 3400. Acoustics and Anatomy of the Ear.** Principles of physical acoustics as applied to Communicative Disorders. Course includes anatomy, physiology, and metabolism of the human auditory system. (3 cr) (F)

**ComD 3500. Phonetics/Developmental Phonology.** Study of the development of the phonological subsystem in English and the acoustic and physiological characteristics of speech sounds. (3 cr) (F)

**ComD 3650. Clinical Processes and Behavior.** A consideration of clinical management as an interactive process. Interpersonal sensitivity, technical knowledge and skills, professional infection-control measures, and behavior modification are core considerations. Prerequisites: ComD 2500 and Psy 1010. (2 cr) (Sp)

**ComD 3700. Basic Audiology and Acoustic Immittance.** Study of pure tone audiometry, including clinical masking, speech audiometry, and clinical immittance measures. Laboratory exercises are required. Prerequisite: ComD 3400. (3 cr) (F)

**ComD 3910. Sign Language II.** Development of expressive and receptive skills in American Sign Language, focusing on idiom-like expressions, number systems, rules, grammar, and conversational language. Total immersion approach is used. Prerequisite: ComD 2910 or instructor approval. (3 cr) (F,Sp)

**ComD 4100 (CI). Clinical Practicum in Speech-Language Pathology.** Supervised diagnostic and treatment practicum with individuals with communication disorders. Prerequisites: ComD 2500, 3120, 3650, and permission of instructor. (1-2 cr) (F,Sp,Su) ®

**ComD 4400. Clinical Practicum in Audiology.** Supervised diagnostic and treatment practicum with individuals with hearing loss. Prerequisites: ComD 3400, 3650, 3700, and consent of instructor. (1-2 cr) (F,Sp,Su) ®

**ComD 4600. Senior Thesis.** Student-initiated research project under faculty supervision. Prerequisites: Satisfactory grade point average, instructor recommendation, and approval of Honors Committee. (1-6 cr) (F,Sp,Su) ®

**ComD 4910 (CI). Sign Language III.** Focuses on: (1) strengthening an American Sign Language base, (2) exposing students to ASL natural discourse, (3) introducing students to processed ASL interpretation; and (4) providing detailed feedback. Prerequisites: ComD 2910 and 3910. (3 cr) (Sp)

**ComD 5000. Institute in Communicative Disorders and Deaf Education.** Special colloquial offerings in communicative disorders and deaf education. (0.5-3 cr) (F,Sp,Su) ®

**ComD 5070. Speech Science.** Explores contemporary theory, research findings, clinical applications, and laboratory experiences in measurement and analysis of normal speech production. Speech subsystems of respiration, phonation, articulation, and resonance are examined in detail through the collection and analysis of physiologic data. (2 cr) (F)

**ComD 5100. Language Science.** Study of clinical analysis of syntactic and morphological properties of speech. (3 cr) (Sp)

**ComD 5140. Neural Bases of Speech and Language.** Study of brain mechanisms underlying normal and disordered speech and language production. Focuses on neuroanatomy, neurophysiology, and the organization of motor and sensory systems. (2 cr) (F)

**ComD 5200. Language Assessment and Intervention for Preschool Children.** Preschool assessment and intervention, including language sampling and analysis procedures, test administration and interpretation, informal language assessment, intervention goals and objectives, planning clinical management, language facilitation strategies, teaching approaches, classroom-based language intervention, and enhancing emergent literacy. Prerequisite: ComD 2500 or equivalent. (4 cr) (Sp)

**ComD 5330. Aural Rehabilitation.** Ramifications of hearing loss among children and adults and rehabilitative audiological techniques and programs. (3 cr) (Sp)

**ComD 5600. Classroom Teaching Using American Sign Language.** Emphasizes development and presentation of lesson plans for different grade levels. Focuses on developing students' abilities in moving from and linking Language 1 (American Sign Language) and Language 2 (the written form of English). Prerequisites: ComD 2910, 3910, and 4910. (3 cr) (F)

**ComD 5610. Introduction to Education of the Deaf and Hard of Hearing.** Provides students with an overview of the history of educating children who are deaf and hard of hearing. Presents an overview of techniques, as well as the philosophical views that have led to the many teaching methods for the deaf and hard of hearing. (3 cr) (F)

**ComD 5620. Teaching School Subjects to Students who are Deaf and Hard of Hearing.** Focuses on effective strategies for teaching students who are deaf and hard of hearing across curricular subject areas. Emphasizes infusion of language and reading into all content areas. (3 cr) (F)

**ComD 5630. Audiology and Teachers of Children who are Deaf and Hard of Hearing.** Focuses on the field of audiology and how information from this discipline relates to education of deaf and hard of hearing children. (3 cr) (Sp)

**ComD 5640. Teaching Speech to Deaf and Hard of Hearing Children.** Evaluative and instructional models, processes, and methodologies in the development of speech for children who are deaf and hard of hearing. (3 cr) (Sp)

**ComD 5650. Teaching the English Language to Individuals who are Deaf and Hard of Hearing.** Evaluation and teaching of the English language to individuals who are deaf and hard of hearing. Language development and remediation using structure, modeling, natural approach, and grammar. Prerequisite: ComD 2500. (3 cr) (Sp)

**ComD 5660. Early Intervention for Children Who are Deaf and Hard of Hearing.** Family-centered early intervention for infants and young children who are deaf and hard of hearing. Identification, testing, hearing aids, communication, auditory, language, and emerging literacy programming, parent and family programs, mentoring. (3 cr) (F)

**ComD 5670. Psychological Principles and Individuals who are Deaf and Hard of Hearing.** Psychological theories and research used to describe the deaf and hard of hearing. Exploration of principles that can be used in helping these individuals achieve emotional well-being. Also taught as Psy 5670. (3 cr) (Sp)

**ComD 5680. Socio-Cultural Aspects of Deafness.** Leads students to understand how society, political institutions, and education have impacted the deaf culture. (3 cr) (Sp)

**ComD 5730 (d6730).<sup>1</sup> Children with Multiple Disabilities and Hearing Loss.** Students will obtain a basic understanding of the problems and characteristics of children who have hearing loss plus one or more disabling conditions. Teaching strategies will also be discussed. (3 cr) (F)

**ComD 5740 (d6740). Teaching Reading to Deaf and Hard of Hearing Children.** Exploration of resources and methods used to teach reading to deaf and hard of hear-

ing children. Discussion of current research regarding the effectiveness of these methods and ideas for improving reading instruction. (3 cr) (F)

**ComD 5860 (d6860). Interdisciplinary Training in Assistive Technology I.** Provides interdisciplinary training in assistive technology, focusing on assistive devices related to powered mobility, seating and positioning, computer access, and augmentative and alternative communication. Prerequisite: Departmental permission. (3 cr) (F)

**ComD 5870 (d6870). Interdisciplinary Training in Assistive Technology II.** Provides advanced training in assistive technology, focusing on assistive devices related to cognitive, hearing, visual, and dual sensory impairments. Funding issues also addressed. (3 cr) (Sp)

**ComD 5900. Independent Study.** Selected work individually assigned, handled, and directed. Problems of mutual interest to students and the instructor are investigated and reported. (1-6 cr) (F,Sp,Su) ®

**ComD 5910. Sign Language IV.** Basic concepts of linguistics pertaining to ASL structure. Students must have a good understanding of ASL structure and excellent receptive ASL skills. Prerequisites: ComD 2500, 3120, 4100, and 5200. (3 cr) (F)

**ComD 6020. Language/Communication Management in the Schools.** Explores language and communicative disorders services in schools, including administration, organization, management, scheduling, inservice, multidisciplinary teams, IEP development, and federal and state laws. Emphasizes assessment and intervention for school-age language disorders. Prerequisites: ComD 2500, 3120, 4100. (3 cr) (F)

**ComD 6030. Disorders of Fluency—Stuttering.** Provides understanding of theory, nature, etiologies, and principles of diagnosis and treatment of communication disorders related to stuttering and other disorders of fluency. (3 cr) (F)

**ComD 6040. Communication Disorders Related to Orofacial Anomalies.** Nature, etiologies, and principles of diagnosis and treatment of communication disorders related to orofacial anomalies. Prerequisite: Graduate standing. (3 cr) (Sp)

**ComD 6050. Professional Practice in Speech-Language Pathology.** Lecture, discussion, and guest presenters on various professional practice topics pertaining to speech-language pathology. Prerequisite: Graduate standing. (2 cr) (F)

**ComD 6100. Advanced Clinical Practicum in Speech-Language Pathology.** Supervised diagnostic and treatment practicum with individuals with communication disorders. Prerequisites: ComD 2500, 3120, 3650, or equivalent, and permission of instructor. (1-3 cr) (F,Sp,Su)

**ComD 6120. Adult Disorders of Motor Speech and Swallowing.** Considers the neurological substrates and clinical manifestation of dysarthria, apraxia, and dysphagia in the adult population. Addresses diagnostic methods and management of these disorders. (3 cr) (F)

**ComD 6130. Neuropathologies of Speech and Language.** Study of neuropathologies of speech and language associated with aphasia, traumatic brain injury, right hemisphere syndrome, dementia, and degenerative neurological diseases. (3 cr) (F)

**ComD 6140. Pediatric Neurogenic Disorders.** Global perspective of normal pediatric development. Study of neuro lesions pathologies and effects on respiration, phonation, and articulation. Also addresses assessment and intervention of oral-motor skills for speech and swallowing purposes. (3 cr) (Sp)

**ComD 6200. Internship in Public Schools—Speech-Language Pathology.** Supervised public school practicum in speech-language pathology. (1-4 cr) (F,Sp,Su) ®

**ComD 6210. Bilingual/Bicultural Services.** Study of the cultural, linguistic, educational, and socioeconomic status of individuals with speech-language disabilities from ethnic or linguistic minority groups. (2 cr) (F)

**ComD 6220. Severe Communication Impairments.** Study of assessment and treatment strategies for individuals with severe communication impairments, including those requiring augmentative and alternative communication systems. (3 cr) (Sp)

**ComD 6230. Introduction to Research in Communicative Disorders.** Introduction to experimental research designs, including educational research and development, causal-comparative, correlational, and qualitative research. Includes research reviews, research proposals, threats to internal and external validity, and statistical/practical significance. Prerequisite: Psy 2800. (3 cr) (Sp)

**ComD 6300. Externship in Speech-Language Pathology.** Supervised off-campus practicum externship in speech-language pathology. Prerequisite: Consent of instructor. (1-9 cr) (F,Sp,Su) ®

**ComD 6310. Advanced Hearing Science.** Psychoacoustic concepts and principles, anatomy of the sensorineural and central auditory and vestibular systems, and advanced principles of acoustics as they apply to the profession of audiology. Prerequisites: ComD 3100, 3400, and 3700. (3 cr) (F)

**ComD 6320. Hearing Aids.** Hearing aid types and uses, hearing aid components and characteristics, electroacoustic performance, hearing aid candidacy and hearing aid evaluation, and hearing aid fitting and orientation. Prerequisites: ComD 3400 and 3700. (3 cr) (Sp)

**ComD 6330. Electrophysiological Auditory Tests.** Tests for vestibular disorder and evoked potentials testing (particularly ABR). Prerequisites: ComD 3400, 3700, 6420. (3 cr) (Sp)

**ComD 6340. Advanced Hearing Aids.** Applications of advanced hearing aid circuitry, especially digital and digitally programmable hearing aids. Presentation of various aspects of measuring hearing aid satisfaction. Tinnitus management and cochlear implants area also treated. Hearing aid trouble shooting, modifications, and repairs are included. Prerequisite: ComD 6310. (3 cr) (Sp)

**ComD 6350. Advanced Audiological Diagnosis.** Special auditory testing for site of lesion in the conductive, sensory, neural, and central auditory systems. Emphasizes Immittance Battery and Otoacoustic Emissions Battery. Tests for assessment of functional hearing loss are also included. Sensitivity and specificity of auditory tests are treated. Test results related to auditory disease process. Prerequisite: ComD 6420. (3 cr) (Su)

**ComD 6360. Private Practice in Audiology.** Audiology business and practice management. Discussion of business set-up, the business plan, managerial accounting and financial analysis, marketing, pricing, reimbursement, record keeping, and forensics. (3 cr) (Su)

**ComD 6370. Educational Audiology.** Management of deaf and hard of hearing children in the regular schools. Population and individual profiles, evaluation and staffing, models of delivery, integration considerations, remedial and facilitative programming. (3 cr) (F)

**ComD 6380. Educational Audiological Management.** Assessment of children with hearing loss who are in the public schools. Management plans for audiological services, as well as appropriate intervention strategies for children. Students develop plans and present methods for bringing change to schools. Prerequisite: ComD 6370. (3 cr) (Sp)

**ComD 6390. Diseases of the Ear.** Study of the etiology, symptomatology, audiological manifestations, and medical treatment of various pathological conditions of the auditory system. Prerequisites: ComD 3400 and 3700. (3 cr) (F)

**ComD 6400. Advanced Clinical Practicum in Audiology.** Supervised advanced diagnostic and treatment practicum with individuals with hearing loss. Prerequisites: ComD 3400, 3700, or equivalent. (1-3 cr) (F,Sp,Su) ®

**ComD 6410. Industrial Audiology.** Principles of noise hazard evaluation, effects of noise on the auditory mechanism, and development and maintenance of an effective hearing conservation program. Prerequisite: ComD 3400. (3 cr) (F)

**ComD 6420. Pediatric Audiology.** Provides students with understanding of normal auditory development and theoretical, clinical, and practical issues involved in screening, assessment, and management of children with hearing loss. Prerequisites: ComD 3400, 3700, or equivalent. (3 cr) (F)

**ComD 6430. Speech Communication and Hearing Loss.** History of listening and speech programs for the hearing impaired. Hearing aids and FM systems, as well as computer and electronic devices used in supporting the speech of this population. Discussion of cochlear implants, the palatometer, and TranSonic hearing aids. (3 cr) (F)

**ComD 6500. Internship in Public Schools—Audiology.** Supervised public school practicum in audiology. (1-6 cr) (F,Sp,Su) ®

**ComD 6600. Externship in Audiology.** Supervised off-campus practicum externship in audiology. (1-9 cr) (Sp,Su) ®

**ComD 6640. Strategies for Teaching Children who are Deaf and Hard of Hearing.** Provides clinical experience in practicing teaching strategies. Emphasizes evaluation, teaching groups, and tutoring children in speech, listening, and English. Includes lecture, demonstration, observation, and practice in classrooms for the deaf. Prerequisite: ComD 5640. (3 cr) (F)

**ComD 6650. Strategies for Teaching English Language to Children who are Deaf and Hard of Hearing.** Practical methods for applying theories of teaching the English language in classrooms where deaf and hard of hearing children are educated. Prerequisite: ComD 5650. (3 cr) (F)

**ComD 6660. INSITE Training.** Training in implementation of the INSITE Model. Early home intervention for infants and young children having a combination of sensory impairments and other disabilities. (1-3 cr) (F,Sp,Su)

**ComD 6670. AHEAD Training.** Training in implementation of the AHEAD Model. Early intervention services for families and child care providers of children with noncategorical disabilities, birth to three years, in home and child care settings. (1-3 cr) (F,Sp,Su)

**ComD 6680. SKI\*HI Training.** Training in implementation of the SKI\*HI Model. Early home intervention for infants and young children who are deaf and hard of hearing, and their families. (1-3 cr) (F,Sp,Su)

**ComD 6690. Early Intervention for Infants and Toddlers with Vision Impairment and Their Families.** Students will gain an understanding of and develop skills in working with infants and toddlers who are visually impaired and their families. (1-3 cr) (F,Sp,Su)

**ComD 6700. Practicum in Education of Children who are Deaf and Hard of Hearing.** Supervised diagnostic and remedial casework in education of the deaf and hard of hearing. (1-3 cr) (F,Sp,Su) ®

**ComD 6710. Mainstreaming Children who are Deaf and Hard of Hearing.** Rationale and procedures used to successfully mainstream children with hearing loss. Also methods of evaluating programs where children with hearing loss are to be placed. (3 cr) (F)

**ComD 6720. Serving Preschoolers with Vision Impairments in Center Based Settings.** To provide students with knowledge and skills in working with children with visual impairments in the preschool setting. (1-3 cr) (F,Sp,Su)

**ComD 6730 (d5730). Children with Multiple Disabilities and Hearing Loss.** Students will obtain a basic understanding of the problems and characteristics of children who have hearing loss plus one or more disabling conditions. Teaching strategies will also be discussed. (3 cr) (F)

**ComD 6740 (d5740). Teaching Reading to Deaf and Hard of Hearing Children.** Exploration of resources and methods used to teach reading to deaf and hard of hearing children. (3 cr) (F)

ing children. Discussion of current research regarding the effectiveness of these methods and ideas for improving reading instruction. (3 cr) (F)

**ComD 6800. Student Teaching—Day-School Program.** Full-time student teaching in a day-school program for the deaf. (6-12 cr) (F) ®

**ComD 6810. Disorders of Phonation.** Advanced consideration of issues and methods in the diagnosis and treatment of voice problems associated with the larynx and the respiratory tract. (3 cr) (Sp)

**ComD 6820. Principles of Intervention for Children who are Deaf and Hard of Hearing.** Application of teaching principles to classrooms for the deaf and hard of hearing. Practicum with children is part of this course. Prerequisites: ComD 6640, 6650, and permission of instructor. (3 cr) (Sp)

**ComD 6830. Student Teaching—Residential.** Full-time student teaching at a residential school for the deaf. Prerequisite: Permission of instructor. (6-12 cr) (Sp)

**ComD 6850. Seminar in Communicative Disorders and Deaf Education.** Research and analysis of selected topics. (1-3 cr) (F,Sp,Su) ®

**ComD 6860 (d5860). Interdisciplinary Training in Assistive Technology I.** Provides interdisciplinary training in assistive technology, focusing on assistive devices related to powered mobility, seating and positioning, computer access, and augmentative and alternative communication. Prerequisite: Departmental permission. (3 cr) (F)

**ComD 6870 (d5870). Interdisciplinary Training in Assistive Technology II.** Provides advanced training in assistive technology, focusing on assistive devices related to cognitive, hearing, visual, and dual sensory impairments. Funding issues also addressed. (3 cr) (Sp)

**ComD 6900. Independent Study.** Prerequisite: Permission of instructor. (1-9 cr) (F,Sp,Su) ®

**ComD 6960. Master's Project.** This experience provides student with opportunity to design and carry out a creative project which is closely related to his or her area of teaching specialty. May require a written report. (1-4 cr) (F,Sp,Su) ®

**ComD 6970. Thesis.** Prerequisite: Permission of instructor. (1-7 cr) (F,Sp,Su) ®

**ComD 6990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

**ComD 7330. Supervision Internship.** Provides extensive supervisory experience for advanced students. Internship is for a period of time to be specified by the department and cooperating agency. Prerequisite: Permission of instructor. (1-7 cr) (F,Sp,Su) ®

**ComD 7510. Supervision in Communicative Disorders.** Principles and practices of supervision in Communicative Disorders and Deaf Education. Emphasizes clinical and educational supervision as these styles relate to individuals who are deaf and hard of hearing or who have communicative disorders. (2 cr) (Su)

**ComD 7810. Research Seminar in Educational Audiology.** Identification of research problem, consideration of research strategies and methods, application of research and statistical concepts in departmental focus, interaction with faculty. (1-3 cr) (F,Sp,Su) ®

**ComD 7900. Independent Study.** Advanced students, under direction of a faculty member, will study independently; however, departmental permission is necessary. (1-2 cr) (F,Sp,Su) ®

**ComD 7910. Independent Research.** Advanced students, under direction of a faculty member, will do research in an area of interest to themselves. (1-2 cr) (F,Sp,Su) ®

**ComD 7970. Dissertation.** Variable credit for dissertation project in connection with the doctoral program emphasis in educational audiology. (1-9 cr) (F,Sp,Su) ®

**ComD 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

Department of  
**Computer Science**

College of Science

**Head: Professor Donald H. Cooley**, fuzzy logic, genetic algorithms, neural networks, multimedia systems  
 Office in Main 414, (435) 797-2451

**Associate Head and Coordinator for Graduate Programs in Computer Science: Associate Professor Gregory W. Jones**,  
 computability, GUIs, software engineering  
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**Professors** *Scott R. Cannon*, parallel processing, real-time systems, biomedical applications; *Heng-Da Cheng*, image processing, artificial intelligence, parallel processing, computer vision, fuzzy logic, VLSI algorithms and architectures, neural networks; **Professors Emeritus** *Rex L. Hurst*, statistical computation, information systems; *Wendell L. Pope*, data structures, automatic software generation, programming languages; **Associate Professors** *Stephen J. Allan*, parallel processing, parallel programming, recognition of parallelism, program optimization; *Vicki H. Allan*, instruction-level parallelism, register allocation, software pipelining, program optimization; *Stephen W. Clyde*, software engineering, object orientation, distributed systems, database theory, multimedia systems; *Hugo de Garis*, artificial intelligence, neural networks, genetic algorithms; *Nelson T. Dinerstein*, analysis and construction of information systems, database management systems, applications of small computers; *Nicholas S. Flann*, machine learning, artificial intelligence; *Daniel W. Watson*, parallel and heterogeneous computing, interconnection networks; *Jianping Zhang*, artificial intelligence, machine learning, intelligent computer-aided instruction; **Associate Professor Emeritus** *Larre N. Egbert*, scientific computing, computer graphics; **Lecturers** *Kendra S. Dinerstein*, introductory programming; *Mary Veronica Kolesar*, introductory computing

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), and Doctor of Philosophy (PhD) in Computer Science; Master of Computer Science (MCS)

**Undergraduate emphases:** BS, BA—Science, Digital Systems, Information Systems; **Graduate specializations:** Artificial Intelligence, Parallel Systems, Software Engineering

**Accreditation:** The Computer Science undergraduate program is accredited by the Computing Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; telephone (410) 347-7700.

## Undergraduate Programs

### Objectives

The core objective of the department is to fulfill its mission, as defined in its mission statement. A detailed description of all department objectives is given under the department's web site: <http://www.cs.usu.edu/>. The outcome objectives for undergraduates are as follows:

### Undergraduate Outcomes

All students graduating with a Bachelor of Science in Computer Science from Utah State University will be expected to show mastery as follows:

1. Graduates will be proficient in programming in at least two programming languages which have significance in industry.
2. Graduates will master the core curriculum in:
  - a. Data Structures and Algorithms
  - b. Computer Architecture and Organization

- c. Programming Languages
- d. Operating Systems
- e. Theory of Computing
- f. Software Engineering

3. Graduates will understand the practices and dynamics required to develop software, whether it be a single program or a major software product developed in a team environment.
4. Graduates will gain proficiency in the use of mathematical tools, including calculus, elementary statistics, and probability.
5. Graduates will have sufficient mastery of fundamental knowledge to be lifelong learners in computer science.
6. Graduates will understand the social and ethical issues which face computer scientists, and thus be able to contribute in a positive and productive manner to society.
7. Graduates will be able to communicate information effectively, both in writing and orally.

The course of study offered by the Department of Computer Science is directed primarily toward developing the problem solving skills of its students. This, in conjunction with the understanding of computers and computer systems provided by coursework, will enable a graduate of the program to apply his or her knowledge to finding solutions to problems that arise in the sciences, business, industry, government, and education sectors.

Students who have the ability to think analytically and creatively will find a challenging and exciting future in computer science.

Opportunities for practical applications of computer science skills are available with members of the computer science faculty who are engaged in research and consultation work both on and off campus.

### Computer Science

Computer Science deals with information structures and processes as they are represented and implemented in modern high-speed digital computers, and with information processing systems designed to implement useful applications of computing.

The program in computer science attempts to provide a solid foundation of knowledge about computers and to teach a mode of thinking which will permit continuing growth on the part of graduates. Prospective students should have an aptitude for mathematics and logic and an interest in analysis and deduction.

Computer science is one of the fastest growing fields of study in our society. Excellent employment opportunities are available to computer science graduates. All of the major corporations hire computer science graduates. Graduates in Computer Science work for such Utah-based corporations as Novell, Evans and Sutherland, TRW, and Thiokol, as well as Microsoft, IBM, Hewlett-Packard, etc.

The Computer Science bachelor's degree is a four-year degree with areas of emphasis in Science, Digital Systems, and Information Systems. In addition, by working with a departmental advisor, students may develop a plan of study tailored to their own unique career objectives.

### Science Emphasis

The Science Emphasis is designed for those who plan to pursue scientific or technical careers, research, or graduate education in computer science. Students choosing the science emphasis will take courses in programming languages, advanced algorithms, and math courses in calculus, linear analysis, and multi-variable calculus. Additional courses include a variety of upper-division computer science courses, chosen in consultation with an advisor.

### Digital Systems Emphasis

The Digital Systems Emphasis is available for those interested in both the hardware and software aspects of computer systems. In addition to computer science and mathematics courses, students in this emphasis will take electrical engineering courses in electronics, circuits, digital fundamentals, microcomputer systems, and digital system design. The curriculum for students in this emphasis is similar to that for students in the computer engineering major in the Electrical and Computer Engineering Department.

### Information Systems Emphasis

The Information Systems program at Utah State University offers a common core of courses through two department majors: (1) **Business Information Systems** and (2) **Computer Science**.

The curricula of the individual departments differ substantially in emphasis.

**The Computer Science major with an Information Systems emphasis** is designed for students interested in a career as a Computer Scientist with a background in Information Sciences and Systems. Majors in this emphasis are trained in all phases of the analysis, design, and implementation of information systems. As part of this emphasis, students also receive training in the theory and application of information. Students select an application area such as business, accounting, or economics. Other application areas can be developed by working closely with an advisor. This program of study, offered within the College of Science, leads to a Bachelor of Science, Bachelor of Arts, or Master of Science degree in Computer Science.

**The Business Information Systems major, Management Information Systems emphasis**, is offered in the Business Information Systems Department, College of Business (see page 163). The Bachelor of Science or Bachelor of Arts program is designed for students interested in business careers as information specialists, systems analysts, network managers, application programmers, and information systems managers in business and industry. BIS majors take required courses in analysis and design, Internet management, telecommunications, decision support systems, spreadsheet and database applications, and information systems projects. All graduates are required to complete a common core of business subjects. The College of Business is accredited by the American Assembly of Collegiate Schools of Business. The department also offers a Master of Science in Business Information Systems with a specialization in Management Information Systems. See page 165 for additional details.

## *Department and General College of Science Requirements*

In addition to the University Studies requirements, all majors in computer science must complete a total of 30 semester credits in writing, languages, humanities, arts, and/or social sciences. Courses taken to meet the University Studies requirements, if applicable, may also be counted to meet this departmental requirement. Students must work closely with their advisor to meet both these requirements.

**Bachelor of Science Core Requirements.** Students working toward the Bachelor of Science degree in Computer Science must complete the following:

1. One year of calculus, including Math 1210 and 1220.
2. One of the following four year-long science sequences: (1) Biol 1210, 1220; (2) Chem 1210, 1220, 1230, 1240; (3) Phyx 2110, 2120; or (4) Geol 1150, 3200. The sequence chosen must be outside the student's department.
3. USU 1360 (Integrated Physical Science). This course may also be applied toward the University Studies Breadth Physical Sciences (BPS) requirement.

The science credits must total at least 13 credits. For students taking Phyx 2110, 2120, and USU 1360, the total will be 11 credits. In this case, students must take one more advisor approved science class.

## Requirements

### Summary of Departmental Admission and Retention Requirements

Admission requirements of the Department of Computer Science for freshmen are the same as those described for the University on pages 48-51. Transfer students with a 2.5 GPA may apply for admission to the department.

Before a student can register for a Computer Science course, he or she must earn a grade of C- or better in all prerequisite courses. All required classes for the major must be completed with a grade of C- or better. Required courses, regardless of department, may not be taken pass-fail, and a Computer Science major must have advanced standing or written permission to register for a Computer Science course at the 3000-level or above.

For a more complete statement of requirements, please contact the department directly. Requirements may change from time to time.

### Bachelor of Science Degree

The department offers a degree program with emphases in science, digital systems, or information systems. The objectives are to train computer scientists who can relate to science, computer design, or information-based business disciplines. Other areas of emphasis will be considered on an individual basis.

#### COMPUTER SCIENCE REQUIRED COURSES

##### Science Emphasis

CS 1700, 1710, 1720, 2200, 2370, 3000, 3100, 4700, 5050; CS 2550 and 2560; Stat 3000; Math 1210, 1220, 2210, 2250, 3310; Math 4630 or 5610; Phil 2400 or 2500 or 3510 or 3520 or 4540 or MHR 3720; Spch 1050; at least 19 credits of upper-division advisor-approved computer science classes numbered 5000 or above.

##### Digital Systems Emphasis

CS 1700, 1710, 1720, 2200, 2370, 3000, 3100, 4700, 5050; Stat 3000; Math 1210, 1220, 2250, 3310; ECE 2410, 2420, 2530, 2540, 3710, 3720; Phil 2400 or 2500 or 3510 or 3520 or 4540 or MHR 3720; Spch 1050; at least 19 credits of upper-division advisor-approved computer science classes numbered 5000 and above.

##### Information Systems Emphasis

CS 1700, 1710, 1720, 2200, 2370, 3000, 3100, 4700, 5050; CS 2550 and 2560; Stat 2300; Math 1210, 1220, 3310; Acct 2010, 2020; Econ 1500; MHR 3110; BA 3080; Phil 2400 or 2500 or 3510 or 3520 or 4540 or MHR 3720; Spch 1050; at least 19 credits of upper-division advisor-approved computer science classes numbered 5000 and above.

### Minor

Requirements for a minor in computer science are listed below. Before beginning any minor, a student must meet with a departmental advisor and file an approved minor application form with the Computer Science Department.

#### Computer Science Minor

CS 1700, 1710, 1720, 2200; two additional CS classes selected from the following list: CS 2370, 2550, 2560, 3100, 4700, or any CS class numbered 5000 or above.

## Graduate Programs

Computer science deals with the programming, use, management, and organization of computers. Graduate students specialize in many different areas, several of which have strong ties to other disciplines such as mathematics, electrical engineering, statistics, accounting, and business administration.

### Admission Requirements

Applicants for admission to the graduate program should have a bachelor's degree in computer science **or** extensive experience in computing. Normally, a score of at least 640 on the quantitative test of the general GRE is required for admission to the MS, and a score of at least 700 is required for admission to the PhD or MCS. For scores less than these, applicants must show other strengths in their backgrounds to be considered for admission. The GRE computer science subject exam is not required for admission. Those who do take the GRE computer science subject exam will have preference in consideration for the award of financial aid. Decisions on financial aid are made on or near March 15 for the following fall semester.

### Course Requirements

In addition to the specific departmental admission and degree requirements described in this section, students are advised that they must also meet all Graduate School requirements as described in the Graduate School section of this catalog. Please note that departmental requirements change from time to time, so students should work closely with their advisor in designing their graduate program. Graduate-level courses outside the department *may* be acceptable for the graduate degree. In all cases, approval of the candidate's graduate committee should be obtained *before* registering for such courses.

Graduate students who have not taken or passed at the 50th percentile the computer science GRE subject exam are required to meet departmental requirements before completion of their first year. Students who have not met this requirement after the first year, as a minimum, will not be eligible for department-funded financial aid and cannot submit their program of study. In some circumstances, students will be terminated in the program. The department placement requirement is met in one or a combination of the following three ways:

1. Pass three of five placement exams: Computer Architecture and Organization, Algorithms, Operating Systems, Programming Languages/Compilers, and Software Engineering.
2. Complete with a grade of at least *B-* three of the following departmental placement courses: CS 2550 and 2560 or ECE 5750 (architecture and organization); CS 2200 or 5050 (algorithms); CS 3100 or 5200 (operating systems); CS 4700, 5300, or 6300 (programming languages/compilers); and CS 2370 or 5370 or 6370 (software engineering).
3. Show on an official transcript from an accredited college or university the completion of three courses deemed by the department to be equivalent to its placement courses. These must be semester-based courses of at least 3 credits, and the corresponding grade must be at least a *B-*.

**Master of Science (MS).** Whether Plan A or Plan B (see School of Graduate Studies general requirements), all MS/CS students must meet the following general requirements:

1. Complete four Computer Science courses numbered between 6000 and 6950. CS 6250 and 6900 are *not accepted* for these four courses. CS 6950 can count as *only one* of these four courses, and in that case must be taken for at least 3 credits in a single semester.

2. Complete 1 credit of CS 6900.

No more than 3 total credits in *both* CS 5950 and 6950 and 1 credit of CS 6900 may be used to satisfy the MS degree requirements. CS 6250 cannot be used to meet MS coursework requirements. A maximum of 15 credits of committee-approved coursework below the 6000-level may be used for the MS degree.

Students completing a Plan A MS degree must fulfill the following requirements:

1. Complete at least 24 credits of graduate coursework. The total GPA must be at least 3.0, and no more than two class grades below *B-* and none below *C* may be included.

2. Successfully meet the departmental placement requirement.

3. Successfully complete and submit a graduate thesis proposal.

4. Successfully complete and defend a graduate thesis, based on original work (CS 6970, 6 credits).

Students completing a Plan B MS degree must fulfill the following requirements:

1. Complete at least 32 credits of graduate coursework. The total GPA must be at least 3.0, and no more than two class grades below *B-* and none below *C* may be included.

2. Successfully meet the departmental placement requirement.

3. Successfully complete and submit a graduate report proposal.

4. Successfully complete and defend a graduate report (CS 6970, 2 credits).

**Master of Computer Science (MCS).** The Master of Computer Science (MCS) is a terminal degree with coursework requirements similar to the PhD, but lacking the PhD's requirement for original research. Students completing an MCS degree must fulfill the following requirements:

1. Complete at least 60 credits of graduate coursework beyond the BS/CS or 30 credits of graduate coursework beyond the MS/CS with a minimum class grade of *B-* and a minimum cumulative GPA of 3.2.

2. No more than 15 credits of coursework numbered below 6000 may be used for the MCS.

3. Complete at least 12 credits of 7000-level computer science coursework.

4. Successfully meet the departmental placement requirement.

5. Successfully complete and submit a research report proposal.

6. Successfully complete and defend a research report, based on original work (CS 7970, 6 credits).

**Doctor of Philosophy (PhD).** The Doctor of Philosophy in Computer Science is, above all else, a degree of quality. Simply completing a number of graduate courses or years of study is not sufficient to receive the degree. The successful candidate must

demonstrate a breadth of understanding in computer science, as well as a depth of understanding in his or her chosen area(s) of emphasis. Also, students must show an ability to do creative research. This research should be carried out over a significant period of time (i.e., at least one year or three semesters). Thus, each successful PhD candidate will produce a significant piece of original research, presented in a written dissertation and defended in an oral examination. This work should be of such quality that one or more journal or conference articles can be derived from it.

Students completing a PhD/CS must fulfill the following requirements:

1. Complete at least 90 credits of graduate coursework (including at least 27 credits of dissertation/research) beyond a BS/CS or at least 60 credits beyond an MS/CS with a minimum class grade of *B* and a minimum cumulative GPA of 3.5.

2. If an MS/CS is completed first, then no more than 15 credits of the 60 credits required for the PhD may be taken in coursework numbered below the 6000 level. If an MS/CS is not completed first, then no more than 21 credits of the 90 credits required for the PhD may be taken in coursework numbered below the 6000 level.

3. Complete at least 12 credits of 7000-level computer science coursework.

4. Complete 2 credits of PhD Seminar (CS 7900).

5. Complete 9 credits of department-approved business administration or business management courses.

6. Pass a set of comprehensive written examinations and an oral examination showing depth and breadth of knowledge in computer science and the student's area(s) of emphasis.

7. Successfully complete and defend a research proposal.

8. Successfully complete and defend a dissertation (CS 7970, for at least 27 credits).

## ***Financial Assistance***

Applicants for admission will automatically be considered for financial aid, with no need for additional application procedures. Continuing students will be requested to apply for aid during the spring semester. Acceptance into the program does not guarantee financial assistance.

## ***Computer Science Courses (CS)***

**CS 1010 (BPS). Foundations of Computer Science, and the Application of Computer Science to the Investigation of Physical Systems and Phenomena.** Investigation of computers and computing in today's society, including the basic scientific and mathematical concepts that underlie computer science, computing, and computer systems. No prerequisites. (3 cr) (F,Sp,Su)

**CS 1020. Campus Computing and Beyond.** Hands-on laboratory for CS 1010. Introduces the campus network and the Internet. Emphasizes general problem-solving strategies and skills associated with computer and application software use. Successful completion of this class includes completion of all Computer and Information Literacy requirements. (1 cr) (F,Sp,Su)

**CS 1050. Problem Solving with Computers.** Investigates problem-solving using methodologies of computer science. Emphasizes techniques used by computer scientists to solve problems, as well as the scientific method. Develops problem-solving methodology for both new and traditional computer applications. (3 cr) (F,Sp)

**CS 1700. Introduction to Computer Science—CS 1.** Introduction to science of problem solving, programming, program development, algorithm analysis, and data structures. Students will learn to develop correct software in a current programming language environment. Computer science majors must enroll in CS 1710 concurrently with CS 1700. Prerequisite or corequisite: Math 1050 or Math ACT score of at least 23. (3 cr) (F,Sp,Su)

**CS 1710. Introduction to Computer Science—CS 1 Lab.** One-hour lab taught in conjunction with CS 1700. Students learn to develop correct software in a hands-on structured environment. Computer science majors are required to pass both the laboratory and the lecture, and are required to enroll in CS 1700 concurrently with CS 1710. For students not majoring in computer science, this laboratory is advised, but not required, for CS 1700. Prerequisite: Math 1050 or Math ACT score of at least 23. (1 cr) (F,Sp,Su)

**CS 1720 (QI). Introduction to Computer Science—CS 2.** Introduction to science of problem solving, programming, program development, algorithm analysis, and data structures. Students will learn to develop correct software in a current programming language environment. Prerequisite: CS 1700. (3 cr) (F,Sp,Su)

**CS 2200 (QI). Algorithms and Data Structures—CS 3.** Introduction to science of problem solving, programming, program development, algorithm analysis, and data structures. Students will learn to develop correct software in a current programming language environment. Prerequisite: CS 1720. (3 cr) (F,Sp,Su)

**CS 2250. Cooperative Work Experience.** Provides credit for students working at a participating firm under faculty supervision. Prerequisite: Permission of instructor. (1-9 cr) (F,Sp,Su) ®

**CS 2370 (CI). Software Engineering.** Science of small and large software project development, taught in team and project management format. Students complete a well-documented functional product, working in teams of four to five students. Prerequisite: CS 2200. (3 cr) (F,Sp)

**CS 2550. Computer Organization.** Fundamental building blocks of digital computers, and the underlying theories upon which these building blocks are assembled. Introduction to information representation, number systems, combinational logic circuits, sequential logic circuits, and instruction sets. Programming such systems at the assembly level. Prerequisites: CS 1700 and Math 1050. (3 cr) (F,Sp)

**CS 2560. Computer Architecture.** Architecture of a computer system, as viewed by the programmer. Topics such as memory management, RISC vs. CISC, pipelining, parallelism, interrupts, and networking discussed in detail. Includes several homework assignments, at least one of which deals with interrupts and interrupt-driven applications. Prerequisite: CS 2550. (3 cr) (F,Sp)

**CS 3000. Undergraduate Seminar.** Serves as a capstone course for the pre-computer science curriculum, as well as an introduction to the advanced standing curriculum. Also includes discussion of computer science as a career and discussion of the advanced standing test. Prerequisite: CS 2200. (1 cr) (F,Sp)

**CS 3010 (DSC, CI, QI). Information Acquisition, Analysis, and Presentation.** Introduces students to use of scientific method and computer technology in analysis of multi-faceted problem, and presentation of that analysis. Each semester, built around single topic such as global warming. Prerequisites: Completion of Computer Literacy and Quantitative Literacy requirements. (3 cr) (F,Sp,Su)

**CS 3100. Operating Systems and Concurrency.** Design and implementation of operating systems. UNIX will be used as one example, but all categories of operating systems will be discussed. Presentation of the concept of concurrency as it applies to operating system design and application. Prerequisite: CS 2200. (3 cr) (F,Sp)

**CS 3410 (DSC, CI). Algorithm Development: JAVA/Internet.** Introduces students to algorithm development and programming for JAVA-based applications, especially those dealing with the Internet. Examines computer-based representation, storage, retrieval, and transmission of information, along with the algorithms used to perform such operations. Prerequisites: CS 1700 and completion of Computer and Information Literacy and Quantitative Literacy requirements. (3 cr) (F,Sp,Su)

**CS 3500 (QI, DSC). Algorithm Development: Visual BASIC/Graphical User.** Introduces students to algorithm development and programming in Visual BASIC, with special emphasis on graphical user interfaces for Windows applications and environments. Prerequisites: Completion of Computer Literacy and Quantitative Literacy requirements. (3 cr) (F,Sp,Su)

**CS 3510 (QI, DSC). Algorithm Development: COBOL/Business.** Introduces students to algorithm development and programming in COBOL. Special emphasis given to applications and algorithms for use in business and information processing applications. Prerequisites: Completion of Computer Literacy and Quantitative Literacy requirements. (3 cr) (F)

**CS 4250. Cooperative Work Experience.** Provides credit for students working at a participating firm under faculty supervision. Prerequisite: Permission of instructor. (1-9 cr) (F,Sp,Su) ®

**CS 4700. Programming Languages.** Theories of programming design and implementation. Introduction to variety of programming languages, showing how they represent trade-offs with respect to these theories. Prerequisite: CS 2200. (3 cr) (F,Sp)

**CS 4720. Computer Networking I.** Focuses on client/server model, which is the dominant architectural model for today's computer systems. Explores the network underlying this model, specifically examining the topology, protocol(s), user interface(s), and hardware. Emphasizes the general theory and functionalities underlying the client/server model and computer networks in general. Prerequisite: CS 2200 or permission of instructor. (3 cr) (F)

**CS 4730. Computer Networking II.** Focuses on client/server model, which is the dominant architectural model for today's computer systems. Emphasizes the specifics of the products of today's dominant network companies, which are currently Novell and Microsoft. Completion of this course prepares students for certification under such products. Prerequisite: CS 4720. (3 cr) (Sp)

**CS 4950. Undergraduate Research.** Participation in research projects, under supervision of a computer science faculty member. Prerequisites: CS 2200 and permission of instructor. (1-4 cr) (F,Sp,Su) ®

**CS 5000. Theory of Computability.** Theory of computation, including presentation of computability, decidability, and complexity. Includes formal grammars, finite and pushdown automata, and turing machines. Prerequisites: CS 2200, Math 3310. (3 cr) (F)

**CS 5050. Advanced Algorithms.** Study of algorithms and their analysis, including: design by induction, algorithms involving sequences and sets, graph algorithms, geometric algorithms, algebraic algorithms, reductions, NP-completeness, and parallel algorithms. Prerequisites: CS 2200, Math 3310. (3 cr) (Sp)

**CS 5100. Graphical User Interfaces and Windows Programming.** Design principles of GUIs and philosophy, structure, and programming in Windows environments. Prerequisite: CS 2200. (4 cr) (Sp)

**CS 5200. Distributed and Network Programming.** Introduction to programming concepts and techniques for distributed and networked environments. Explores concurrency, process synchronization, network protocols, connectionless and connection-oriented communications, network architectures and topology, load balancing, and transmission media. Prerequisite: CS 3100. (4 cr) (F)

**CS 5300. Compiler Construction.** Review of programming language structures, translation, loading, execution, and storage allocation. Compilation of declarations, expressions, statements, and procedures/functions. Organization and design of a compiler. Prerequisite: CS 4700. (4 cr) (F)

**CS 5370. Advanced Software Engineering.** Advanced software engineering concepts, including project management, requirements acquisition, formal methods of specification and verification, object-oriented design, and software testing. Student cannot receive credit for both CS 5370 and CS 6370. Prerequisite: CS 2370. (3 cr) (F)

**CS 5400. Computer Graphics I.** Introduction to concepts of graphical techniques. Digital and pictorial representation of information. Prerequisites: CS 2200; Math 1220; Math 2250 or 2270. (4 cr) (F)

**CS 5450. Multimedia Systems.** Introduction to concepts and techniques underlying multimedia-based systems. Deals with both the hardware aspects of multimedia systems (e.g., transfer rates, capacities, resolution, etc.) and the software requirements of such systems. Each student required to develop a multimedia-based system. Prerequisite: CS 2200. (4 cr) (Sp)

**CS 5500. Parallel Algorithms.** Examines basic techniques for designing parallel algorithms, such as balanced trees, pointer jumping, partitioning, pipelining, accelerated cascading, list ranking, and tree contraction. Consideration of classic parallel algorithms in graphs, merging, sorting, planar geometry, string matching, and randomized techniques. Prerequisite: CS 2200. (3 cr) (Sp)

**CS 5600. AI: Problem Solving and Expert Systems.** Introduction to practical artificial intelligence methods for building problem solving and expert systems. Covers search, knowledge representation, and reasoning. Students will develop projects in LISP and expert system shells. Prerequisite: CS 2200. (3 cr) (F)

**CS 5650. AI: Pattern Analysis and Machine Intelligence.** Introduction to theories and techniques of machine intelligence, with emphasis on pattern recognition, computer vision, fuzzy logic, and neural networks. Prerequisites: CS 2200, Math 2270, Stat 2000. (3 cr) (Sp)

**CS 5700. Object-Oriented Software Development.** Study of fundamental object-oriented principles, including abstraction, encapsulation, classification, and inheritance. Application of these principles in systems analysis, specification, design, implementation, and testing. Prerequisite: CS 2370. (3 cr) (F)

**CS 5800. Introduction to Database Systems.** Comparison of various database systems. Normal forms, protection, concurrency, security and integrity, and distributed and object-oriented systems. Prerequisite: CS 2200. (3 cr) (F)

**CS 5850. Systems Analysis.** Theory and practice of analysis, design, and implementation of information systems. Students will construct an information system. Prerequisite: CS 5800. (3 cr) (Sp)

**CS 5890. Topics in Computer Science (Topic).** Current topics in computer science as determined by advances in the field. Prerequisite: CS 2200 and permission of instructor. (1-4 cr) (F,Sp,Su) ®

**CS 5950. Independent Study.** Provides for independent study of selected topics. Prerequisites: CS 2200 and permission of instructor. (1-6 cr) (F,Sp,Su) ®

**CS 6200. Distributed System Design.** Examines advanced design concepts related to development of distributed software systems. Students learn how to model and evaluate communication protocols and study techniques for time coordination, distributed process synchronization, object replication and migration, and distributed transaction processing. Students also learn about Common Object Request Broker Architecture (CORBA). Prerequisite: CS 5200 or ECE 6600. (3 cr) (Sp)

**CS 6250. Cooperative Work Experience, Graduate.** Provides credit for students working at a participating firm under faculty supervision. Prerequisite: Permission of instructor. (1-9 cr) (F,Sp,Su) ®

**CS 6300. Supercompilers for Sequential and Parallel Computers.** Analysis and optimization for sequential and parallel computers, including loop restructuring, concurrency analysis, vector analysis, and optimizations for shared and distributed memory computers. Prerequisite: CS 5300. (3 cr) (Sp)

**CS 6370. Software Engineering with a Project.** Advanced software engineering concepts, including project management, requirements acquisition, formal methods of specification and verification, object-oriented design, and software testing. Students will work in teams, developing significant software products. Student cannot receive credit for both CS 5370 and CS 6370. Prerequisite: CS 2370. (3 cr) (F)

**CS 6400. Computer Graphics II.** Study of computer rendering of three-dimensional objects. Object representation, hidden surface removal, and shading. Ray tracing of synthetic scenes using mathematically defined surfaces. Prerequisite: CS 5400. (3 cr) (Sp)

**CS 6500. Advances in Parallel Systems.** Survey of current advances in parallel processing and concurrent systems. Review of current scientific literature to understand current issues, problems, and progress in advanced topics of parallel processing. Students read, summarize, report, and discuss up-to-date scientific papers in the field. Prerequisite: CS 5500. (3 cr) (F)

**CS 6550. Parallel Computing Systems.** Design of large-scale parallel systems. Explores machine organizations SIMD and/or MIMD modes of parallelism, emphasizing interconnection patterns among processors. Discussion of low-level parallel processing algorithms. Presents case studies of existing and proposed systems. Prerequisite: CS 5500. (3 cr) (F)

**CS 6600. AI: Advanced Intelligent Systems.** Investigation of advanced techniques for creating intelligent systems. Covers machine learning, reasoning under uncertainty, decision making, natural language understanding, and advanced knowledge representation. Students develop projects in LISP and expert system shells. Prerequisite: CS 5600. (3 cr) (Sp)

**CS 6650. AI: Advanced Techniques in Pattern Analysis and Machine Intelligence.** Advanced course in theories and techniques of machine intelligence, emphasizing pattern recognition, computer vision, robotics, fuzzy logic, and neural networks. Prerequisite: CS 5650. (3 cr) (Sp)

**CS 6690. AI: Advanced Topics in Artificial Intelligence (Topic).** Advanced course in selected theories and techniques of artificial intelligence. Prerequisite: Permission of instructor. (3 cr) (Sp)

**CS 6700. Object-Oriented Models, Methods, and Tools.** Study of object-oriented concepts, principles, techniques, development processes, and tools across all areas of software engineering, with special emphasis on current research topics. Prerequisite: CS 5700. (3 cr) (F)

**CS 6800. Theory of Relational Databases.** Graduate-level relational database course covering constraints and normal forms, mathematical models and provable properties, minimality, graphs, and synthesis. Prerequisite: CS 5800. (3 cr) (Sp)

**CS 6890. Topics in Computer Science (Topic).** Current topics in computer science as determined by advances in the field. Prerequisite: Permission of instructor. (1-4 cr) (F,Sp,Su) ®

**CS 6900. Seminar.** Series of one-hour seminars on current research topics presented by computer science faculty. Prerequisite: Permission of instructor. (1 cr) (F)

**CS 6950. Reading and Reports.** Directed reading on advanced topics in computer science. Prerequisite: Permission of instructor. (1-4 cr) (F,Sp,Su) ®

**CS 6970. Thesis and Research.** Graduate research in computer science. Prerequisite: Permission of instructor. (1-9 cr) (F,Sp,Su) ®

**CS 6990. Continuing Graduate Advisement.** Prerequisite: Permission of instructor. (1-6 cr) (F,Sp,Su) ®

**CS 7350. Patterns in Computer Software Systems.** Investigates common patterns in computer software systems and how they can be better cataloged, understood, and reused to improve software productivity and quality. Includes readings of current literature, writing research papers, and participation in group discussions. Prerequisite: Permission of instructor. (3 cr) (Sp)

**CS 7380. Software Testing.** Explores current issues, including testing, object-oriented software, test data generation and sufficiency, domain-based testing,

functional testing, and code-based testing. Prerequisite: Permission of instructor. (3 cr) (F)

**CS 7500. Fault-Tolerant Systems.** Advanced study of design and implementation of operating systems for fault-tolerant parallel and distributed systems. Topics chosen will provide students with knowledge of current research issues, practices, and techniques for the design and development of such systems. Prerequisite: Permission of instructor. (3 cr) (Sp)

**CS 7550. Interconnection Networks for Parallel Computer Systems.** Explores the design of large-scale parallel processing systems generally suited for multi-micro-processor implementation. Emphasizes interconnection patterns among the processing elements in parallel processors. Prerequisite: Permission of instructor. (3 cr) (F)

**CS 7650. Advanced CVPRIP: Computer Vision, Pattern Recognition, and Image Processing.** Investigates new developments in representation and processing of gray-level and color images, including thresholding, segmentation, curve detection, etc. Also examines visual perception, as well as statistical and syntactical pattern classification. Prerequisite: Permission of instructor. (3 cr) (Sp)

**CS 7660. Robotics and Autonomous Systems.** Surveys current advances in robotic and autonomous systems. Reviews current scientific literature in the field, with emphasis on understanding the problems solved and the approaches used. Prerequisite: Permission of instructor. (3 cr) (F)

**CS 7670. Data Mining and Machine Learning.** Covers cutting-edge research in machine learning, data mining, and intelligent information retrieval. Focuses on how these topics related to data mining. Prerequisite: Permission of instructor. (3 cr) (Sp)

**CS 7900. Seminar.** Series of lectures and presentations on current topics in computer science. Students participate by giving presentations. As part of the course, students are expected to prepare their dissertation proposal. Prerequisite: Permission of instructor. (2 cr) (Sp)

**CS 7910. Special Topics in Intelligent Systems (Topic).** Discussion of current topics in intelligent systems, such as parallelism and software systems. Prerequisite: Permission of instructor. Taught on demand. (3 cr) (F,Sp,Su) ®

**CS 7920. Special Topics in Parallelism (Topic).** Topics of current interest in the area of parallelism. Prerequisite: Permission of instructor. (3 cr) (F,Sp,Su) ®

**CS 7930. Special Topics in Software Systems (Topic).** Topics of current interest in the area of software systems. Prerequisite: Permission of instructor. (3 cr) (F,Sp,Su) ®

**CS 7950. Reading and Reports.** Directed reading on cutting-edge topics in computer science. Prerequisite: Permission of instructor. (1-4 cr) (F,Sp,Su) ®

**CS 7970. Dissertation Research.** PhD dissertation research. Prerequisite: Permission of instructor. (1-15 cr) (F,Sp,Su) ®

**CS 7990. Continuing Graduate Advisement.** Continuing PhD-level advisement. Prerequisite: Permission of instructor. (1-6 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

## *Interdepartmental Program in Ecology*

**Director: Professor Martyn M. Caldwell**  
Office in Natural Resources 314, (435) 797-2555  
WWW <http://www.usu.edu/ecology/eco-cntr.htm>

**Assistant Director for Administrative Affairs: Marvin C. Bennett**  
Office in Natural Resources 314B, (435) 797-2090

**Degrees offered:** Master of Science (MS) and Doctor of Philosophy (PhD) in the following departments: Aquatic, Watershed, and Earth Resources; Biology; Forest, Range, and Wildlife Sciences; and Plants, Soils, and Biometeorology

### *Graduate Program*

The ecology program at Utah State University is administered by the interdepartmental Ecology Center. Its goals are to promote research and graduate education in the science of ecology and to provide expert, professional information and advice for decision makers considering actions that affect the environment. The research carried out by the center's associates covers the full spectrum of ecology on several continents, but most of it is centered in the montane and desert regions of the western United States.

Students earn their degrees in ecology while maintaining residence in one of the participating departments; the center itself does not grant degrees. The candidate selects and is assigned a major professor from the department appropriate to his or her interests.

### *Degree Requirements*

Requirements for graduate degrees in ecology include the University and departmental degree requirements, as well as the Ecology Center requirements outlined below, which are formulated by the Ecology Center Faculty Advisory Committee. This committee is comprised of faculty representatives, designated by the respective department heads, from the departments of Aquatic, Watershed, and Earth Resources; Biology; Forest, Range, and Wildlife Sciences; Geology; and Plants, Soils, and Biometeorology. The Ecology Center director chairs the committee.

The ecology MS and PhD are research degrees requiring a research thesis or dissertation. The following course requirements for each of these degrees fall into two categories. The first is a general science category. Students receiving graduate degrees in ecology are expected to have some breadth and sophistication in modern science. The second category includes ecology course requirements. These are for the most part general requirements, with the specific courses taken by each student selected by his or her graduate committee and tailored to his or her needs and professional goals.

### *Ecology MS and PhD Degrees General Science Requirements*

(For further details, see the USU Ecology Center web site: <http://www.usu.edu/ecology/eco-cntr.htm>.)

#### **Mathematics, Chemistry, Physics, and Computer Science**

By its very nature, ecology must draw upon knowledge from most branches of science. As a result, at least a reasonable facility with fundamental mathematics and physical sciences must be attained by students, since these concepts have expression throughout the sciences. In order to assure a minimal comprehension in these areas, students receiving graduate degrees in ecology are required to have had the following at some point in their university careers:

1. Equivalent of mathematics through one semester of calculus.
2. Equivalent of at least a one-semester overview course in physics.
3. Chemistry through organic.
4. One year of introductory statistics and one graduate-level statistics course.

These courses are the minimum requirements for the MS and PhD degrees. The committee strongly recommends developing greater facility by taking at least a full year of calculus; one or more courses from the set of three including linear algebra, differential equations, and multi-variable calculus; and a full year of professional-level physics.

#### **Biology**

The following are required of all ecology graduate students, and must be taken at some point during their university career:

1. Genetics or evolution, one course.
2. One course in animal physiology for students emphasizing animal ecology.
3. One course each in plant physiology and soils for students emphasizing plant ecology.

## **Ecology Course Requirements**

### **Master of Science**

1. Attendance in Ecology Seminar (AWER/Biol/EnvS/FRWS 6870) is required each semester in residence.

2. A one-semester course in Graduate General Ecology (AWER/Biol/EnvS/FRWS 6960) is also required.

3. One course must be taken in each of three blocks. The following functional (core) blocks, listed alphabetically, are available:

### **Functional (Core) Blocks**

Animal Behavior (Biol 6260; FRWS 6150/7150, 7450)

Animal Community Ecology (Biol 6590)

Animal Ecophysiology (Biol 6520; FRWS 6100/7100)

Animal Population Biology (FRWS 6850/7850;  
AWER 6750/7750)

Applied Ecology (FRWS 6610)

Ecosystem Ecology (Biol/FRWS/Soil 6200; FRWS 6700)  
Environmental Biophysics (Bmet 6500; AWER/Geol 6150;  
Soil 6130)

Evolutionary Ecology (Biol 6170, 6180, 6270, 6280)

Freshwater Ecology (AWER 6100/7100, 6820/7820)

Landscape Ecology (FRWS 6710/7710)

Plant Community Ecology (FRWS 6420, 6700, 6770, 7420;  
EnvS 6420)

Plant Ecophysiology (FRWS 7200)

Plant Population Biology (FRWS 7300)

### **Doctor of Philosophy**

1. Attendance in Ecology Seminar (AWER/Biol/EnvS/FRWS 6870) is required each semester in residence.

2. A one-semester course in Graduate General Ecology (AWER/Biol/EnvS/FRWS 6960) is also required.

3. One course must be taken in each of five blocks. Students continuing from the MS to the PhD degree can apply block courses taken for the MS degree to the PhD requirement.

## Department of **Economics**

### **College of Agriculture and College of Business\***

**Head: Professor** *Keith R. Criddle*, resource economics and quantitative methods  
Office in Business 615, (435) 797-2310

**FAX** (435) 797-2701

**E-mail** econinfo@econ.usu.edu

**WWW** <http://www.econ.usu.edu>

**Professors** *DeeVon Bailey*, agricultural economics; *Basudeb Biswas*, international trade and economic development; *Christopher Fawson*, public finance and econometrics; *Terrence F. Glover*, production economics and policy; *E. Bruce Godfrey*, agricultural and resource economics; *L. Dwight Israelsen*, comparative systems and economic history; *John E. Keith*, agricultural and resource economics; *W. Cris Lewis*, regional-urban and managerial economics; *Kenneth S. Lyon*, economic theory; *H. Craig Petersen*, regulation and antitrust and managerial economics; *Donald L. Snyder*, agricultural and resource economics; **Professors Emeriti** *Roice H. Anderson*, *Larry K. Bond*, *Rondo A. Christensen*, *Lynn H. Davis*, *Reed R. Durtschi*, *Herbert H. Fullerton*, *Gary B. Hansen*, *Allen D. LeBaron*, *Darwin B. Nielsen*, *Morris D. Whitaker*; **Associate Professor** *Paul M. Jakus*, natural resource and environmental economics, nonmarket valuation; **Associate Professor Emeritus** *Glenn F. Marston*; **Assistant Professors** *David M. Aadland*, macroeconomics and applied econometrics; *Tyler J. Bowles*, econometrics and international economics; *Arthur J. Caplan*, environmental economics and applied microeconomic theory; *David L. Dickinson*, labor and experimental economics; *John P. Gilbert*, international trade theory and policy, applied general equilibrium modeling, development economics; *Kevin Xiaodong Huang*, monetary, financial, and international economics; *Lynn Hunnicutt*, industrial organization and business strategies; *Rimma Shiptsova*, international trade, food safety, econometrics; *Ruby A. Ward*, agribusiness management and operations research; **Human Resources Specialist** *Marion T. Bentley*, manpower economics

**Degrees offered:** Bachelor of Science (BS) in Agribusiness; Bachelor of Arts (BA) in International Agribusiness; BS in Agricultural Economics; Master of Science (MS) in Applied Economics; BS, BA, MS, Master of Arts (MA), and Doctor of Philosophy (PhD) in Economics; participates in Master of Business Administration (MBA); participates in Master of Social Sciences (MSS). The Agribusiness and Economics majors are structured to facilitate a dual major with companion majors within or outside the College of Business.

**Undergraduate emphases:** *BS, BA in Economics*—Economic Theory, Managerial, and Prelaw

**Graduate specializations:** *MS in Applied Economics*—Agricultural Economics, Natural Resource Economics, and Regional Economic Development; *MBA*—Agribusiness Management, International Economics, and Quantitative Economic Analysis; *MSS*—Economics

## **Undergraduate Programs**

### **Objectives**

Undergraduate economics provides students with the basic intellectual framework to understand and analyze economic problems and to make informed decisions. A basic understanding of economics is essential to becoming a well-informed citizen, as well as a successful business or public leader.

### **Admission Requirements**

Freshmen who meet the admission requirements and are accepted in good standing by the University are eligible for admission to the College of Agriculture, the College of Business, and the Department of Economics. All transfer students, whether transferring from within Utah State University or from other colleges and universities, must have an overall minimum GPA of 2.2 to be accepted as majors in the department.

New students wishing to major in the Department of Economics may do so by listing one of the departmental majors on their application when they apply for admission to USU. Students enrolled at USU may change to a departmental major by applying directly to the College of Agriculture, the College of Business, or the Department of Economics.

### **Graduation Requirements**

To receive a bachelor's degree in Agribusiness, Agricultural Economics, Economics, or International Agribusiness, students must complete all University requirements and the college and departmental requirements for their specific major as noted below.

#### **Agribusiness Major**

The Agribusiness major provides a foundation for employment in the agricultural sectors and rural regions and in businesses serving agriculture and rural regions, such as banks and financial institutions, production, marketing and buying cooperatives, value-added food producers, real estate and land management, agricultural chemical production and sales, and farms and ranches. Graduates of this program are employed in a variety of agribusiness operations throughout the United States. Agribusiness graduates have achieved prominence in positions in wholesale and retail sales and service, stock and commodity brokerage, real estate appraisal, banking and farm credit, insurance, and in farm and ranch operations. Classwork provides training in basic business and economics, as well as the specific management tools required for agricultural enterprises.

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\*The Department of Economics is jointly administered by the College of Agriculture and the College of Business. Programs in both the College of Agriculture and the College of Business are offered.

To graduate with a bachelor's degree in Agribusiness, a student must have an overall GPA of 2.5 or higher, as well as a minimum GPA of 2.5 in Economics courses. An overall GPA of 2.5 or higher is required for admission into some required BA and MHR courses. All required courses must be taken for a letter grade. Econ 2250, 3900, and 4250 cannot be used to meet economics elective requirements.

**Agribusiness Major with a dual major in Business:** Econ 1500, 2010, 3400, 4010 (or 5010), 4020 (or 5000), 4030, 5020, 5030, 5050 (or 5350); Acct 2010, 2020; BA 3400, 3500, 3700; BIS 2450, 2550; MHR 2990, 3110, 4890; Math 1050, 1100; and Stat 2300.

**Agribusiness Major with a dual major in Agricultural Systems Technology:** Econ 1500, 1550, 3030, 3050, 4010, 4030, 5030, 5050, 5350; ASTE 1010, 2200, 3030 (or 4100), 3050, 3090, 3200 (or 3080), 3600, 5260; Acct 2010, 2020; Chem 1010; Math 1050, 1100; MHR 2990; Soil 4000; Stat 2300.

### Agricultural Economics Major

The Agricultural Economics major emphasizes the development of quantitative skills in and a deeper understanding of economic theory. While this program provides a solid base for individuals desirous of careers in agricultural businesses, it is also an excellent preparation for graduate studies in economics, agricultural economics, natural resources, business, or law. The Agricultural Economics degree provides an excellent background for work in federal, state, and local government, as well as in the private sector. Graduates of this program are now working in positions involving the analysis of prices and markets, preparation of economic feasibility studies, and preparing economic forecasts.

To graduate with a bachelor's degree in Agricultural Economics, a student must have an overall GPA of 2.2 or higher, as well as a minimum GPA of 2.2 in Economics courses.

**Agricultural Economics Major:** Econ 1500, 2010, 3400, 4030, 4310 (or 5310), 5000, 5010, 5020, 5030, 5050, 5330, 5950; Acct 2010, 2020; MHR 2990; BIS 2450; Math 1050, 1100; Stat 2300; and BIS 2550 or ASTE 3050.

### Economics Major

The **Economic Theory Emphasis** is designed for students who are interested in preparing for graduate studies in economics or agricultural economics and for students who are preparing for a career that requires training in quantitative economic analysis. Graduates have employment opportunities in business and government, as well as opportunities for continuing their education in graduate economics programs or in professional schools. Economists are often involved in policy analysis for government agencies and nongovernmental organizations.

The **Managerial Emphasis** is for students who are planning for careers in business. The program can serve as a terminal program for those planning to enter the job market on graduation or as excellent preparation for students who intend to pursue an MBA or MPA.

The **Prelaw Emphasis** is for students who plan to attend law school or pursue a career related to political science, and who want to obtain a strong foundation in economics. The large number of elective credits included in this emphasis area provides enough flexibility for students to custom design their program of study to meet individual interests and educational goals. Several

students have taken advantage of this flexibility to design a dual major with Economics and Political Science.

The **Economics major with a dual major in the College of Business** has been very popular with Finance and Accounting majors because of the added theoretical and analytical dimension that advanced studies in economics can contribute to Finance and Accounting majors. The dual major is excellent preparation for students interested in advanced studies in Accounting or Finance. In addition, because the dual major provides a strong grounding in economic theory, it helps open career opportunities that involve policy analysis. Many finance and accounting faculty members hold graduate degrees in economics.

The **Economics major with a dual major outside the College of Business** provides students in the humanities, and social and natural sciences with an opportunity to learn policy analysis tools. Whether the students are directly interested in policy or simply interested in the impact of policy within their chosen primary major, economics introduces a robust and empirically verified paradigm for explaining the behavior of social systems and their interaction with cultural, biological, and physical resources.

To graduate with a bachelor's degree in Economics, a student must have an overall GPA of 2.2 or higher, as well as a minimum GPA of 2.2 in Economics courses.

**Economics Major—Economic Theory Emphasis:** Econ 1000, 1500, 2010, 3400, 4310 (or 5310), 5000, 5010, 5100, 5330, 5950; Acct 2010, 2020; BIS 2450, 2550; MHR 2990; Math 1050, 1100; Stat 2300; Psy 1010 or Soc 1010; and 12 credits of upper-division Econ electives.

**Economics Major—Managerial Emphasis:** Econ 1000, 1500, 2010, 3400, 4010 (or 5010), 4020 (or 5000), 4310 (or 5310), 5330, 5950; Acct 2010, 2020; BA 3400, 3500, 3700; BIS 2450, 2550; MHR 2990, 3110; Math 1050, 1100; Stat 2300; Psy 1010 or Soc 1010; and 6 credits of upper-division Econ electives.

**Economics Major—Prelaw Emphasis:** Econ 1500, 2010, 3400, 4010 (or 5010), 4020 (or 5000), 5100, 5950; Math 1050, 1100; PolS 1100; Stat 2300; 6 credits of Econ electives; and 6 credits of PolS electives.

**Economics Major with a dual major in the College of Business:** Econ 1000, 1500, 2010, 3400, 4010 (or 5010), 4020 (or 5000); Acct 2010, 2020; BIS 2450, 2550; MHR 2990; Math 1050, 1100; Stat 2300; Psy 1010 or Soc 1010; and 6 credits of upper-division Econ electives.

**Economics Major with a dual major outside the College of Business:** Econ 1500, 2010, 3400 (or 5400), 4010 (or 5010), 4020 (or 5000); Math 1050, 1100; Stat 2300; and 9 credits of upper-division Econ electives.

### International Agribusiness Major

The International Agribusiness major combines training in business, language skills, and economics courses that emphasize the role of the trade and development issues that are critical to operating in the increasingly internationalized agribusiness sector. The program provides a foundation for employment in agricultural and agribusiness sectors and in banks and financial institutions, production, marketing and buying cooperatives, value-added food producers, agricultural chemical production and sales, and farms and ranches in domestic and international settings. Classwork provides training in basic business and economics, as

well as the specific management tools required for agricultural enterprises.

To graduate with a bachelor's degree in International Agribusiness, a student must have an overall GPA of 2.2 or higher, as well as a minimum GPA of 2.2 in Economics courses.

**International Agribusiness Major:** Econ 1500, 2010, 3400, 4010, 4020, 5030, 5050, 5120, 5350, 5400, 5950; Acct 2010; BIS 2450; Math 1050, 1100; Stat 2300; NFS 5510; PISc 4300; ASTE 6140; and a score of 3 or better on the Federal FSI Test or completion of a language minor.

### Minor Requirements

**Economics Minor:** Econ 1500, 2010, 3400 (or 5400), 4020 (or 5000), and 4010 (or 5010).

**Economics Teaching Minor:** Econ 1500, 2010, 3400 (or 5400), 5100, 5110; BIS 3000, 3300 (or 4300), 4400.

**Agribusiness Management Minor:** Econ 1500, 3030, 3050, 4030; Acct 2010.

**Agricultural Economics Minor:** Econ 1500, 2010, 4010 (or 5010), 4030, 5030.

### Additional Information

For more information about bachelor's degree requirements, see the major requirement sheets available from the Department of Economics.

### Financial Support

The Department of Economics, the College of Agriculture, and the College of Business award scholarships in addition to those available through the University Financial Aid Office. Information and application forms may be obtained from the college or departmental offices.

## Graduate Programs

The MA, MS, and PhD in Economics, along with the MS in Applied Economics, are offered jointly through the College of Agriculture and College of Business. The MBA, with specializations in Agribusiness Management, International Economics, and Quantitative Economic Analysis, is offered through the College of Business. The MSS, with specialization in Economics, is an interdepartmental program offered in conjunction with the College of Humanities, Arts and Social Sciences.

### Objectives

Economics graduate training emphasizes economic theory, critical thinking, and quantitative analysis. This foundation is a means to an end, not an end in itself: theory and quantitative methods are tools used in applied courses, in theses and dissertations, and in other research and extension activities carried out in the department.

The **Master of Science and Master of Arts in Economics** are intended to prepare students for doctoral studies in economics. Consequently, students are required to take the same first-year core theory and econometrics courses as the PhD students, with

specialization courses in the second year. The **MS in Applied Economics** is a terminal degree that prepares students for positions in industry; private consulting firms; local, regional, and national policy-making agencies; private not-for-profit organizations; and community/regional economic planning and development agencies. The **Doctor of Philosophy in Economics** is intended to prepare students for faculty and research positions with a dual specialization in Trade and Development and Natural Resource and Environmental Economics. All PhD students are required to complete these "field" sequences. Students interested in other specialties are discouraged from applying.

### Admission Requirements

Applicants must have earned a bachelor's degree from an accredited college or university, maintained a grade point average of at least 3.0 for the last 60 semester credits earned, and score in at least the 40th percentile on either the Graduate Record Exam (GRE) or Graduate Management Admission Test (GMAT). In addition, international applicants from non-English-speaking countries must score at least 550 on the Test of English as a Foreign Language (TOEFL). Satisfaction of these minimum admission requirements does not guarantee admission. Applications for graduate study from students trained in disciplines other than economics are welcomed. However, all applicants are expected to have: (1) an understanding of intermediate microeconomic and macroeconomic theory, (2) preparation in mathematical economics, and (3) preparation in probability and statistics. In addition, applicants are expected to have strong written and oral communications skills.

### Degree Requirements

**Doctor of Philosophy in Economics.** PhD students are required to: (1) complete the first-year core (Econ 7060, 7130, 7140, 7230, 7240, 7310, 7350, 7360); (2) perform successfully on a written qualifying examination based on the first-year core; (3) complete the advanced core (Econ 7150, 7250, 7320, 7330); (4) complete the International Trade and Development and Natural Resource and Environmental Economics field sequences (Econ 7400, 7500, 7510, 7800); (5) complete a research dissertation and give an oral defense of the dissertation; and (6) meet University requirements for dissertation research and total credit hours.

**Master of Science in Applied Economics.** To complete an MS degree in Applied Economics, students are required to: (1) complete the applied core (Econ 6000, 6060, 6100, 6300, 6330); (2) complete a specialization in: (a) agricultural economics (Econ 6030 and 6040), (b) natural resource economics (Econ 6500 and 6510), or (c) regional economic development (Econ 6700 and 6710); (3) submit and orally defend a thesis (Plan A) or research report (Plan B); and (4) complete elective class or thesis research credits to meet Plan A, B, or C graduation requirements. Plan A requires at least 30 credits and must include at least 6 thesis research credits. Plan B requires at least 30 credits and must include 2 to 3 thesis research credits. Plan C has no research component and requires at least 33 credits. (No more than 6 undergraduate credits may be used in meeting degree requirements.)

**Master of Science and Master of Arts in Economics.** Students are required to complete the first-year core (Econ 6000, 6060, 6100, 7140, 7240, 7310, 7350, 7360) and to submit and orally defend a thesis (Plan A) or research report (Plan B). The department also accepts Plan C, which has no research compo-

ment. Students must also complete additional class or research credits to meet Plan A, B, or C graduation requirements. MA students must satisfy the foreign language requirement. Plan A requires at least 30 credits and must include at least 6 thesis research credits. Plan B requires at least 30 credits and must include 2 to 3 thesis research credits. Plan C requires at least 33 credits. (No more than 6 undergraduate credits may be used in meeting degree requirements.)

**Master of Business Administration (Agribusiness Management, International Economics, or Quantitative Economic Analysis Specialization).** A student may receive a College of Business Master of Business Administration degree with a specialization in Agribusiness Management, International Economics, or Quantitative Economic Analysis by completing the MBA advanced core (see the MBA program description on pages 160-161) and 12 specialization credits. Econ 6330 should be taken to satisfy the quantitative methods requirement. The **Agribusiness Management** specialization requires: Econ 6030, 6040, 6300; and either Econ 6500 or 6700. The **International Economics** specialization requires Econ 5150, 5400, 6910; and PoLS 6220. The **Quantitative Economic Analysis** specialization requires Econ 5310, 6300, 6330; and Stat 5100.

**Master of Social Sciences (Economics Specialization).** This degree is an interdisciplinary program with a specialization designed for economics students. General requirements for the degree are found on pages 424-425. To qualify, a student is required to earn a minimum of 36 credits based on: (1) a minimum of 16 credits in Economics, which must include Econ 5000, 5010, 6060, and 6330 (or their equivalent); (2) a minimum of 8 credits in (a) two social science minors or (b) one social science minor and one social science cluster; and (3) 2 credits in a comprehensive integrative experience or Plan B report. Areas of emphasis include: (a) Labor Economics, (b) Economic History/Comparative Economic Systems, (c) Business and Government, (d) Economic Education, (e) Environmental Economics, (f) Trade and Development, and (g) Rural Economic Development. The disciplines from which the minors or minor/cluster may be selected include two of the following: Anthropology, Business Administration, Computer Science/Instructional Technology, Family and Human Development, Geography, History, Management and Human Resources, Political Science, Psychology, Sociology, and Social Work.

**International MBA in Food and Agribusiness.** The Department of Economics participates with the Royal Agricultural College (RAC) in Cirencester, England to offer this degree. The degree is awarded by the RAC. Students study at USU during fall semester, and then study spring semester at the RAC. Students complete a team project and a thesis. The degree is designed to prepare students to be agribusiness managers in an international environment. Required courses to be completed at USU include: Acct 6010; Econ 5030 or 6030; BA 6520 or 4590; MHR 6550; and Econ 6900 (an independent readings course in supply chain management). During spring semester, courses in finance, marketing and advertising, human resource management, macroeconomics, and business strategy are taught at the RAC. Participating students pay USU tuition and are expected to complete the program in 12-15 months.

## Research

The department maintains an active and productive research program. The results of this research are published in professional journals, books, and technical reports. Financial support for the departmental research program is provided by the Utah Agricul-

tural Experiment Station, the colleges of Agriculture and Business, the Office of the Vice President for Research, and by a combination of public and private extramural sources. The Economics Research Institute provides support and coordination for some of the department's research activities. Graduate students are an integral part of departmental research programs.

## Financial Assistance and Assistantships

The department offers teaching and research assistantships to qualified graduate students. These are awarded on a competitive basis, and all accepted students are considered eligible. However, while the department makes every effort to assist students in obtaining financial assistance, acceptance into department programs does not guarantee financial assistance.

Financial assistance is not provided to PhD students who fail to pass the written qualifying exam nor to graduate students who are not making satisfactory progress toward completion of their degrees.

## Economics Courses (Econ)

**Econ 1000. Business Orientation.** Orients freshmen and transfer students to College of Business programs, academic and student services, professional organizations, and career possibilities. Also taught as Acct 1000, BA 1000, BIS 1000, and MHR 1000. (0.5 cr) (F,Sp)

**Econ 1500 (BAI). Introduction to Economic Institutions, History, and Principles.** Designed to build an understanding of economic institutions, history, and principles. Relationship between private and public sectors of U.S. economy. Analysis of major economic institutions, such as property rights, markets, business organizations, labor unions, money and banking, trade, and taxation. No prerequisites. (3 cr) (F,Sp,Su) ©

**Econ 1550 (BSS). Introduction to Environmental and Natural Resource Economics.** Introduction to the concepts of economics in the context of environmental and natural resource management. (3 cr) (F)

**Econ 2010. Introduction to Microeconomics.** Designed to build an understanding of the economics of the marketplace from the perspectives of individual consumer and producer or business. Development and application of microeconomic principles to demonstrate the role and limitations of competitive markets in motivating socially efficient consumer, business, and public sector choices. Prerequisite: Econ 1500. (3 cr) (F,Sp,Su) ©

**Econ 2250. Introductory Internship.** Introductory-level experience in a career-related position approved by the Cooperative Education Office. One credit for every 75 hours of internship experience, with a maximum of 9 credits. A maximum of 12 credits of 2250 and 4250 combined can be counted toward the minimum degree requirements for the College of Business. (1-9 cr) (F,Sp,Su) ©

**Econ 3030 (DSS). Introduction to Agribusiness Marketing.** Principles and practices used by agribusiness firms to market products. Topics covered include the use of futures markets, international trade, marketing orders, and commodity marketing problems. Prerequisite: Econ 1500. (3 cr) (F)

**Econ 3050 (DSS). Introduction to Agribusiness Management.** Application of principles and practices used by managers of agribusiness firms. Prerequisites: Econ 1500, Acct 2010. (3 cr) (Sp)

**Econ 3170. Law and Economics.** Explains legal and political rules, the organization of government, and other institutional processes. Uses standard microeconomic

tools and concepts, such as scarcity, choice, preferences, incentives, and supply and demand. Prerequisite: PoLS 1100. Also taught as PoLS 3170. (3 cr) (F)

**Econ 3250. Discussions With Business Leaders.** Students attend Partners in Business Program seminar sessions to examine new methods for improving performance in organizations. Repeatable to a maximum of 1.5 credits. (0.5 cr) (F,Sp) ©

**Econ 3400 (DSS). International Economics for Business.** Primary issues in international economics as applied to contemporary business problems. Topics include trade patterns and policies, capital markets, and technology transfer. Prerequisite: Econ 2010. (3 cr) (F,Sp,Su)

**Econ 3900. Independent Reading and Research.** (1-3 cr) (F,Sp,Su) ©

**Econ 4010. Managerial Economics.** Microeconomic principles applied to economic decision-making and policy formulation, with emphasis at the level of business firm and the individual consumer. Designed for undergraduate business and accounting majors. Credit will not be given for both Econ 4010 and 5010. Prerequisites: Econ 2010; Math 1100; Stat 2300. (3 cr) (F,Sp,Su)

**Econ 4020. Macroeconomics for Managers.** Macroeconomic analysis applied to forecasting and understanding fluctuations in the levels of income, employment, and production. Designed for undergraduate business and accounting majors. Credit will not be given for both Econ 4020 and 5000. Prerequisite: Econ 1500. (3 cr) (F,Sp,Su) ©

**Econ 4030 (CI). Agribusiness Finance.** Financial considerations in organizing and operating farms, ranches, and agribusiness firms. Prerequisites: Econ 2010, or Econ 3030 and 3050; Acct 2010. (3 cr) (F)

**Econ 4250. Advanced Internship.** Advanced or middle-level internship experience in a career-related position approved by the Cooperative Education Office. One credit for every 75 hours of internship experience, with a maximum of 9 credits. (1-9 cr) (F,Sp,Su) ©

**Econ 4310 (QI) (d5310).<sup>1</sup> Mathematical Methods for Economics.** Review of single-variable calculus (differentiation and integration); multivariate calculus (including the chain rule and implicit differentiation); optimization (unconstrained and constrained); linear algebra and applications (including linear programming). Economic applications. Prerequisites: Econ 2010; Math 1100 or its equivalent. (3 cr) (F)

**Econ 4950H. Senior Honors Thesis/Project.** Creative project that will then be written up, and presented, as a Senior Thesis as required for an Honors Plan. (3 cr) (Sp)

**Econ 4990. Senior Seminar.** Introduces students to current research and special topics in economics. (1 cr) (Sp) ©

**Econ 5000. Macroeconomics.** Analysis of underlying causes of unemployment, economic instability, inflation, and economic growth. Credit will not be given for both Econ 4020 and 5000. Prerequisite: Econ 1500. (3 cr) (F) ©

**Econ 5010. Microeconomics.** Analysis of behavior of consumers and business firms. Application of theory to the solution of real world problems. Credit will not be given for both Econ 4010 and 5010. Prerequisite: Econ 2010. (3 cr) (Sp) ©

**Econ 5020 (CI). Economics and Public Policy.** A study of selected federal policies and their impacts on product and factor markets, with major focus on an economic analysis of public policy actions. Prerequisites: Econ 4020 or 5000, Econ 4010 or 5010. (3 cr) (Sp)

**Econ 5030. Agricultural Marketing and Price Analysis.** Agribusiness market strategies and price analysis. Designed for upper-division students. Prerequisite: Econ 4010 or 5010. (3 cr) (F)

**Econ 5050. Farm and Ranch Planning and Analysis.** Economic principles and tools in operation of farm and ranch enterprises. Designed for upper-division students. Prerequisites: Econ 4010 or 5010; and Econ 4030. (3 cr) (Sp)

**Econ 5100. History of Economic Thought.** Origin and development of economic theories of leading thinkers in western civilization. Prerequisite: Econ 2010. (3 cr) (Sp)

**Econ 5110 (DSS). Economic History of the United States.** Development of agriculture, industry, transportation, and finance from colonial times. Prerequisite: Econ 2010. (3 cr) (F)

**Econ 5120. Economics of Russia and Eastern Europe, 9th Century to 21st Century.** Development of the economics of Russia and Eastern Europe from earliest times to the present, emphasizing the interaction between economic forces and policies of the state. Prerequisite: Econ 2010. Also taught as PoLS 5120. (3 cr) (Sp)

**Econ 5150 (DSS). Comparative Economic Systems.** History, economic theories, and comparative policies of communist, socialist, and capitalistic economies. Problems facing transition economies. Prerequisite: Econ 2010. (3 cr) (Sp)

**Econ 5300. Industrial Organization.** Emphasizes market structure, firm conduct, and economic efficiency. Topics include competition, game theory, monopoly, oligopoly, monopolistic competition, firm strategies, and anti-trust policy in the United States. Prerequisites: Econ 4020 or 5000, Econ 4010 or 5010. (3 cr) (F)

**Econ 5310 (QI) (d4310). Mathematical Methods for Economics.** Review of single-variable calculus (differentiation and integration); multivariate calculus (including the chain rule and implicit differentiation); optimization (unconstrained and constrained); linear algebra and applications (including linear programming). Economic applications. Prerequisites: Econ 2010; Math 1100 or its equivalent. (3 cr) (F)

**Econ 5330 (QI). Applied Econometrics.** Introduction to basic statistics, simple linear regression, multiple regression, and simultaneous equation models for economics. Prerequisites: Stat 2000 or 2300 or 3000. (3 cr) (F)

**Econ 5350 (CI). Agribusiness, Cooperatives, and Management.** Applications of economic and management principles to farm marketing and supply firms. Includes independent work on a set of case studies designed to enhance understanding of current issues in agribusiness and provide practice in solving everyday management problems. Prerequisite: Econ 4010 or 5010. (3 cr) (Sp)

**Econ 5400. International and Development Economics.** Intermediate-level issues in international trade, international finance, and economic development. Topics include competitive and noncompetitive trade models, trade policy, balance of payments accounting, exchange rates, international lending and investment, economic growth, and poverty alleviation. Prerequisites: Econ 4020 or 5000; Econ 4010 or 5010. (4 cr) (F)

**Econ 5500. Public Finance.** Government fiscal institutions-expenditure programs, budget procedures, tax systems, debt issues, levels of government, and the issues surrounding their operations. Prerequisites: Econ 4020 or 5000, Econ 4010 or 5010. (3 cr) (F)

**Econ 5560. Natural Resource and Environmental Economics.** Economics of developing, managing, and conserving natural resources and the environment. Topics include resource use and conservation, environmental quality, public and private resource management, and valuation of nonmarket goods. Prerequisite: Econ 1550 or 2010. (3 cr) (F)

**Econ 5600. Financial Economics.** Introduction to development of our present system of money, banking, and financial institutions. Analysis of central bank policy, capital markets, speculative markets, and portfolio theory. Prerequisites: Econ 4020 or 5000, Econ 4010 or 5010. (3 cr) (Sp)

**Econ 5660 (d6660). Training and Organizational Development.** Theoretical basis for training and development in organizations. Practical experience in the design and development of training and other educational programs in an organizational setting. Prerequisites: Econ 2010 required for 5660; graduate standing required for 6660. (2 cr) (Sp)

**Econ 5670. Labor and Employee Relations.** A comprehensive study of the bargaining process and scope of labor-management contracts, the day-to-day administration of agreements, and the major substantive issues in negotiations. Prerequisite: Econ 2010. (3 cr) (F)

**Econ 5680. Labor Market Policy.** Labor force development and behavior, occupational choice and mobility, human capital formation, labor market information and institutions, and manpower policies. Prerequisite: Econ 2010. (3 cr) (Sp)

**\*Econ 5850. Regional and Community Economic Development.** Building on microeconomic theory, models for regional and urban structure and change are explored. Policy decision models are also developed. Prerequisites: Econ 4020 or 5000, Econ 4010 or 5010. (3 cr) (F)

**Econ 5950 (CI). Senior Project.** A current economic problem is identified and analyzed, bringing together other agricultural economics and economics course concepts and methods. (3 cr) (Sp)

**Econ 6000 (d7230). Macroeconomic Theory I.** Lays a foundation of advanced macroeconomic analysis, integrating theory, data, and computational methods. Special attention given to real-world issues, with an emphasis on how economists use macro models and data to improve business and public policy decisions. Topics covered include neoclassical and endogenous growth theories, real business cycle and new Keynesian theories of economic fluctuations, monetary theory, macroeconomic policy, and open-economy macroeconomics. (3 cr) (F)

**Econ 6030. Agricultural Marketing.** Covers a variety of topics relating to price analysis for agricultural commodities. Explores econometric and time series modeling and forecasting of agricultural prices. Includes a section on futures and options on futures contracts, focusing on fundamental and technical analysis. Prerequisite: Econ 6330. (3 cr) (F)

**Econ 6040. Agricultural Production/Policy.** Includes analysis of marketing margins and a section on food demand and nutrition. Also explores food safety issues. Prerequisite: Econ 6030. (3 cr) (Sp)

**Econ 6060 (d7060). Research Methods.** Provides introduction to application of scientific methods in economics, with an emphasis on proposal writing. (2 cr) (Sp)

**Econ 6100 (d7130). Microeconomic Theory I.** Provides a rigorous introduction to graduate-level microeconomic theory. While the specific focus is on the theoretical construct of graduate-level microeconomic models, the broad objective of the class is to lay the foundation for empirical applications in microeconomics. To meet this broad objective, the course covers theory of the firm, consumer theory, market structure, theory of public goods and externalities, and welfare economics. (3 cr) (F)

**Econ 6160. Integrative Pre-MBA Core.** Integrates financial reporting, analysis, and markets; domestic and global economic and legal environments; creation and distribution of goods and services; and human behavior in organizations. Upon completion, students without undergraduate degrees in business are prepared to enter advanced MBA core. Also taught as Acct 6160, BA 6160, BIS 6160, and MHR 6160. (18 cr) (Su)

**Econ 6250. Graduate Internship.** Provides practical experience for graduate students. Prerequisites: Econ 6000, 6100, 6330. (1-3 cr) (F,Sp,Su) ®

**Econ 6300. Quantitative Analysis for Business and Policy Decisions.** Provides an introduction to applied mathematical programming, operations research, simulation, risk analysis, adaptive management, and other decision theoretic tools used by government policy makers and managers of firms. (3 cr) (Sp)

**Econ 6330. Applied Econometrics.** Provides graduate-level introduction to applied regression tools, including: simple and multivariate regression analysis; linear, non-linear, and qualitative dependent variable models; distributed lags; seemingly unrelated regression; and model specification and validation tests. Prerequisite: Background in statistics and calculus. (3 cr) (F)

**Econ 6500. Introduction to Natural Resource and Environmental Economics.** Introduction to the legal and regulatory foundations of natural resource and environmental policy, with specific attention to water, minerals, rangelands, forests, fish, and off-site impacts of agricultural and industrial production. Topics include externalities, property rights, public goods, public choice, and public trust. (3 cr) (Sp)

**Econ 6510. Applied Resource and Environmental Economics.** Introduction to economic tools used for applied natural resource and environmental policy analysis. Role of economics in resource management. Introduction to the application of regional economic models, cost-benefit analysis, and the valuation of amenity and other nonpecuniary resource services for Regulatory Impact Reviews, Environmental Impact Statements, etc. Prerequisite: Econ 6500. (3 cr) (F)

**Econ 6660 (d5660). Training and Organizational Development.** Theoretical basis for training and development in organizations. Practical experience in the design and development of training and other educational programs in an organizational setting. Prerequisites: Econ 2010 required for 5660; graduate standing required for 6660. (2 cr) (Sp)

**Econ 6670. Employee Relations and the Labor Movement.** Comprehensive survey of union-management relationships, including labor markets and the labor movement, labor history and law, union organization and government, and contract negotiation and administration. Includes exercises and cases in negotiations and grievance processes. Also taught as MHR 6670. (3 cr) (Sp)

**Econ 6700. Regional and Community Economic Development.** Extension of microeconomic foundations of regional and urban economics to recent advances in economic growth and development, economic structure, land-use, public finance, housing, social welfare, environmental quality, and transportation. Prerequisite: Econ 6100. (3 cr) (Sp)

**Econ 6710. Community Planning and Impact Analysis.** Focuses on tools used by local and regional economic development specialists as they relate to planning and impact assessment. Specific topics will include I/O models, IMPLAN models, and computable CGE modeling approaches as they are used in a planning environment. Prerequisite: Econ 6700. (3 cr) (F)

**Econ 6900. Readings and Conference.** Directed readings. Credits from this course toward any economics graduate degree require approval of the student's advisory committee, the department graduate committee, and the department head. Prerequisites: Econ 5000 and 5010. (1-3 cr) (F,Sp,Su) ®

**Econ 6910. Independent Research.** Directed readings. Credits from this course toward any economics graduate degree require approval of the student's advisory committee, the department graduate committee, and the department head. Prerequisites: Econ 5000 and 5010. (1-3 cr) (F,Sp,Su) ®

**Econ 6970. Thesis Research.** Master's level research. (1-9 cr) (F,Sp,Su) ®

**Econ 6990. Continuing Graduate Advisement.** Master's level advisement. (1-9 cr) (F,Sp,Su) ®

**Econ 7060 (d6060). Research Methods.** Provides introduction to application of scientific methods in economics, with an emphasis on proposal writing. (2 cr) (Sp)

**Econ 7130 (d6100). Microeconomic Theory I.** Provides a rigorous introduction to graduate-level microeconomic theory. While the specific focus is on the theoretical construct of graduate-level microeconomic models, the broad objective of the class is to lay the foundation for empirical applications in microeconomics. To meet this broad objective, the course covers theory of the firm, consumer theory, market structure, theory of public goods and externalities, and welfare economics. (3 cr) (F)

**Econ 7140. Microeconomic Theory II.** Extends the theoretical foundations of microeconomics with an emphasis on model building in economics. Topics include static games of complete and incomplete information, dynamic games of complete and incomplete information, imperfectly competitive markets, risk and uncertainty, public goods, general equilibrium, and information economics. Prerequisites: Econ 7130, 7360. (3 cr) (Sp)

**Econ 7150. Microeconomic Theory III.** Explores the uses of microeconomic theory in fields such as Game Theory, Industrial Organization, and Labor Economics. Study of topics such as multi-stage and repeated games, bargaining, principal-agent models of economic behavior, auctions and bidding, labor market discrimination, price discrimination and two-part tariffs, and the labor-leisure choice. Course is based on both classic and contemporary papers in each of these fields. Prerequisite: Econ 7140. (3 cr) (F)

**Econ 7230 (d6000). Macroeconomic Theory I.** Lays a foundation of advanced macroeconomic analysis, integrating theory, data, and computational methods. Special attention given to real-world issues, with an emphasis on how economists use macro models and data to improve business and public policy decisions. Topics covered include neoclassical and endogenous growth theories, real business cycle and new Keynesian theories of economic fluctuations, monetary theory, macroeconomic policy, and open-economy macroeconomics. (3 cr) (F)

**Econ 7240. Macroeconomic Theory II.** Extends the foundations of Econ 7230 with a more in-depth look at the theory and computational aspects of various models of economic growth and business cycles. Prerequisites: Econ 7230, 7360. (3 cr) (Sp)

**Econ 7250. Macroeconomic Theory III.** Focuses on emerging topics in macroeconomics, relying heavily on skills acquired in Econ 7230 and 7240. Topics to be covered include, but are not limited to, endogenous growth, real and monetary business cycle, capital theory, fiscal and monetary policy, and economic transition. Prerequisite: Econ 7240. (3 cr) (F)

**Econ 7310. Econometrics I.** Begins with a review of probability and statistics. Remainder of course is spent discussing the Classical linear regression model, least squares and maximum likelihood estimation, finite and asymptotic sample properties, inference, prediction, and nonlinear optimization. Prerequisite: Econ 7360. (3 cr) (Sp)

**Econ 7320. Econometrics II.** Extension of Econ 7310, covering topics such as nonspherical disturbances, panel data, simultaneous equations, time series and distributed lag models, and limited and qualitative dependent variable models. Prerequisite: Econ 7310. (3 cr) (F)

**Econ 7330. Econometrics III.** Provides in-depth coverage of current topics/techniques in applied econometric time series analysis, with an emphasis on econometric model development, estimation, and interpretation. Topics include difference equations, lag operators, stationary ARMA processes, modeling economic time series including trends and volatility, testing for trends and unit roots, vector autoregressions, the Kalman filter including the state space representation of a dynamic system, cointegration, and error-correction models. Prerequisite: Econ 7320. (3 cr) (Sp)

**Econ 7350. Mathematical Economics I.** Includes linear equations, matrix algebra, multivariate calculus, static optimization, comparative static analysis, constrained optimization, and Kuhn-Tucker conditions. (3 cr) (F)

**Econ 7360. Mathematical Economics II.** Extends the presentation of Econ 7350 by covering applications of constrained optimization, the envelope theorem and applications, differential equations, dynamic economics, and optimal control. Prerequisite: Econ 7350. (3 cr) (F)

**Econ 7400. International Trade Theory and Policy.** Focuses on recent developments in the theory of trade and trade policy, including: (1) the incorporation of imperfect competition into the theory of international trade, (2) international factor movements, (3) the empirical investigation of trade flows, and (4) strategic trade policies. Prerequisites: Econ 7140, 7240. (3 cr) (Sp)

**Econ 7500. Resource Economics.** Focuses on formal economic models associated with optimal exploitation of renewable and nonrenewable resources. Applications to minerals, groundwater, energy resources, soil, forests, fisheries, rangelands, watersheds, wildlife, etc. Prerequisites: Econ 7140, 7240. (3 cr) (F)

**Econ 7510. Environmental Economics.** Covers the theory of environmental policy. Topics include, but are not limited to, externalities, uncertainty and the choice of policy instruments, market imperfections and the number of participants, nonconvexities in the production set, the charges and standards approach, marketable emission permits, the environment and development, international environmental issues, and ecological economics. Prerequisites: Econ 7140, 7240. (3 cr) (Sp)

**Econ 7700. International Finance.** Focuses on the international monetary system and currency markets, with an emphasis on balance of payment adjustment and exchange rate determination. Different exchange rate regimes are introduced, and issues regarding exchange rate overshooting and currency substitution are addressed. Topics covered also include the international banking system, international investment decisions on funding and capital structure, foreign exchange risk hedging and management, and foreign exchange instruments and techniques. Prerequisites: Econ 7130, 7230, 7360. (3 cr) (F)

**Econ 7800. Development Economics.** Focuses on a broad introduction to formalized economic models associated with developing regions/countries and theories of growth. Examines the interconnection between development and economic inequality, poverty and undernutrition, population growth, rural-urban migration, and agricultural development theories. Prerequisites: Econ 7140, 7240. (3 cr) (Sp)

**Econ 7970. Dissertation Research.** PhD dissertation research. (1-9 cr) (F,Sp,Su) ®

**Econ 7990. Continuing Graduate Advisement.** PhD-level advisement. (1-9 cr) (F,Sp,Su) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Taught 2002-2003.

## *Interdepartmental Doctoral Program in Education (EdD, PhD)*

**Chairman:** *Gerard R. Giordano*, Dean, College of Education  
Office in Emma Eccles Jones Education 109, (435) 797-1437

**Faculty:** Faculty are listed with participating departments.

**Degrees offered:** Doctorate of Education (EdD) and Doctorate of Philosophy (PhD)

**Graduate specializations:** Business Information Systems, Curriculum and Instruction, and Research and Evaluation

**FAX** (435) 797-3939

**E-mail** info@coe.usu.edu

### *Admission Requirements*

For admission information, contact: Dean, School of Graduate Studies, Utah State University, 0900 Old Main Hill, Logan UT 84322-0900; telephone (435) 797-1189; FAX (435) 797-1192; grads@cc.usu.edu.

To be evaluated against established criteria, students must submit to the School of Graduate Studies at Utah State University an **Application for Admission** along with the following:

1. Two official transcripts of both undergraduate and graduate credits from all colleges or universities attended. An average grade of *B* (3.0) or better is required during the last two years of undergraduate work and for all graduate work.
2. Three letters of recommendation (required). At least two of these letters should come from individuals who can evaluate the student's academic abilities. All letters should address the student's potential for successful graduate study.
3. Documentation of a master's degree or equivalent coursework related to an area of specialization, or a statement of why admission is sought without a master's degree.
4. An official report of the Graduate Record Examination (GRE), including both the Verbal and the Quantitative subtests.
5. Evidence of writing competency as determined by the department of specialization.
6. A statement of specific reasons for wanting to enroll in the doctoral program in education, including the area of specialization student desires to pursue.
7. For students in the Curriculum and Instruction (C&I) specialization of the PhD and students pursuing an EdD degree, evidence must be shown that they (a) have or have held a valid school teaching certificate or its equivalent, and (b) have a minimum of two years of teaching experience or the equivalent.

### *General Information*

The **Doctorate of Education (EdD)** degree program is intended for students who wish to: (1) understand educational research and curricular and instructional concepts sufficiently to deal effectively with problems as administrators, supervisors, and curriculum specialists in public or private educational institutions and settings; and (2) teach in community colleges, four-year colleges, and universities.

The **Doctorate of Philosophy (PhD)** degree program is intended for students who wish to: (1) fulfill roles as college and university researchers and teachers in education and education-related fields; and (2) conduct and direct research and development activities in public or private educational agencies or in the corporate sector.

### *Interdepartmental Specializations*

The **Curriculum and Instruction (C&I) Specialization** prepares curriculum specialists and instructional leaders in school districts and state education agencies, professors in colleges of education, and subject area instructors in four-year or community colleges. Areas of emphasis available are: (1) Reading/Writing, (2) Math/Science, (3) Social Studies, (4) Instructional Leadership, (5) Early Childhood, (6) Gifted/Talented Education, and (7) Special Education.

The **Research and Evaluation (R&E) Specialization** prepares graduates to evaluate the quality of educational programs, including the comparison of strengths and weaknesses of alternative programs; the revision, updating, and/or redirection of existing programs; and the analysis of related educational issues.

One department, **Business Information Systems (BIS)**, offers a departmental specialization. A student wishing to enroll in a departmental specialization is considered for admission by the respective departmental faculty. Those interested in departmental specializations should contact the head of the department. The **BIS Specialization** prepares students interested in careers as teachers or educational leaders in the public school and/or faculty members in higher education. Possible areas of emphasis include business information systems, communication, business and/or marketing education, and training and development. Other areas related to teaching business subjects may be approved by departmental graduate committees. Flexibility in program design through elective courses is provided.

### *Planned Program*

To complete a doctorate degree, a minimum of 60 total credits are required for students with a master's degree, and a minimum of 90 total credits are required for students without a master's degree. A student must:

1. Complete a Unifying Program of Studies Core (6 semester credits) and a Research and Statistics Core (12 semester credits), required of all doctoral students.

2. Complete a planned program of supporting electives, as designated by the specialization or by a department and approved by the student's supervisory committee.

3. Pass an eight-hour, written comprehensive examination. This exam must be satisfactorily completed before the student advances to candidacy. Advancement to candidacy also requires an approved dissertation proposal.

4. Present at a professional conference.

5. Submit for publication an approved manuscript.

6. Complete and satisfactorily defend a doctoral research study directed and judged by a supervisory committee of faculty.

7. Complete all final requirements, as specified by an area of specialization, the College of Education, and the School of Graduate Studies.

### ***Resident Coursework***

The **Doctorate of Philosophy degree (PhD)** requires three semesters of full-time registration in residency with a minimum of two semesters of consecutive residency. Completion of 33 credits in residence on the Logan campus is required.

The **Doctorate of Education degree (EdD)** requires at least three semesters in full-time residency, but they need not be consecutive. At least two semesters must be spent on campus prior to registering for dissertation credit. Completion of 39 credits must be completed in residence.

It is strongly recommended that the applicant enroll on campus the first semester after admission, so that appropriate program planning can be completed.

### ***Research***

Each student must complete a significant research study; present at a professional conference; and prepare an article for publication in an appropriate journal, based on the completed research and/or program of study.

### ***Financial Assistance***

Students should contact department heads for all inquiries regarding assistantships and tuition waivers. Applications for University assistantships, fellowships, and all financial aid go through department offices. For a listing of fellowships and scholarships, see the *Graduate Financial Assistance* section of this catalog (pages 71-72).

### ***Career Opportunities***

The doctoral specialization prepares educational leaders for positions as college and university researchers and teachers in education and education-related fields. Recipients of the doctoral degree are also prepared to conduct and direct research and development activities in public or private educational agencies or in the corporate sector; teach in community colleges, four-year colleges, and universities; serve as supervisors and curriculum specialists in public or private educational institutions and settings; and serve in a variety of other careers.

### ***Administrative/Supervisory Certificate Program***

A doctorate in education is separate from, but related to, the Administrative/Supervisory Certificate (A/SC) Program. Completion of the A/SC program qualifies a person for the certificate required of administrators and/or supervisors at any level in the public school systems of Utah. Students desiring an Administrative/Supervisory Certificate may need to take courses in addition to those required for the PhD and EdD degree.

### ***College of Education Courses***

Education courses are listed under the College of Education, pages 87-88.

Department of

# Electrical and Computer Engineering

College of Engineering

**Head: Professor Randy L. Haupt**, antennas, scattering, computer modeling  
Office in Engineering Laboratory 149, (435) 797-2840

**Graduate Program Coordinator: Associate Professor Tamal Bose**, digital signal processing, communications

**FAX** (435) 797-3054

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**Degrees offered:** Bachelor of Science (BS), Master of Engineering (ME), Master of Science (MS), Electrical Engineer (EE), and Doctor of Philosophy (PhD) in Electrical Engineering; BS in Computer Engineering

**Graduate specializations:** Communications, Computer Engineering, Control Systems, Electromagnetic Fields, Instrumentation and Optics, Microwaves, Networks and Concurrent Systems, Space Science and Engineering, Signal Processing, and VLSI Design

## Undergraduate Programs

### Department Mission Statement

The mission of the Electrical and Computer Engineering (ECE) Department is to develop students into outstanding electrical and computer engineers. The department is dedicated to superb teaching, research, and service.

### Program Descriptions

The ECE Department offers a balanced curriculum of classwork, laboratory work, and design experiences to prepare students for careers as practicing engineers. The Bachelor of Science programs in Electrical Engineering and Computer Engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET). The research program of the department, which includes undergraduates as well as graduate students, is internationally acclaimed in the fields of aerospace instrumentation and measurements, image compression, communications, electromagnetics, controls, and robotics.

### Electrical Engineering

The Electrical Engineering program is dedicated to producing engineers who: (1) contribute to engineering practice, advance engineering knowledge, and contribute to the good of society; (2) are advancing their education in engineering and other professions; and (3) take a leadership role in engineering and society.

Each student is given a solid foundation in electricity, electronics, signals, and systems, with individual practical experience. Upon this basic foundation the students then build expertise in advanced areas, stressing actual design practice, to prepare them for productive engineering careers. The specialty areas can be categorized into the following: analog and digital electronics, controls, signal processing, communications, and microwave engineering.

### Computer Engineering

The Computer Engineering program is dedicated to producing engineers who: (1) apply fundamental principles to solve practical engineering problems; (2) are continually engaged in professional, personal, and community development; (3) are implementing well-planned, top-down designs of complex systems; and (4) function well as team members and interact well with other professionals and nonengineers.

Building on a solid curriculum in computing hardware and software, the program begins with a strong foundation in electricity, digital logic design, and computer science, then leads into advanced software engineering and microcomputer systems. Advanced courses provide experience in formal design methods, high-performance architectures, data communications, concurrent programming, and real-time and embedded systems. Students are also required to complete advanced course sequences in computer science.

Students in the BS programs in both electrical engineering and computer engineering are permitted and encouraged to take courses in the other program. Many courses, such as controls, digital signal processing, and robotics, draw heavily on skills in both areas.

### **Assessment**

In addition to the regular national accreditation, the ECE Department employs a number of means to assess the quality of departmental programs. The primary indicator is the success of ECE graduates in obtaining professional employment. At several intervals following graduation, the department keeps track of student placement. Other major tools include annual quantitative assessment of program objectives, semi-annual reviews of the curriculum and facilities by the ECE Industrial Advisory Board, interviews of undergraduate and graduate students upon completion of their programs, regular monitoring of faculty members by peers, and periodic surveys of ECE graduates working in industry.

### **Requirements**

Prior to entry into the upper-division classes, the student must meet the standards for entry into the Professional Engineering Program. Additional information concerning these items is given in the College of Engineering write-up (pages 91-92). It is the responsibility of students to be aware of these rules and procedures; however, advisor assistance is available.

**Bachelor of Science in Electrical Engineering.** The program leading to a Bachelor of Science degree in electrical engineering is nominally a four-year program. The required program consists of a basic foundation of mathematics, science, computer science, engineering fundamentals, and laboratory and design experiences. Elective courses providing for one or more areas of technical specialization, communication skills, and University Studies complete the program and prepare students for productive and rewarding careers in the electrical engineering profession.

**Bachelor of Science in Computer Engineering.** The program leading to a Bachelor of Science in computer engineering is nominally a four-year program. The required program consists of a basic foundation of mathematics, science, computer science, engineering fundamentals, and laboratory and design experiences. Elective courses providing for one or more areas of technical specialization, communication skills, and University Studies complete the program and prepare students for productive and rewarding careers in the computer engineering profession.

**Required Courses** are shown in the accompanying paragraphs; however, because of differences in high school or transfer student preparation, it is strongly recommended that students meet with the college academic advisor to plan a detailed semester-by-semester schedule for completing the preprofessional requirements. Particular attention must be paid to course

prerequisites, requiring some students to take longer than four semesters to complete the preprofessional program. Students transferring into the department should consult with the college academic advisor for transfer credit evaluation and proper placement in the curriculum.

AP and CLEP credit may be used to meet some of the required technical and University Studies courses. Details concerning courses acceptable as electives are available from the Electrical and Computer Engineering Department.

### **Electrical Engineering**

#### *Preprofessional Program*

Math 1210, 1220, 2210, 2250; CS 1700, 1720; Engr 1010; ECE 2410, 2420, 2530, 2540; Phyx 2210, 2220; Engl 2010; Math/Science Elective; University Studies Breadth

#### *Professional Program*

Math 5710; ECE 3410, 3420, 3620, 3640, 3710, 3820, 3870, 4310, 4660, 4840, 4850, 5530; Electrical Engineering Electives; Technical Electives; University Studies Depth

### **Computer Engineering**

#### *Preprofessional Program*

Math 1210, 1220, 2250, 3310; CS 1700, 1720, 2200; Engr 1010; ECE 2410, 2420, 2530, 2540; Phyx 2210, 2220; Engl 2010; Math/Science Elective; University Studies Breadth

#### *Professional Program*

Math 5710; CS 3100; ECE 3160, 3410, 3620, 3640, 3710, 3720, 3780, 3820, 4740, 4840, 4850, 5530; Computer Engineering Electives; Computer Science Electives; Technical Electives; University Studies Depth

### **Student Research Opportunities**

Undergraduate students are extensively involved with research activities in the department. Electrical engineering majors and computer engineering majors have presented papers at research conferences and have won prizes. They have also designed satellites for deployment from the space shuttle. Electrical and Computer Engineering faculty members are dedicated to helping students and providing a challenging and interesting learning atmosphere. For additional information, see the *Research* section under *Graduate Programs* (pages 215-216).

### **Financial Support**

Scholarships, assistantships, grants-in-aid, and work-study programs are available through the University. In addition, the department employs undergraduate and graduate students to assist in engineering research and development.

### **Concurrent BS/Master's Program**

The concurrent BS/Master's program allows engineering students to begin taking graduate-level classes during their senior year. This permits them to complete requirements for *both* the BS degree *and* the master's degree concurrently during two years. Students in this program have a greater selection of graduate courses, since many graduate courses are taught during alternate years. In addition, the student's senior design project could be a start for a graduate design project or thesis. After completing their

BS degree, students in the program can earn a master's degree in only one additional year. Both the BS and the master's degree can generally be earned with 150 total credits, although students should note that a Plan C MS requires 3 extra credits. Finally, students with a master's degree can expect a much higher starting salary following graduation. (For more information, see *College of Engineering* section of this catalog, page 92.)

## Graduate Programs

### Admission Requirements

See general admission requirements on pages 72-73. Applicants with a bachelor's degree in Electrical or Computer Engineering from an ABET accredited program and having a 3.25 GPA or better can generally be admitted without restriction. Additional coursework in electrical and computer engineering fundamentals may be required in individual cases. Students must take the general GRE exam; however, the subject GRE is not required. All graduate students are expected to have a working knowledge of a computer language (preferably C).

Applications will be considered throughout the year. However, students desiring financial aid should submit application materials by December 15 to be considered for the following fall semester.

**No applications will be considered until all required information arrives in the office of the School of Graduate Studies.**

### Degree Requirements

Specific requirements for the ME, MS, EE, and PhD degrees are outlined below; these are in addition to the general requirements of the School of Graduate Studies.

#### Master of Engineering (ME) and Master of Science (MS).

The ME degree is based on coursework and is designed to give graduates a strong practical foundation. The MS degree requires substantial thesis or project work in a specific area and prepares students for advanced study or advanced work in that area. The MS degree has two options. Under Plan A, the student completes a thesis. Under Plan B, the student prepares an engineering project report.

If a student chooses an MS degree, changing to the ME degree is only possible by approval of the major professor, ECE graduate committee, and the department head.

The MS and ME degrees require successful completion of 30 credits of 5000-level or above coursework in a program approved by the student's supervisory committee, with the following stipulations:

#### Master of Science

1. At least 12 credits of ECE coursework must be completed at or above the 6000 level.
2. MS Plan A students must complete 6 credits of Thesis Research (ECE 6970).
3. MS Plan B students must complete 3 credits of Thesis Research (ECE 6970) and 3 credits of Design Project (ECE 6950).
4. MS students must have a one- to two-page, double-spaced thesis or project proposal approved by their committee when a project has been identified.

#### Master of Engineering

1. At least 18 credits of ECE coursework must be completed at or above the 6000 level.
2. At least two ECE courses with substantial lab components must be completed at or above the 5000 level.

#### All Master's Students

1. At least 3 credits of ECE coursework must be completed at the 7000 level.
2. One credit of ECE 6800 (Electrical Engineering Colloquium) must be completed as soon as possible.
3. Each master's student must form a committee and have a program of study approved by the end of his or her first semester.
4. No more than 10 credits of 5000-level coursework may be applied toward a master's degree.
5. Any exceptions to the master's requirements must be approved by the student's committee and the ECE Graduate Committee.

A course in technical and professional writing, or equivalent writing experience, is required for MS students prior to beginning the thesis. MS students may, at the discretion of their supervisors, be required to hire an editor to bring the thesis or paper into acceptable form.

**Electrical Engineer.** The Electrical Engineer degree is awarded for the successful completion of an advanced program of 60 credits of academic work beyond the BS, or 30 credits beyond the MS, and a comprehensive engineering report earning an additional 10 credits. The degree requirements are the same as those for the PhD listed below, except that the comprehensive examination need not be taken and the engineering report is given in lieu of the original research dissertation, reducing the total credits required for the PhD. The degree differs from the PhD by preparing the student for professional engineering work, rather than for research.

**Doctor of Philosophy.** The PhD is awarded for the successful completion of an advanced program of academic work and original research. A flexible program is planned individually by each candidate in consultation with his or her faculty supervisory committee.

The PhD program is expected to include 60 credits of coursework beyond the BS degree or 30 credits of coursework beyond the MS degree, plus 30 credits of dissertation research. The coursework generally represents two years of study beyond the MS degree, with up to 20 credits being taken outside the Electrical and Computer Engineering Department.

Once the student has completed at least 45 and not more than 60 graduate credits, he or she must pass a comprehensive examination based on graduate-level courses. Near the end of the program, the results of the original (publishable) research work will be presented and publicly defended as a dissertation.

### Research

The department conducts extensive research through the following groups:

1. Center for Self-Organizing Intelligent Systems (CSOIS)
2. National Center for the Design of Molecular Function (NCDMF)
3. Space Dynamics Laboratory (SDL)

4. Anderson Wireless Center
5. Center of Excellence for Smart Sensors
6. Signal and Image Processing

Research activities include: robotics, control systems, digital system design, computer networks, concurrent systems, antennas, numerical modeling, faulty wire detection, space systems, image processing, digital signal processing, wireless communications, acoustics, electromagnetic compatibility, and sensors.

### **Financial Assistance**

All applicants who are accepted academically are automatically considered for financial aid. Virtually all successful graduate students in the department do receive some level of financial aid during their degree program.

## **Electrical and Computer Engineering Courses (ECE)**

**ECE 2200. Electrical Engineering for Nonmajors.** Introduction to electrical engineering, including DC circuits, electronic circuits, digital circuits, and power circuits. Not for ECE majors. Three lectures, one lab. Prerequisite: Math 1210. (4 cr) (F)

**ECE 2410. Electrical Circuits.** Introduction to electrical circuits and basic circuit elements. Circuit theory, analysis techniques, and introduction to design. DC analysis. First-order inductive and capacitive circuits. Operational amplifiers. AC steady-state analysis. Introduction to computer-aided design and analysis. Prerequisite: Math 1210. Corequisite: ECE 2420. (3 cr) (F,Sp)

**ECE 2420. Electrical Circuits Laboratory.** Introduction to measurements and use of laboratory instrumentation. Basic circuit design and analysis. Introduction to computer-aided design and analysis. Must be taken concurrently with ECE 2410. (1 cr) (F,Sp)

**ECE 2530. Digital Circuits.** Design of combinational and sequential logic circuits with discrete and programmable logic devices. Simulations and timing analysis. Use of CAD tools. Design of digital systems. Corequisite: ECE 2540. (3 cr) (F,Sp)

**ECE 2540. Digital Circuits Laboratory.** Laboratory course to accompany ECE 2530. Corequisite: ECE 2530. (1 cr) (F,Sp)

**ECE 3160. Transmission Lines.** High frequency effects on transmission lines: reflectors, terminations, standing waves, and matching networks. Prerequisites: ECE 2410 and Phyx 2220. (1 cr) (F)

**ECE 3260 (QI, DSC). Science of Sound.** Application of principles of acoustics (study of sound) to everyday life. Explores physical acoustics, psychoacoustics, musical acoustics, electroacoustics, architectural acoustics, and environmental acoustics. Uses algebra and reasoning to solve problems in acoustics. (3 cr) (F)

**ECE 3410. Electronic Systems I.** Fundamentals of transistors, operational amplifiers, and other integrated circuits, along with their utilization in amplifiers, switches, and other applications. Laboratory work required. Prerequisites: ECE 2410, 3620. (3 cr) (F,Sp)

**ECE 3420. Electronic Systems II.** Design of electronic circuits for applications in instrumentation, communication, control, and power systems. Three lectures, one lab. Prerequisite: ECE 3410. (4 cr)

**ECE 3620. Circuits and Signals.** Continuation of basic circuit concepts: AC power, second-order response, mutual inductance, and frequency response. Time-domain analysis of higher-order systems: impulse response and convolution. Laplace trans-

form analysis of circuits and other systems. Some lab and computational work required. Prerequisites: Math 2250, ECE 2410, CS 1720. (3 cr) (F)

**ECE 3640. Signals and Systems.** Systems realizations. Time and transform domain analysis of discrete-time systems. Vector-space concepts and Fourier series. Fourier transforms in continuous and discrete time. Some lab and computational work required. Prerequisite: ECE 3620. (3 cr) (Sp)

**ECE 3710. Microcomputer Hardware and Software.** Synthesis of microcomputer systems, including interfacing, component analysis, signaling requirements, and programming. Covers architecture basics, including instruction sets, assembly language programming, loading, timing, and interrupts. Includes hands-on implementation. Three lectures, one lab. Prerequisites: ECE 2530 and CS 1720. (4 cr) (F,Su)

**ECE 3720. Microcomputer Systems Programming.** Advanced assembly language and systems programming concerned with performance and I/O. Study of modern computer architecture issues, such as caching, pipelining, concurrent instruction execution, memory access time, and role and structure of device drivers. Prerequisite: ECE 3710. (3 cr) (Sp)

**ECE 3780. Engineering Software.** Methods for development of reliable engineering software. Includes experience with modern CASE tools. Prerequisite: CS 1720. (3 cr) (Sp)

**ECE 3820. Design I.** Students work on an engineering project as part of a multidisciplinary team. Emphasizes engineering design, project management, technical writing, technical presentations, and project documentation. Prerequisite: Professional standing. (2 cr) (Sp)

**ECE 3860. Transmission Lines.** Covers transmission line analysis and high frequency effects, including reflections, standing waves and interference, VSWR, crosstalk, and coupling. Intended to be taken by computer engineers. Meets simultaneously with ECE 3870 during the first five weeks of the semester. Prerequisites: ECE 2410, Phyx 2220, Math 2250. (1 cr) (F)

**ECE 3870. Electromagnetics.** Discussion of Maxwell's equations, electromagnetic waves, power and energy, reflection and refraction processes, transmission lines, waveguides, and antennas. Explores electrostatic and magnetostatic fields produced by charge and current distributions, as well as electromagnetic forces and materials. Laboratory work required. Prerequisites: ECE 2410, Phyx 2220. (3 cr) (F)

**ECE 4250. Internship/Co-op.** Planned, career-related work experience in industry. Students must register with USU Co-op Office and have program approved by the ECE co-op advisor. Written report required. Prerequisite: Professional standing. (3 cr) (F,Sp,Su) ®

**ECE 4310. Control Systems I.** Study of analog and computer controlled systems, classical and modern control system design methods, s-domain and z-domain transfer function models, state space, dynamics of linear systems, and frequency domain analysis and design techniques. Introduction to controllability and observability, and full-state pole placement controller design. Laboratory work required. Prerequisite: ECE 3640. (3 cr) (F)

**ECE 4660. Communication Systems I.** Principles of analog and digital communications theory. Signal analysis. Quantization. Amplitude and angle modulation. Survey of communication systems. Laboratory work required. Prerequisites: ECE 3640, Math 5710. (3 cr) (F)

**ECE 4740. Computer and Data Communications.** Systems approach to computer and data communications. Includes transmission lines, hardware controllers, computer interfaces, and protocols relating to local and wide area networks. Prerequisite: ECE 3720. (3 cr) (F)

**ECE 4840 (CI). Design II.** Individual or team engineering project, including design, development, and testing. Interdisciplinary projects strongly encouraged. Design reviews and written progress reports required. Prerequisite: ECE 3820. (3 cr) (Sp,Su)

**ECE 4850 (CI). Design III.** Individual or team engineering project, including design, development, and testing. Interdisciplinary projects strongly encouraged. Written and oral reports required, describing technical details of design project. Prerequisites: ECE 4840 and senior standing. (2 cr) (Sp,Su)

**ECE 4930. Special Studies for Undergraduates.** Independent or group study of engineering problems not covered in regular course offerings. (1-3 cr) (F,Sp,Su) ®

**ECE 5020 (d6020).<sup>1</sup> Computational Methods for Electrical Engineers.** Advanced computing methods for electrical engineers, such as numerical integration and differentiation, finding roots and extrema, matrix manipulations, interpolation, Fourier methods, solution of differential and partial differential equations (finite differences, finite difference time domain, finite element, method of moments). Emphasis on practical applications. Prerequisites: ECE 3870 and C/C+/C++ or MATLAB programming. (3 cr) (Sp)

**ECE 5230. Spacecraft Systems Engineering.** Spacecraft communications, telemetry systems, and command and data handling. Introduction to astrodynamics and orbit design. Electrical power generation and storage. Spacecraft subsystems (e.g., guidance, navigation, and control). Prerequisites: Either ECE 2200, or *both* ECE 2410 and 2530. (3 cr) (F)

**ECE 5280. Electro-Acoustic Systems.** Engineering analysis and design of electro-acoustic systems, including sound reinforcement and electronic music systems. Practice measuring acoustic environments and component specifications, as well as using software tools for design and analysis. Three lectures, one lab. Prerequisite: ECE 3260. (4 cr) (Sp)

**ECE 5320. Control Systems II.** Modern control system design, including full-state and reduced-state estimators, compensator design and the separation theorem, tracking systems, and disturbance suppression. Introduction to linear quadratic optimal controller design and real-time control system design, describing function methods for nonlinear systems. Three lectures, one lab. Prerequisite: ECE 4310. (4 cr) (Sp)

**ECE 5430. Advanced Electronic Circuits.** Analysis, design, and application of analog integrated circuits in electronic systems. Laboratory work required. Prerequisite: ECE 3420. (3 cr) (F)

**ECE 5460. Digital VLSI System Design I.** Team-oriented design of large digital systems using hardware description languages. Schematic capture and standard-cell libraries. Behavioral system modeling and simulation. Preparation of behavioral models for floor-planning, testability, and design synthesis. Extensive use of CAD tools. Design project. Prerequisite: ECE 5530. (3 cr) (F)

**ECE 5470. Digital VLSI System Design II.** Continuation of ECE 5460. Logic synthesis, timing analysis, and structural simulation and back annotation. Design refinement to the point of final mask artwork production. Design validation through LVS, DRC, and gate-level or device-level simulation. Formal methods of circuit verification. Extensive use of CAD tools. Design project. Prerequisite: ECE 5460. (3 cr) (Sp)

**ECE 5480 (d6480). Electromagnetic Compatibility.** Introduces concepts and techniques of electromagnetic compatibility to students who will be designing and working with high-speed electronic systems. (3 cr) (Sp)

**ECE 5490 (d6490). Radar I.** Emphasizes the system aspects of radar. After introducing the basic concepts of radar, methods for the prediction of radar performance are developed and the principles of CW, FM, MTI, and tracking radars are presented. Prerequisites: ECE 3640 and 3870 or equivalent knowledge. (3 cr) (Sp)

**ECE 5530. Digital System Design.** Presents modern top-down, bottom-up approach to design of digital systems, emphasizing programmable devices. Extensive use of CAD tools. Designing with ABEL, and introduction to designing with Verilog HDL. Laboratory work required. Prerequisite: ECE 2530. (3 cr) (F,Sp)

**ECE 5630. Introduction to Digital Signal Processing.** Theory and principles of digital signal processing, including discrete-time signals and systems, Z-Transforms,

Fourier analysis, FIR and IIR digital filter design, discrete Fourier transforms, and multi-rate processing. Laboratory work required. Prerequisite: ECE 3640. (3 cr) (F)

**ECE 5640. Real-Time Processors.** Real-time processor architectures and methods used for digital signal processing. Includes C and assembly language programming, modern DSP architectures, tools for real-time system development, and finite word-length effects. Laboratory includes implementation of hardware-based real-time systems. Laboratory work required. Prerequisites: ECE 3640 and 3710. (3 cr) (Sp)

**ECE 5660. Communication Systems II.** Concepts from digital communications. Signal spaces, modulation, and performance of common digital communication constellations. Bandwidth issues. Detection and matched filtering. Synchronization and equalization. Prerequisites: ECE 4660, Math 5710. (3 cr) (Sp)

**ECE 5740. Concurrent Programming.** Analysis of problems associated with the use of multiple threads and processes (e.g., deadlock, livelock, and starvation) and methods for avoiding them. Proper usage of synchronization operations (mutual exclusion, critical sections, semaphores, and monitors) and communication operations (message passing, remote procedure calls, remote method invocation, and rendezvous). Extensive programming exercises in C and JAVA. Prerequisites: ECE 3720 and CS 3100 or graduate standing. (3 cr) (Sp)

**ECE 5750. High-Performance Microprocessor Architecture.** Modern architecture fundamentals, instruction set analysis and design, pipelined and superscalar architectures, software-hardware interaction, memory hierarchy, and virtual memory stresses processor-specific low-level code optimization. Prerequisite: ECE 3710 or equivalent. (3 cr) (Sp)

**ECE 5770. Microcomputer Interfacing.** Design of hardware and software interfaces to microcomputers for instrumentation and control applications. Three lectures, one lab. Prerequisite: ECE 3710. (4 cr) (Sp)

**ECE 5780. Real-Time Systems.** Real-time system design and implementation of basic concepts, including interrupts and controllers, context switch, concurrent processes, semaphores, message passing, rate monotonic and deadline scheduling, hardware system design and test issues, and typical engineering practice. Includes hands-on implementation. Three lectures, one lab. Prerequisite: ECE 3720. (4 cr) (F)

**ECE 5810 (d6810). Microwave Engineering I.** Theory of operating and design techniques for passive microwave components, transmission lines, waveguides, power dividers/combiners, and filters. Prerequisite: ECE 3870. (3 cr) (Sp)

**ECE 5820 (d6820). Microwave Engineering I Laboratory.** Design of a wireless local area network FSK receiver. Corequisite: ECE 5810/6810. (1 cr) (Sp)

**ECE 5830 (d6830). Microwave Engineering II.** Theory of operation and design techniques for active microwave components. Solid-state devices, amplifiers, oscillators, mixers, detectors, and systems. Modeling of active microwave devices. Prerequisite: ECE 5810/6810. (3 cr) (F)

**ECE 5840 (d6840). Microwave Engineering II Laboratory.** Students design, build, and test the active building blocks that make up microwave systems. Prerequisites: ECE 3870, 5810/6810, 5820/6820. Corequisite: ECE 5830/6830. (1 cr) (F)

**ECE 5850 (d6850). Antennas I.** Theory and application of electromagnetic radiation and radiating structures. Emphasis on antenna designs for modern wireless communications and radar systems. (3 cr) (F)

**ECE 5860 (d6860). Antennas I Laboratory.** Students build and test antennas and antenna systems. Corequisite: ECE 5850/6850. (1 cr) (F)

**ECE 5870 (d6870). Wireless Communications.** System-level analysis and design of wireless communication systems. Link budget analysis. Frequency reuse and planning. Evaluation of modern communication systems. Prerequisite: ECE 3870. Corequisite or prerequisite: ECE 4660. (3 cr) (F)

**ECE 5880 (d6880). Wireless Communications Laboratory.** Design and testing of a CDMA communication system. Measurement and analysis of indoor and outdoor propagation effects. Corequisite: ECE 5870/6870. (1 cr) (F)

**ECE 5930. Special Topics in Electrical and Computer Engineering.** Independent or group study of engineering problems not covered in regular course offerings. (1-4 cr) (F,Sp,Su) ®

**ECE 6010. Stochastic Processes in Electronic Systems.** Introduction to stochastic processes in communications, signal processing, digital systems, and control. Topics include continuous and discrete random processes, correlation and power spectral density, optimal filtering, Markov chains, and queuing theory. Prerequisites: Math 5710 and ECE 3640. (3 cr) (F)

**ECE 6020 (d5020). Computational Methods for Electrical Engineers.** Advanced computing methods for electrical engineers, such as numerical integration and differentiation, finding roots and extrema, matrix manipulations, interpolation, Fourier methods, solution of differential and partial differential equations (finite differences, finite difference time domain, finite element, method of moments). Emphasis on practical applications. Prerequisites: ECE 3870 and C/C+/C++ or MATLAB programming. (3 cr) (Sp)

**ECE 6030. Mathematical Methods for Signals and Systems.** Signal representation using vector spaces. Linear algebraic techniques for signal modeling and estimation. Optimal detection and estimation algorithms, with applications. Prerequisite: Graduate status. Corequisite: Math 5760. (3 cr) (F)

**ECE 6100. Electromagnetics Seminar.** Weekly seminar or colloquium for advanced electromagnetics students. (1 cr) (Sp) ®

**ECE 6240. Space Environment and Engineering.** Study of space environment and models used for engineering analysis. Topics include considerations for engineering in the space environment, such as plasma interactions, debris, chemical reactions, radiation effects, and thermal issues. Also taught as Phyx 6240. (3 cr) (Sp)

**ECE 6250. Graduate Internship/Co-op.** Planned work experience in industry. Detailed program; must have prior approval. Written report required. (1-3 cr) (F,Sp,Su)

**ECE 6290. Fundamentals of Acoustics.** Principles underlying generation, transmission, and reception of acoustic waves. Applications of these principles using analytical methods to attack acoustic problems. Taught on demand. (3 cr)

**ECE 6320. Linear Multivariable Control.** Modeling, analysis, and design of multi-input, multi-output control systems, including both state space and transfer matrix approaches, with an emphasis on stability. Prerequisite: ECE 4310, MAE 5310, or equivalent. Also taught as MAE 6320. (3 cr) (F)

**ECE 6330. Nonlinear and Adaptive Control.** Methods of nonlinear and adaptive control system design and analysis. Includes qualitative and quantitative theories, graphical methods, frequency domain methods, sliding surface design, linear parameter estimation methods, and direct and indirect adaptive control techniques. Prerequisite: ECE/MAE 6320. Also taught as MAE 6330. (3 cr) (Sp)

**ECE 6340. Spacecraft Attitude Control.** Spacecraft attitude dynamics and controls. Spin stabilized, three axis, and dual spin modes. Attitude determination techniques. Prerequisite: ECE 5320. Also taught as MAE 6340. (3 cr) (F)

**\*\*\*ECE 6350. Robotics.** Fundamentals of robotic systems, including kinetics, kinematics, sensors, actuators, control algorithms, motion planning, and computer systems. Integration of critical design components to develop complete systems. Robotic manipulator analysis and design. Applications in manufacturing. Mobile robots, including wheeled, legged, and alternative locomotion robots. Prerequisite: ECE/MAE 6320 or instructor approval. Also taught as MAE 6350. (3 cr) (Sp)

**ECE 6450. Device-Level Digital VLSI Design.** VLSI fabrication technologies and device modeling. Layout design rules and mask artwork CAD tools. Techniques for estimating parasitic capacitance and resistance. Transistor-level circuit implementa-

tion and analysis techniques for digital circuits. Timing analysis. Modeling of submicron devices. Focus on CMOS technology. Extensive use of CAD tools. Prerequisites: ECE 2410 and 2530. Taught on demand. (3 cr)

**ECE 6460. Device-Level Analog VLSI Design.** Analog device characterization. Current sinks, sources, mirrors, and amplifiers. Current and voltage references, comparators, and operational amplifiers. A/D and D/A conversion. Specialized layout techniques to deal with on-chip device variance. Focus on CMOS technology. Extensive use of CAD tools. Prerequisites: ECE 5430 and 6450. Taught on demand. (3 cr)

**ECE 6470. Semiconductor Device Physics.** Semiconductor materials, and their physical and electronic properties. Detailed device models for metal-semiconductor contacts, p-n junctions, bipolar transistors, and field-effect transistors. Introduction to fabrication technology, including crystal growth and doping, diffusion, epitaxy, ion-implantation, and lithography. Prerequisite: ECE 6450. Taught on demand. (3 cr)

**ECE 6480 (d5480). Electromagnetic Compatibility.** Introduces concepts and techniques of electromagnetic compatibility to students who will be designing and working with high-speed electronic systems. (3 cr) (Sp)

**ECE 6490 (d5490). Radar I.** Emphasizes the system aspects of radar. After introducing the basic concepts of radar, methods for the prediction of radar performance are developed and the principles of CW, FM, MTI, and tracking radars are presented. Prerequisites: ECE 3640 and 3870 or equivalent knowledge. (3 cr) (Sp)

**ECE 6600. Computer Networking I.** Topics include network topology, flow, capacity and queuing analysis, detailed description of the standard layers, and specific networking systems, including local area networks. Some lab work included. (3 cr) (F)

**ECE 6620. Introduction to Digital Image Processing.** Digital processing theory and techniques for two-dimensional signals. Topics include two-dimensional transforms, image perception, sampling, modeling, enhancement, and data compression. Prerequisites: ECE 5630 and 6010. (3 cr) (Sp)

**\*ECE 6750. Concurrent Systems Engineering I.** Reliable and efficient software design for multiprocessor and multithreaded applications on real-time or embedded systems. Use of CASE tools to develop substantial concurrent programs for single and multiprocessor systems. Prerequisite: BS degree in Electrical and Computer Engineering or Computer Science. (3 cr) (F)

**\*\*ECE 6760. Fault-tolerant Systems.** Methods for design and implementation of fault-tolerant computer systems, emphasizing small real-time and embedded applications. Detection, assessment, confinement, and treatment of faults. Checkpointing, rollback, and secure protocols. Fault-tolerance on distributed systems. Prerequisite: BS degree in Electrical and Computer Engineering or Computer Science. (3 cr) (F)

**ECE 6770. Real-Time Operating Systems.** Both low- and high-level design and implementation of real-time operating systems. Provides hands-on experience with embedded real-time operating system. Introduction to scheduling tradeoffs. Survey of current commercial real-time operating systems. Prerequisite: ECE 5780. Taught on demand. (3 cr)

**ECE 6780. Device Drivers.** Design and implementation of UNIX and Windows device drivers. Includes hardware/software design tradeoffs in light of modern operating systems. Students implement working device drivers. Prerequisite: ECE 5780. Taught on demand. (3 cr)

**ECE 6800. Electrical Engineering Colloquium.** Weekly seminars or colloquia. Students are normally required to enroll for two semesters. (0.5 cr) (F,Sp) ®

**ECE 6810 (d5810). Microwave Engineering I.** Theory of operating and design techniques for passive microwave components, transmission lines, waveguides, power dividers/combiners, and filters. Prerequisite: ECE 3870. (3 cr) (Sp)

**ECE 6820 (d5820). Microwave Engineering I Laboratory.** Design of a wireless local area network FSK receiver. Corequisite: ECE 6810/5810. (1 cr) (Sp)

**ECE 6830 (d5830). Microwave Engineering II.** Theory of operation and design techniques for active microwave components. Solid-state devices, amplifiers, oscillators, mixers, detectors, and systems. Modeling of active microwave devices. Prerequisite: ECE 6810/5810. (3 cr) (F)

**ECE 6840 (d5840). Microwave Engineering II Laboratory.** Students design, build, and test the active building blocks that make up microwave systems. Prerequisite: ECE 3870, 6810/5810, 6820/5820. Corequisite: ECE 6830/5830. (1 cr) (F)

**ECE 6850 (d5850). Antennas I.** Theory and application of electromagnetic radiation and radiating structures. Emphasis on antenna designs for modern wireless communications and radar systems. (3 cr) (F)

**ECE 6860 (d5860). Antennas I Laboratory.** Students build and test antennas and antenna systems. Corequisite: ECE 6850/5850. (1 cr) (F)

**ECE 6870 (d5870). Wireless Communications.** System-level analysis and design of wireless communication systems. Link budget analysis. Frequency reuse and planning. Evaluation of modern communication systems. Prerequisite: ECE 3870. Corequisite or prerequisite: ECE 4660. (3 cr) (F)

**ECE 6880 (d5880). Wireless Communications Laboratory.** Design and testing of a CDMA communication system. Measurement and analysis of indoor and outdoor propagation effects. Corequisite: ECE 6870/5870. (1 cr) (F)

**ECE 6930. Special Topics in Electrical Engineering.** Independent or group study in electrical engineering topics, such as automated systems, optics and laser engineering, electro-acoustics, solid-state materials, devices, and intelligent systems engineering. (1-6 cr) (F,Sp,Su) ®

**ECE 6950. Design Project.** (3 cr) (F,Sp,Su) ®

**ECE 6970. Thesis Research, MS.** (1-6 cr) (F,Sp,Su) ®

**ECE 6990. Continuing Graduate Advisement.** (1-6 cr) (F,Sp,Su) ®

**ECE 7210. Spacecraft Instrumentation.** Theory, engineering, and data reduction techniques of spacecraft instrumentation for space science and spacecraft systems. Taught on demand. Also taught as Phyx 7210. (3 cr)

**\*\*\*ECE 7350. Intelligent Control Systems.** Intelligent control strategies, including neural network, fuzzy logic, associated memory networks, and rule-based control systems. Prerequisite: ECE/MAE 6320 or instructor approval. Also taught as MAE 7350. (3 cr) (F)

**\*\*\*ECE 7360. Optimal and Robust Control.** Advanced methods of control system analysis and design. Operator approaches to optimal control, including LQR, LQG, and L1 optimization techniques. Robust control theory, including QFT, H-infinity, and interval polynomial approaches. Prerequisite: ECE/MAE 6320 or instructor approval. Also taught as MAE 7360. (3 cr) (Sp)

**ECE 7610. Computer Networking II.** Advanced TCP/IP protocols, routing strategies, major applications. Details of Unix systems for advanced use of BSD sockets and TLI/Streams. Prerequisite: ECE 6600. (4 cr) (Sp)

**\*ECE 7620. Advanced Digital Image Processing.** Advanced digital processing theory and techniques. Topics include image restoration, image reconstruction from projections (computed tomography), and data compression. Prerequisite: ECE 6620. (3 cr) (F)

**\*\*ECE 7630. Advanced Digital Signal Processing.** Advanced digital signal processing theory and methods. Topics include optimal filter design (Wiener and

Kalman filters), adaptive filtering, spectral estimation, and beamforming. Prerequisite: ECE 5630, 6010. (3 cr) (F)

**\*ECE 7670. Coding Theory and Practice in Communication.** Examination of codes employed in digital communications, including discussion of error correction codes over finite fields. Reed-Solomon, convolutional, and trellis coding. Advanced coding techniques. Prerequisite: ECE 6030. Corequisite: ECE 5660. (3 cr) (Sp)

**\*\*ECE 7680. Information Theory.** Topics related to information theory, including source coding theorem with examples of data compression, channel coding, and rate distortion theory. Prerequisite: ECE 6030. Corequisite: ECE 5660. (3 cr) (Sp)

**\*ECE 7710. Concurrent Systems Engineering II.** Advanced work on the development of reliable and correct concurrent systems, including those with time constraints. Substantial experience with CASE tools and application development. Prerequisite: ECE 6750. (3 cr) (Sp)

**ECE 7740. Real-Time Scheduling.** Classic real-time scheduling from a mathematical basis. Includes rate monotonic, deadline, value-based, slack-based, and job shop flow scheduling problems. Advanced research topics in real-time scheduling, including adaptive, multi-processor, and stochastic techniques. Prerequisites: ECE 5780, 6010. Taught on demand. (3 cr)

**ECE 7750. Distributed Control Systems.** Design and implementation issues concerning distributed control systems. Real-time processing, distributed stability methods, network techniques and standards, system development and management, smart sensors, and control actuators. Survey of current literature. Prerequisites: ECE 4310 and 5780. Taught on demand. (3 cr)

**ECE 7760. Advanced Topics in Distributed Systems.** Advanced topics in parallel and distributed computing, emphasizing small-scale real-time and embedded systems. Prerequisite: ECE 6750. Taught on demand. (3 cr)

**ECE 7770. Advanced Topics in Real-Time Systems.** Survey of current real-time systems research. Covers topics such as scheduling, multiprocessor systems, fault tolerance, diagnostic systems, use of artificial intelligence techniques, and user interfaces. Prerequisite: ECE 5780. Taught on demand. (3 cr)

**ECE 7850. Antennas II.** Advanced topics, such as antenna arrays, smart antennas, fields in matter, radar cross section, and computational methods. Prerequisite: ECE 6850/5850 or instructor's approval. (3 cr) (Sp)

**ECE 7860. Computational Electromagnetics.** Topics selected from advanced numerical methods, high-frequency methods, finite elements, finite difference time domain, and other current electromagnetic modeling tools. (3 cr) (Sp)

**ECE 7930. Special Topics in Electrical Engineering.** Independent or group study in electrical engineering topics, such as automated systems, laser engineering, electroacoustics, solid-state materials, devices, and intelligent systems engineering. (1-6 cr) (F,Sp,Su) ®

**ECE 7970. Dissertation Research.** (1-6 cr) (F,Sp,Su) ®

**ECE 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

<sup>1</sup> Parenthetical numbers preceded by *d* indicate a *dual* listing.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

\*\*\*This course is taught alternating years. Check with department for information about when course will be taught.

## Department of *Elementary Education*

### *College of Education*

**Head: Professor Bernard L. Hayes**, reading education  
Office in Emma Eccles Jones Education 385A, (435) 797-0385

**FAX** (435) 797-0372

**E-mail** eled@coe.usu.edu

**WWW** <http://www.coe.usu.edu/eled/>

**Emma Eccles Jones Distinguished Professor** *D. Ray Reutzel*, reading; **Professor** *Deborah A. Byrnes*, social studies education, early childhood; **Associate Professors** *James J. Barta*, early childhood and mathematics; *Martha T. Dever*, foundations, early childhood education; *James T. Dorward*, mathematics, research methods, middle level education; *Deborah E. Hobbs*, language arts, foundations, gifted/talented; *Scott L. Hunsaker*, gifted/talented education, foundations; *Francine Fukui Johnson*, foundations, gifted/talented education, supervision; *John A. Smith*, reading education, research methods; **Assistant Professors** *Rebecca M. Monhardt*, science education; *Martha L. Whitaker*, foundations; **Temporary Lecturers** *Lorilynn B. Brandt*, reading education; *Judy Greene*, language arts/foundations; *Leigh C. Monhardt*, science education; **Student Teaching Director** *Kathleen O. Johnson*; **Advisors** *Amy C. Greenway*, *Sheri N. Noble*, *Sylvia Robinson*

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), Master of Arts (MA), and Master of Education (MEd) in Elementary Education; BS and BA in Early Childhood Education; the Elementary Education Department participates in the Interdepartmental Doctoral Program in Education, including Doctor of Education (EdD) and Doctor of Philosophy (PhD) with Curriculum and Instruction Specialization

**Graduate specializations:** *MA, MS, MEd*—Early Childhood Education; ESL Education; Gifted and Talented Education; Math and Science Education; Middle Education; Reading, Writing, Educational Leadership, and Social Studies Education

## *Undergraduate Programs*

### *Objectives*

The purposes of the Department of Elementary Education are:

1. To develop professional educators;
2. To advance knowledge in the field of education.

These purposes are realized through teaching, scholarly activities, and service. The department provides leadership in the preparation of teachers, supervisors, curriculum specialists, and other professional personnel for careers in elementary education, early childhood education, and middle education.

The Department of Elementary Education at Utah State University offers three programs leading to licensure as a teacher: (1) *Elementary Education*: Offers licensure to teach in grades one through eight in the public schools; (2) *Early Childhood Education*: Offers licensure to teach prekindergarten, kindergarten, and grades one through three in the elementary school; and (3) *Middle Education*: Offers an endorsement to teach in grades five through eight.

### *Requirements*

**Provisional Admission Process and Requirements.** Since more students major in Elementary Education at USU than in any other major, competition for admission into the program is very keen. Due to increased demands for admission coupled with limited resources, a ceiling of 175 students has been placed on admissions each year. Thus, admission to USU does not necessarily guarantee admission into the Elementary Education program.

Provisional admission to the Elementary and Early Childhood Teacher Education Program is determined by (1) the student's GPA in a set of core courses, (2) ACT scores and Writing Diagnostic Test or PPST test results, (3) the number of credits a student has taken, and (4) successful completion of a group assessment evaluation. (Additional factors to be weighted may be gender and/or minority status consistent with applicable law.) Applications are accepted each semester. Because there are typically more applicants than there is space available, the number accepted is limited. **Students who are not accepted may reapply.** Provisional admission requires formal action by the Office of the Dean of the College of Education, as well as by the student's department.

Admission to the Teacher Education Program is a prerequisite for enrollment in the major, starting with Level II. A student de-

siring admission to the Teacher Education Program should file an application in the Elementary Education Office, located in room 373 of the Emma Eccles Jones Education Building.

**Elementary Education SODIA Program.** The acronym SODIA represents the elementary teacher education program. The name is derived from the initial letter of descriptive words (Self, Others, Discipline, Implementation, and Application) which represent emphasis placed at each level of the program.

The elementary education SODIA program is performance-based and field-centered. It utilizes public schools as partners in each phase of the teacher education program. SODIA is an interdisciplinary and interdepartmental program utilizing staff members from the Departments of Psychology; Special Education and Rehabilitation; Family and Human Development; Health, Physical Education and Recreation; Music; Art; Theatre Arts; and Instructional Technology who work in conjunction with the Department of Elementary Education. These University faculty members work with teachers and principals of cooperating public schools and the Edith Bowen Laboratory School on the USU campus in an integrated program.

**Level I, Self,** is represented by the “S” in the acronym SODIA. This is the first-level course (EEd 1000) introducing the field of education and emphasizing the student’s self-assessment in relation to ability and desire to teach. A minimum of 15 hours are spent observing in an elementary or middle school classroom, completing volunteer service in other community settings, and viewing a variety of selected professional videos. In addition, a human growth and development course is required. The two courses in Level I are prerequisites to applying to the Teacher Education Program.

**Level II, Others,** is represented by the “O” in the acronym SODIA. This stands for the many “others” who make up the education community. In this bloc, each student receives 15 credits and is assigned as a teacher assistant in one of the public schools. The remainder of the time is spent in seminars and classwork offered on the USU campus. The classwork is interdisciplinary and interrelated, including courses in elementary education, psychology, special education, and technology. Entrance to Level II requires prior admission to the Teacher Education Program.

**Level III, Disciplines,** is represented by the “D” in the acronym SODIA. Students in this bloc complete 15 credits of methods coursework and practica at the Edith Bowen Laboratory School or public schools. The “methods” courses in reading, social studies, language arts, mathematics, and science are included in this bloc. A preliminary course in reading is required as a transition from Level II to Level III.

**Level IV, Implementation,** is represented by the “I” in the acronym SODIA. This is the student teaching or internship phase of the program. Student teaching constitutes full days of actual teaching experience for the entire semester. Internships are for the entire academic year.

**Level V, Application,** is represented by the “A” in the acronym SODIA. At this level, graduates of the program make a transition into the profession of teaching.

Program Strands also receive major emphasis through SODIA’s levels of progression. These strands are: (1) Assessment, (2) Classroom Management, (3) Curriculum, (4) Effective Teaching, (5) Learner, (6) Parent and Community, (7) Diversity,

and (8) Personal and Professional Development. A student performance portfolio assessment process is also included.

**Continuing Status Requirements.** A minimum GPA of 2.75 is required to remain in good standing and to graduate from the program.

All students majoring in elementary education must be registered in the College of Education. An advisor will be assigned from the Department of Elementary Education. Programs of professional education courses, as well as teaching support courses and an area of emphasis, have been developed by the Department of Elementary Education and approved by the Council on Teacher Education and the Utah State Office of Education. For a complete description of the program and requirements for graduation and licensure, students should obtain a copy of the *Department of Elementary Education, Student Program Planning Guidebook*, available from the Department of Elementary Education.

Each student completes a professional semester of student teaching or a year of internship. An application for student teaching/internship must be made at least one semester in advance, and credentials are reevaluated at that time. Not all student teachers/interns can be accommodated by the schools located within Cache Valley. Students should be financially prepared to spend that time off campus in the event such an arrangement is necessary. Students must be responsible for their own transportation.

Students who carefully select their elective courses may also qualify for a special endorsement to the basic professional teaching license. All students complete an area of emphasis in a subject matter field, in addition to the teaching support courses. Dual licensure programs exist in deaf education, early childhood education, special education, and middle education. Information concerning special endorsements and additional areas of specialization may be obtained from the Department of Elementary Education.

Students who have teaching licenses in areas other than elementary education may obtain the elementary license by meeting the same or equivalent requirements for licensure expected of an elementary education major. Those desiring to acquire a dual license should work with an advisor from the Department of Elementary Education.

All courses listed as major subject courses must be taken on an *A-B-C-D-F* basis and the grade point average for these courses must be 2.75 or better. Major subject courses passed with less than a *C* grade must be repeated.

## Endorsements

The USU Elementary Education Department and Secondary Education Department jointly offer a K-12 English as a Second Language (ESL) Endorsement, as well as a Middle-Level Endorsement. Graduate endorsements are also available in Early Childhood Education, ESL, Reading, Gifted and Talented, and Middle-Level Education.

## Additional Information

For more information concerning requirements for University graduation and for basic professional teaching licensure in elementary education, early childhood education, and middle education, see major requirement sheets available from the Elementary Education Department Advisement Center, Emma Eccles Jones Education Building, Room 373.

## **Financial Support**

The following scholarships are available to junior and senior students: Ballam, Blair, Bowen, DeHart, Frye, Hales, Jackson, Kurzhals, McEvoy, Stewart, Taylor, Vest, and Young (see page 30). To be eligible, students must have completed Level II of the Elementary Education Program and have a cumulative GPA of 3.5 or higher. Applications are available from the Elementary Education Department and are due by February 1.

# **Graduate Programs**

## **Admission Requirements**

Students applying for admission to master's programs must have GRE scores at or above the 40th percentile. This same percentile is the minimum required on the MAT. For the doctorate degree, GRE scores at or above the 40th percentile are also required on the verbal and quantitative tests. Admission committees also consider experience, undergraduate record, curricula completed, and formal recommendations. One year of successful elementary school teaching experience is required for the master's program. Two years of teaching experience or the equivalent is required for admission to the doctoral program. Students with deficient oral or written English skills will be required to complete additional coursework to improve their skills.

Admission to graduate programs is contingent upon (1) completion of an application to graduate school and (2) recommendation by the department screening committee for the master's program or the management admissions committee for the doctoral program. In addition to the requirements of the School of Graduate Studies (see pages 72-73), letters of recommendation must be received from three professionals in education.

## **Degree Programs—On Campus**

Three avenues exist for on-campus students wishing to pursue a master's degree in the Department of Elementary Education at Utah State University. They are as follows:

**Master of Arts/Master of Science—Plan A.** Students planning to pursue a future doctoral degree or wishing to follow a traditional master's degree should complete a Master of Arts or Master of Science (Plan A) degree. This is a 36-credit program, including 6 credits for the thesis. Educ 6570 is required as a research course (rather than Educ 6550). A copy of the Program of Study form listing other required core and professional option courses is available from the department office. A committee chair and two committee members will work with students pursuing the Plan A master's degree. Plan A students should submit an Appointment for Examination form to their major professor, committee, and the Graduate School at least five working days before the final examination is to be held.

Requirements for the Master of Arts degree include two years of an acceptable foreign language or the equivalent, as determined by testing arranged by the supervisory committee and approved by the department and the graduate dean. One year each, or the equivalent, of two languages is acceptable if approved by the student's committee.

**Master of Education—Plan B.** Students wishing to include a creative project as part of their master's degree program should enroll in the Master of Education (Plan B) program. Three credits

will be given for EIED 6960, Master's Creative Project. All MEd students will complete Educ 6550 (Research for Classroom Teachers, 3 credits) and other courses listed on the current Program of Study form. A committee chair and two committee members will work with students completing the creative project; however, the chairperson will have major responsibility in approving the proposal and primarily work as the program advisor, with the committee members being involved more directly in the presentation of the creative project.

**Master of Education—Plan C.** In order to provide another option for prospective elementary education master's degree students, the Department of Elementary Education conducts a Plan C option within its Master of Education Degree. The basic elements of a Plan C option include completion of 40 credits of prior approved graduate courses, completion of an exit paper, and an oral review.

The exit paper should be a pre-planned scholarly activity. It could be a paper discussing coursework applicability to the student's teaching assignment, or a written plan for changing curriculum and/or instruction drawing on coursework and the student's role, etc. The intent is that the exit paper be an integral part of the planned course of study.

A notice of intent to complete the degree must be filed with the School of Graduate Studies *at the beginning of the last semester of coursework*. A letter of completion should be filed by the committee chairperson upon successful completion of all requirements.

## **Degree Programs—Off Campus**

Two avenues exist for students wishing to pursue a master's degree in the Department of Elementary Education at Utah State University primarily through offerings at USU Continuing Education centers. They are as follows.

**Master of Education—Plan B.** Off-campus students wishing to include a creative project as part of their master's degree program should enroll in the Master of Education Program. Three credits will be given for EIED 6960 (Master's Creative Project). All MEd students will complete the required core and other courses listed on the current Program of Study form. A committee chair and two committee members will work with students completing the creative project; however, the chairperson will have major responsibility in approving the proposal and primarily work as the program advisor, with the committee members being involved more directly in the presentation of the creative project (oral exam).

**Master of Education—Plan C.** In order to provide another option for prospective off-campus elementary education master's degree students, the Department of Elementary Education conducts a Plan C option within its Master of Education Degree. The basic elements of a Plan C option include completion of 40 credits or prior approved graduate courses, completion of an exit paper, and an oral review.

The exit paper should be a pre-planned scholarly activity. It could be a paper discussing coursework applicability to the student's teaching assignment, or a written plan for changing curriculum and/or instruction drawing on coursework and the student's role, etc. The intent is that the exit paper be an integral part of the planned course of study.

A notice of intent to complete the program should be filed by the student with the department and the School of Graduate Studies *at the beginning of the semester the candidate is to finish*

*the degree.* A letter of completion should be filed by the committee chairperson upon successful completion of all requirements.

### **Doctoral Programs (PhD and EdD)**

The department participates in the Interdepartmental Doctoral Program in Education, which includes the Doctor of Philosophy (PhD) and the Doctor of Education (EdD). For information about areas of specialization, emphasis of study, research sponsored, admission requirements, procedures to follow, and other information, see pages 211-212 of this catalog.

### **Additional Information**

All students completing master's degrees in Elementary Education must enroll for a minimum of 10 credits *on the USU campus*, except for students completing their degrees at the following USU continuing education centers: Uintah Basin Campus (Vernal and Roosevelt), Moab Center, Price Center, and Blanding Center.

The Program of Study form for the appropriate degree and plan described above should be approved by the committee and submitted to the School of Graduate Studies *at least two months prior to the oral exam, oral review, or presentation appropriate to that degree.*

After matriculation into the program, a master's degree must be completed within a six-year time period. Pass/fail grades will be accepted only for seminars, special problems, interdisciplinary workshops, thesis or dissertation research, and continuing graduate advisement. A maximum of 8 workshop credits may be included. Transfer credit accepted toward a degree is normally limited to 6 credits; however, with prior approval, 12 transfer credits may be accepted. A maximum of 15 credits taken during one summer may be counted toward the degree. A maximum of 12 credits taken before admission to the program may be counted toward the degree. All coursework in a student's area of specialization must be taken at the 6000 level or above, in order to be applied toward a graduate degree in the Department of Elementary Education. Coursework goes out-of-date after eight years.

Admission deadlines for students applying to graduate programs are: June 15 for fall semester, October 15 for spring semester, and March 15 for summer semester.

### **Research**

Cooperation with other departments and research centers at the University, as well as with public school and State Office of Education collaborators, permits strong graduate programs in all phases of elementary education. Research opportunities are available with the Edith Bowen Laboratory School, cooperating school districts in Utah and surrounding states, the Utah State Office of Education, and the United States Department of Education.

### **Financial Assistance**

Both departmental and School of Graduate Studies support are available for the regular academic program and are awarded on a competitive basis. Students requesting financial support should apply to the department by March 15. To be eligible for financial assistance, a student must attend USU full-time. No financial assistance is available for summer semester.

**Assistantships.** Teaching assistantships are available through the department. Some research assistantships are available through faculty members who have ongoing projects with off-campus funding agencies.

Students are not eligible for assistantships or any form of financial assistance from the University until all application procedures are completed and the student is formally admitted to a program of studies.

Acceptance to pursue graduate study does not guarantee the student financial assistance. Inasmuch as funds are limited, the assistantships are awarded by the department to cover specific teaching assignments and by the faculty to provide for research.

Doctoral students desiring information about financial assistance should write to: Coordinator, Doctoral Degrees, College of Education, 2800 Old Main Hill, Utah State University, Logan UT 84322-2800.

### **Career Opportunities**

**Positions in Higher Education—Master Teachers.** Many school districts support and encourage teachers to further their education and expertise by obtaining a master's degree. Added financial remuneration generally accompanies the completion of such a degree. Supervisors, curriculum specialists, and other professional careers are enhanced by completion of a master's degree.

Completion of a doctorate degree qualifies the graduate for a wide variety of careers, including positions in higher education, curriculum specialist positions in school districts and state offices of education, positions in educational agencies of the United States government, and educational specialist positions in business and industry.

## **Elementary Education Courses (EEd)**

**EEd 1000. Orientation to Elementary Education.** Level I. Students assess themselves as prospective teachers. Students will also have an opportunity to do observations in the public schools (grades K-8) and complete volunteer service in other community educational settings. (3 cr) (F,Sp,Su)

**EEd 3000 (CI). Foundation Studies and Practicum in Teaching and Classroom Management Level II.** Introduction to historical, philosophical, and social factors shaping contemporary educational practice in kindergarten, elementary, and middle school. Through these factors, students investigate various aspects of teaching and classroom management. Extensive practicum included. (6-8 cr) (F,Sp) ©

**EEd 3010. Practicum Remediation Level II.** Students work to develop defensible teaching ideas and to translate these ideas into practical experiences in elementary classroom settings. Specific arrangements for scheduling, placement with a cooperating teacher, and course requirements are handled by professors from the program level recommending remediation and the Elementary Education Advising Office. (2-4 cr) (F,Sp)

**EEd 3100. Teaching Reading I.** Focuses on variety of approaches to reading instruction and issues in reading curriculum development. Includes reading theories, stages of reading growth, and assessment practices. Prerequisite: Admission to teacher education. (3 cr) (F,Sp,Su) ©

**EIEd 4000. Teaching Science and Practicum Level III.** Investigation and practical application of science programs, materials, and techniques of instruction to the teaching of science. Prerequisites: Completion of Level II and Biol 1010 with a lab, or USU 1350; Phyx 1200 and Geol 1100 or their equivalents. (3 cr) (F,Sp,Su)

**EIEd 4010. Practicum Remediation Level III.** Students work to develop defensible teaching ideas and to translate these ideas into practical experiences in elementary classroom settings. Specific arrangements for scheduling, placement with a cooperating teacher, and course requirements are handled by professors from the program level recommending remediation and the Elementary Education Advising Office. (2-4 cr) (F,Sp)

**EIEd 4030 (CI). Teaching Language Arts and Practicum Level III.** Study of language development in children, and its implication and application in a practicum setting. Curriculum development, instructional methods, and evaluation in the content areas of listening, speaking, writing, and reading. (3 cr) (F,Sp,Su)

**EIEd 4040 (CI). Teaching Reading II and Practicum Level III.** Examines developmental, content, and recreational components of classroom reading programs, including teacher read-aloud, SSR, decoding, shared reading, uses of children's literature, content area reading, assessment, adaptive strategies, and parent involvement. Prerequisite: EIEd 3100. (3 cr) (F,Sp,Su)

**EIEd 4050. Teaching Social Studies and Practicum Level III.** Students develop necessary knowledge and skills to plan and implement an appropriate social studies program consistent with the nature of the child and our democratic society. Includes practicum work. Prerequisite: Admission to teacher education. (3 cr) (F,Sp,Su)

**EIEd 4060. Teaching Mathematics and Practicum Level III.** Relevant mathematics instruction in the elementary and middle-level curriculum; methods of instruction, evaluation, remediation, and enrichment. Prerequisite: Admission to teacher education. (3 cr) (F,Sp,Su)

**EIEd 4250. Advanced Cooperative Work Experience.** Advanced or middle level career-related experience designed to integrate classroom study with practical work experience. Students must work a minimum of 75 hours per credit hour. (1-8 cr) (F,Sp,Su) ®

**EIEd 4410. Gifted Education in the Regular Classroom.** Introduction to characteristics of gifted learners. Exploration of strategies for challenging gifted learners in regular classroom settings. (3 cr) (F)

**EIEd 4420. Multiple Talent Approach to Thinking.** Explores one model for the teaching of creative and critical thinking embedded in regular curricula. Includes practical application requirements. (2 cr) (Sp)

**EIEd 4480. Early Childhood Education Kindergarten through Grade 3.** Study of early childhood (K-3) curriculum, methodology, and learning environments. (3 cr) (Sp)

**EIEd 4600 (d6600).<sup>1</sup> Philosophy and Organization of the Middle Level School.** Focuses on characteristics of young adolescents and how middle level schools can be organized to meet those characteristics through interdisciplinary teaming, advisory programs, and exploratory mini-courses. Taught summer of odd-numbered years. Also taught as ScEd 4600/6600. (3 cr) (F,Su)

**EIEd 4610 (d6610). Curriculum, Methods, and Assessment for the Middle Grades.** Integrates current approaches to curriculum design with instructional models and assessment of learning appropriate for grades 5-9. Taught summer of even-numbered years. Also taught as ScEd 4610/6610. (3 cr) (Sp,Su)

**EIEd 4620 (d6620). Service Learning Applications for the Middle Grades.** Examines literature related to service learning for the middle grades. Application of service learning in curriculum. Also taught as ScEd 4620/6620. (3 cr) (Su)

**EIEd 4710. Diversity in Education.** Provides educators with background and techniques for more effectively addressing the needs of students in a culturally and lin-

guistically diverse society. Diversity topics also include religion, socioeconomic class, ability differences, gender, and sexual orientation. Also taught as ScEd 4710. (3 cr) (F,Sp)

**EIEd 4760 (d6760). ESOL Instructional Strategies.** Includes principles and techniques for promoting oral language, reading, and writing development for K-12 English language learners. Explores language acquisition theory, classroom organization, teaching strategies, and parental involvement for effective English language instruction. Also taught as ScEd 4760/6760. (3 cr) (F,Sp)

**EIEd 4770 (d6770). ESOL Instructional Strategies in the Content Areas.** Focuses on strategies which help language-minority students in content-area classrooms to increase academic learning. Includes methods for increased integration of language learners into the larger school community. Discussion of parental involvement. Also taught as ScEd 4770/6770. (3 cr) (Su)

**EIEd 4780 (d6780). Assessment for Language Learners.** Explores principles and techniques for developing, analyzing, and interpreting assessment measures for language learners, including oral, writing, reading, and content-area assessment. Examines assessment requirements for public schools, intensive language programs, and higher education. Also taught as ScEd 4780/6780. (3 cr) (Su)

**EIEd 4900. Senior Project.** All honors students are required to submit a senior project for graduation from the Honors Program. Students work with a departmental advisor on a topic of their choice. (1-5 cr) (F,Sp) ®

**EIEd 4970. Senior Thesis.** An in-depth paper or project culminating in a formal presentation. Required of all students for graduation from the Honors Program in Elementary Education. (1-5 cr) (F,Sp) ®

**EIEd 5000 (d6000). Practicum in Improvement of Instruction.** Open topics course focusing upon effective teaching methods, teaching performance, curriculum decision-making, and characteristics of learners. Also taught as ScEd 5000/6000. (1-6 cr) (F,Sp,Su) ®

**EIEd 5050. Student Teaching—Kindergarten.** Constitutes 6 semester credit hours of student teaching in a kindergarten classroom. Student teachers need to demonstrate competency and professionalism in teaching. An understanding of developmentally appropriate curriculum is necessary. (3-6 cr) (F,Sp)

**EIEd 5100. Student Teaching—Primary Grades (1-3).** Constitutes 6 semester credit hours of student teaching in a primary grade (1-3). Student teachers will demonstrate competency in designing and implementing a developmentally appropriate learning environment. (6 cr) (F,Sp)

**EIEd 5150. Student Teaching—Elementary (Grades 4-6).** Constitutes 6 semester credit hours of student teaching at the upper elementary grade level. Student teachers need to demonstrate competency and professionalism in teaching. Students begin their transition from university student to professional teacher. (6 cr) (F,Sp)

**EIEd 5200. Student Teaching—Middle Level (Grades 7-8).** Constitutes 6 semester credits of student teaching at the middle school level. Student teachers need to demonstrate competency and professionalism in teaching. Students begin their transition from university student to professional teacher. (6 cr) (F,Sp)

**EIEd 5250. Student Teaching—Seminar.** Designed to provide student teachers/interns with teaching skills and strategies that will assist them in the classroom. Accompanies one of EIEd 5050, 5100, 5150, or 5200. Course content is implemented into the student teaching experience. (3 cr) (F,Sp)

**EIEd 5300. Associate Teaching—Level V.** Designed to allow students who have completed student teaching to extend their teaching time in a classroom. In order to better prepare for their own classroom, students continue to develop individual teaching skills and competencies. (3-6 cr) (F,Sp)

**EIEd 5900. Independent Study.** (0.5-2 cr) (F,Sp,Su) ®

**EIEd 6000 (d5000). Practicum in Improvement of Instruction.** Open topics course focusing upon effective teaching methods, teaching performance, curriculum decision-making, and characteristics of learners. Also taught as ScEd 6000/5000. (1-6 cr) (F,Sp,Su) ®

**EIEd 6020 (d7020). Foundations and Change in Early Childhood Education.** Survey course designed to acquaint professionals with historical and philosophical foundations of early childhood education, leading to examination of contemporary trends and issues. (3 cr) (F)

**EIEd 6040. Designing and Interpreting Measurements for Assessing Student Learning.** Teachers and instructional supervisors develop their talents for (a) designing and interpreting measurements for monitoring students' learning and (b) interpreting scores from standardized and government-mandated tests. Also taught as ScEd 6040. (3 cr) (F,Su)

**EIEd 6100. Motivation and Management in Inclusive Settings.** Leads in-service teachers to develop classroom management strategies for gaining and maintaining students' cooperation. Also taught as ScEd 6100. (3 cr) (Sp,Su)

**EIEd 6150. Foundations of Curriculum.** Examination of theories, principles, and foundations of curriculum, emphasizing program planning and current curriculum trends. Also taught as ScEd 6150. (3 cr) (F,Su)

**EIEd 6190. Theories of Teaching and Learning.** Demonstration, analysis, and evaluation of various models of teaching, emphasizing research-based principles of learning. Also taught as ScEd 6190. (3 cr) (Sp,Su)

**EIEd 6200. Curriculum and Issues in Early Childhood Education.** Examination of current issues and research topics in early childhood education important to the improvement of K-3 programs. (2 cr) (F)

**EIEd 6220. Workshop in Early Childhood Education.** Exploration of current topics important in teaching young children. (1-6 cr) (Su)

**EIEd 6230. Literacy Learning in Early Childhood.** Investigation of early literacy development and effective classroom practices in kindergarten and the primary grades. Relevant research is examined. (3 cr) (Sp,Su)

**EIEd 6240. Workshop in Science Education.** Exploration of current topics in science education. (1-6 cr) (Su) ®

**EIEd 6250. Graduate Cooperative Work Experience.** Cooperative education work experience at a professional level. Prior approval required. (1-10 cr) (F,Sp,Su) ®

**EIEd 6260. Supervised Practicum in Early Childhood Education.** Encompasses approximately 125 hours of supervised practicum in a kindergarten classroom and observations in prekindergarten settings. Participants demonstrate their ability to integrate and apply early childhood theory and research in kindergarten. (2 cr)

**EIEd 6300. Workshop in Mathematics Education.** Exploration of current topics and methods in mathematics education. In the past, topics have included: relevant mathematics in rural settings, integration of mathematics and children's literature, and ethnomathematics. (1-6 cr) (Su) ®

**EIEd 6310. Content Area Reading and Writing.** Practical approaches for teaching reading/writing and learning skills to elementary, middle, and high school students in all content areas. Also taught as ScEd 6310. (3 cr) (Su)

**EIEd 6320 (d7320). Literacy and Cognition.** Examination of cognitive and sociocultural research related to K-12 students' acquisition and use of reading, writing, and learning strategies. Explores implications for school policies and classroom instruction. Also taught as ScEd 6320/7320. (3 cr) (Sp)

**EIEd 6330. Utah Writing Project.** Workshop, seminar, and institute experiences in the Utah Writing Project, focusing on writing process, principles, and research-based

strategies for improving writing instruction in grades K-12. Also taught as ScEd 6330. (1-6 cr) (Su)

**EIEd 6340. Issues and Trends in Literacy.** Exploration of current issues and instructional trends in the teaching of reading and writing. Emphasis on reading widely and critically in the professional literature. Prerequisites: EIEd 3100, 4040; or teaching experience in elementary or middle school. Also taught as ScEd 6340. (2 cr) (F,Su) ®

**EIEd 6350. Reading Assessment and Diagnosis.** Covers the correlates and diagnosis of reading problems, as well as methods and materials for remedial reading instruction. Prerequisites: EIEd 3100, 4040; or teaching experience in elementary, middle, or secondary school. Also taught as ScEd 6350. (3 cr) (Sp)

**EIEd 6360. Reading Improvement and Remediation.** Designed to help classroom teachers update and enhance components of their reading instruction and assessment. Emphasizes development of balanced and comprehensive reading instruction program. Prerequisites: EIEd 3100, 4040; or teaching experience in elementary or middle school. Also taught as ScEd 6360. (3 cr) (Su)

**EIEd 6370. Supervised Internship in Reading and Writing.** Individual practicum experience designed to allow graduate students to implement and focus on one or more aspects of reading and writing instruction in a classroom or clinical setting. Prerequisite: Consent of instructor. Also taught as ScEd 6370. (1-3 cr)

**EIEd 6380. Improvement of Language Arts Instruction.** Exploration of current topics and instructional practices in elementary language arts. Prerequisite: EIEd/ScEd 6310 or 6360. (3 cr) (F)

**EIEd 6390. Teaching with Tradebooks in the Elementary and Middle Level Classroom.** Explores the use of trade books in the elementary and middle level classroom. Focuses on how teachers can use various genres to invite children to read and write. Prerequisites: EIEd/ScEd 6310 or 6360. Also taught as ScEd 6390. (3 cr) (Su)

**EIEd 6400. Multiple Talent Approach to Teaching.** Explores one model for embedding the teaching of creative and critical thinking in regular curricula. Includes practical application requirements. Also taught as ScEd 6400. (2 cr) (Su)

**\*EIEd 6420. Education of Gifted and Talented Learners.** Provides multiple cultural and historical perspectives on giftedness and talent. Explores characteristics of gifted individuals, with emphasis on identifying needs. Provides general overview of possible services for gifted learners. Must be taken concurrently with EIEd/ScEd 6430. Also taught as ScEd 6420. (2 cr) (F)

**\*EIEd 6430. Practicum: Individual Case Study.** Practicum experience in association with EIEd/ScEd 6420. Requires intensive supervised study of gifts and talents of individual child of student's choice. Must be taken concurrently with EIEd/ScEd 6420. Also taught as ScEd 6430. (1 cr) (F)

**EIEd 6440. Creativity in Education.** Exploration of theories, research, and strategies concerning creativity, and their application to personal creativity and to improvement of classroom practice. Also taught as ScEd 6440. (2 cr) (Su)

**\*EIEd 6460. Identification and Evaluation in Gifted Education.** Provides educators with theory and models for identifying students as gifted, creative, and talented. Presents models for evaluation of programs for gifted learners. Explores instruments for use in identification and evaluation. Must be taken concurrently with EIEd/ScEd 6470. Also taught as ScEd 6460. (2 cr) (Sp)

**\*EIEd 6470. Practicum: Team Consultation.** Practicum experience in association with EIEd/ScEd 6460. Requires participation, as part of a consultative team, to improve practice in an approved setting for a specific child, classroom, school, school district, or other educational entity. Must be taken concurrently with EIEd/ScEd 6460. Also taught as ScEd 6470. (1 cr) (Sp)

**\*\*EIEd 6480. Methods and Materials in Gifted Education.** Explores programming and curriculum models in gifted education, with special attention to the development of instructional materials for use with students. Must be taken concurrently with EIEd/ScEd 6490. Also taught as ScEd 6480. (2 cr) (F)

**\*\*EIEd 6490. Practicum: Classroom Applications.** Practicum experience in association with EIEd/ScEd 6480. Requires application of at least three curriculum, cognitive, or affective models in the student's current teaching assignment. Must be taken concurrently with EIEd/ScEd 6480. Also taught as ScEd 6490. (1 cr) (F)

**EIEd 6500. Interdisciplinary Workshop.** (1-2 cr) (F,Sp,Su) ®

**EIEd 6550. Practicum in the Evaluation of Instruction.** Field-based research study contributing toward graduate degrees. Supervisory licensure related to assessment of ongoing or newly proposed program of instruction. (1-4 cr) (F,Sp,Su) ®

**EIEd 6560. Practicum in Improvement of Instruction.** Field-based program focusing upon characteristics of effective teaching methodologies, teaching performance, curriculum decision making, value guidelines, and the characteristics of the learner. (1-4 cr) (F,Sp,Su) ®

**EIEd 6570. Advanced Comprehension.** Designed to enhance teachers' understanding of research and practice related to teaching vocabulary and reading comprehension and fostering motivation for reading. Prerequisite: EIEd/ScEd 6310 or 6360. Also taught as ScEd 6570. (3 cr) (Alt years)

**EIEd 6580. Character and Values Education.** Overview of research, theory, and practical approaches to values education, emphasizing processes of moral development and socialization. Also taught as ScEd 6580. (2 cr) (Su)

**EIEd 6590. Supervising School Reading Program.** Examines strategies for improving school reading programs. Emphasizes simulations, guided practice, and small group discussions. Prerequisites: EIEd/ScEd 6350 and 6360. Also taught as ScEd 6590. (2 cr) (Sp)

**EIEd 6600 (d4600). Philosophy and Organization of the Middle Level School.** Focuses on characteristics of young adolescents and how middle level schools can be organized to meet those characteristics through interdisciplinary teaming, advisory programs, and exploratory mini-courses. Graduate students have additional course requirements for design and implementation of a project. Taught summer of odd-numbered years. Also taught as ScEd 6600/4600. (3 cr) (F,Su)

**EIEd 6610 (d4610). Curriculum, Methods, and Assessment for the Middle Grades.** Integrates current approaches to curriculum design with instructional models and assessment of learning appropriate for grades 5-9. To receive credit for 6610, graduate students design and implement an action research project related to curricular or pedagogical interests, then share their findings in class. Project will include review of literature related to student's interest. Prerequisite: EIEd/ScEd 6600. Taught summer of even-numbered years. Also taught as ScEd 6610/4610. (3 cr) (Sp,Su)

**EIEd 6620 (d4620). Service Learning Applications for the Middle Grades.** Examines literature related to service learning for the middle grades. Application of service learning in curriculum. Also taught as ScEd 6620/4620. (3 cr) (Su)

**EIEd 6700. Improvement of Science Instruction.** For practicing classroom teachers. Considers a Science/Technology/Society approach to curriculum and instruction in science in the elementary school. Prerequisite: EIEd 4000 or teaching experience in elementary or middle school. (2 cr) (F,Su)

**EIEd 6720. Practicum in Science Instruction.** Optional practicum to be taken semester following enrollment in EIEd 6700. (1 cr) (F,Sp)

**EIEd 6750. Improvement of Mathematics Instruction.** Examines advanced concepts in curriculum theory and methods of teaching mathematics in the elementary and middle school. Prerequisite: EIEd 4060 or teaching experience in elementary or middle school. (2 cr) (Sp)

**EIEd 6760 (d4760). ESOL Instructional Strategies.** Includes principles and techniques for promoting oral language, reading, and writing development for K-12 English language learners. Explores language acquisition theory, classroom organization, teaching strategies, and parental involvement for effective English language instruction. Also taught as ScEd 6760/4760. (3 cr) (F,Sp)

**EIEd 6770 (d4770). ESOL Instructional Strategies in the Content Areas.** Focuses on strategies which help language-minority students in content-area classrooms to increase academic learning. Includes methods for increased integration of language learners into the larger school community. Discussion of parental involvement. Also taught as ScEd 6770/4770. (3 cr) (Su)

**EIEd 6780 (d4780). Assessment for Language Learners.** Explores principles and techniques for developing, analyzing, and interpreting assessment measures for language learners, including oral, writing, reading, and content-area assessment. Examines assessment requirements for public schools, intensive language programs, and higher education. Also taught as ScEd 6780/4780. (3 cr) (Su)

**EIEd 6800. Improvement of Social Studies Instruction.** Emphasizes study of newer concepts in curriculum and methods of instruction for elementary social studies programs. Designed for experienced teachers. Prerequisite: EIEd 4050 or teaching experience in elementary or middle school. (3 cr)

**EIEd 6840. Workshop: Intermountain Conference on Education of the Gifted and Talented.** Provides instruction by leading national authorities in gifted and talented education, as well as networking with educators of the gifted from throughout the Intermountain West. Also taught as ScEd 6840. (1-2 cr) (Su) ®

**EIEd 6900. Independent Study.** (0.5-3 cr) (F,Sp,Su) ®

**EIEd 6910. Independent Research.** (0.5-3 cr) (F,Sp,Su) ®

**EIEd 6940. Supervision and Administration Internship.** Provides experience in supervision and administration in school systems. (3 cr) (F,Sp,Su)

**EIEd 6960. Master's Creative Project.** Provides students with opportunity to design and carry out a creative project closely related to area of teaching specialty. Requires written report. (3 cr) (F,Sp,Su) ®

**EIEd 6970. Thesis.** Master's level research and thesis writing with guidance and criticism. (1-9 cr) (F,Sp,Su) ®

**EIEd 6990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

**EIEd 7020 (d6020). Foundations and Change in Early Childhood Education.** Survey course designed to acquaint professionals with historical and philosophical foundations of early childhood education, leading to examination of contemporary trends and issues. (3 cr) (F)

**EIEd 7050. Internship in Program Evaluation.** Experience in practical aspects of program evaluation through planned, supervised evaluation project participation approved by student's supervisory committee. (1-4 cr) (F,Sp,Su) ®

**EIEd 7060. Internship in Research.** Experience in conducting research through planned, supervised research project participation approved by student's supervisory committee. (1-4 cr) (F,Sp,Su) ®

**EIEd 7120. Student Teaching Supervision.** Considers ways and means of providing desirable experiences for student teachers in the public schools. Analysis of roles of classroom teacher and college supervisor. (1-3 cr) (F,Sp) ®

**EIEd 7320 (d6320). Literacy and Cognition.** Examination of cognitive and sociocultural research related to K-12 students' acquisition and use of reading, writing, and learning strategies. Explores implications for school policies and classroom instruction. Also taught as ScEd 7320/6320. (3 cr) (Sp)

**EIEd 7330. Supervision Internship.** Provides extensive supervisory experience for doctoral students. Internship is for period of time to be specified by department and cooperating agency. (2-9 cr) (F,Sp,Su) ®

**EIEd 7350. Internship in Curriculum Development.** Internship with recognized leaders in the development, implementation, and evaluation of curricular programs and activities at early childhood, elementary, and/or middle education levels. (1-4 cr) (F,Sp,Su) ®

**EIEd 7500. Interdisciplinary Workshop.** (1-2 cr) (F,Sp,Su) ®

**EIEd 7550. Evaluation of Supervisory Performance.** Program for graduate students to become acquainted with and demonstrate competency in supervision. (1-4 cr) (F,Sp,Su) ®

**EIEd 7810. Research Seminar.** Identification of research problem, consideration of research strategies and methods, application of research and statistical concepts in departmental focus, and interaction with faculty. (1 cr) (F,Sp,Su) ®

**EIEd 7900. Independent Study.** (0.5-3 cr) (F,Sp,Su) ®

**EIEd 7910. Independent Research.** (0.5-3 cr) (F,Sp,Su) ®

**EIEd 7970. Dissertation.** Individual work on research problems in PhD or EdD program. Emphasizes writing and editorial techniques. (1-9 cr) (F,Sp,Su) ®

**EIEd 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

*Department of*  
***English***

*College of Humanities, Arts and Social Sciences*

**Head: Professor Jeffrey Smitten**, eighteenth century British literature, Scottish literature, literary theory and criticism  
 Office in Ray B. West 201, (435) 797-2733

**Associate Head: Professor Christine Hult**, composition and rhetoric, teacher education  
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**Director, Graduate Studies: Associate Professor Keith A. Grant-Davie**, composition and rhetoric, reading theory, technical communication  
 Office in Ray B. West 310, (435) 797-3547

**Director, Undergraduate Studies: Assistant Professor Kathryn R. Fitzgerald**, teacher education, composition and rhetoric  
 Office in Ray B. West 204F, (435) 797-0235

**Director, Undergraduate American Studies Program: Associate Professor Paul J. Crumbley**, American poetry, nineteenth century American women writers, American identity, the wilderness experience  
 Office in Ray B. West 412C, (435) 797-3860

**Director, Folklore Program: Professor Barre Toelken**, folklore, Native American studies, medieval literature  
 Office in Merrill Library 104B, (435) 797-2728

**English Undergraduate Advisor: Jana Kay Lunstad**  
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**American Studies Graduate Advisor: Professor Melody Graulich**, American Literature, American Studies, Western American literature, feminist studies  
 Office in Ray B. West 211B, (435) 797-3855

**American Studies Undergraduate Advisor: Jana Kay Lunstad**, Project Manager, American Studies  
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**Director, Writing Program: Associate Professor Lynn L. Meeks**, teacher education, composition and rhetoric, literature for children and young adults  
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**Professors Jay Anderson**, folklife, material culture, folk art; **Thomas L. Kent**, rhetoric and composition (Dean, School of Graduate Studies); **Joyce Kinkead**, composition and rhetoric (Vice Provost for Undergraduate Studies and Research); **Professors Emeritus Jan Bakker**, nineteenth- and early twentieth-century American literature; **Kenneth W. Brewer**, poetry and essay writing; **Associate Professors Evelyn I. Funda**, American literature, Western American literature; **Patricia Gantt**, teacher education, young adult literature, American studies; **David E. Hailey, Jr.**, technical communication, online information, CBT technology; **Phebe Jensen**, sixteenth- and seventeenth-century British literature, Shakespeare; **Sonia Manuel-Dupont**, linguistics, technical communication, teacher education; **Brian W. McCuskey**, nineteenth-century British literature; **John E. McLaughlin**, linguistics, technical communication, Native American languages; **Jan E. Roush**, American Studies, folklore; **Anne Shifrer**, twentieth-century literature, women writers, poetry, literary theory and criticism; **Ronald R.**

*Shook*, technical communication, linguistics; *Stephen C. Siporin*, folklore, folk narrative, material culture, folk ethnicity; *Jeannie B. Thomas*, folklore, legend, oral narrative, humor and gender; *Charlotte Thralls*, professional communication, workplace culture; **Associate Professors Emeritus** *Kate M. Begnal*, twentieth-century literature, postmodernism, literary theory and criticism; *Patricia Gardner*, world literature, children's and young adult literature, folklore; **Assistant Professors** *Kelli Cargile Cook*, technical communication; *Brock Dethier*, composition, creative writing; *Kristine A. Miller*, twentieth-century British literature; *Jennifer Sinor*, rhetoric and composition, teacher education; *Roberta S. Stearman*, American literature, fiction writing; *Andrea Tinnemeyer*, American literature; *Nancy Warren*, Old and Middle English literature; *Mark Zachry*, rhetoric and professional communication; **Senior Lecturer** *Nancy O'Rourke*, technical communication; **Lecturer** *Marina L. Hall*, American literature, composition

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), and Master of Arts (MA) in English; BS, BA, MS, and MA in American Studies

**Undergraduate emphases:** *BS, BA in English*—Literary Studies, Professional and Technical Writing, and English Teaching; **Graduate specializations:** *MS, MA in English*—Literary Studies, Technical Writing, Theory and Practice of Writing; *MS, MA in American Studies*—Folklore, Public Sector Folklore, and Standard Program

## Undergraduate Programs

### General Objectives

The undergraduate programs in English encourage students to gain an appreciation of language and literature through reading, analysis, and writing as a means of enriching their lives as individuals, citizens and professionals. Through a variety of courses in literature, writing, and linguistics, students develop an awareness of these subjects in their personal and cultural contexts, a heightened sensitivity to human experience, and a capacity to adapt to a world of continually changing values and centers of conflict. Students majoring in English thus acquire communicative, analytical, and interpretive skills that help prepare them for a wide range of careers.

After completing a set of core requirements, students in English fulfill the requirements in one of three emphases: (1) the **Literary Studies** emphasis, which gives students a knowledge of the texts and writers of American, British, and world literature and their cultural contexts; (2) the **Professional and Technical Writing** emphasis, which prepares students for various writing careers in professional organizations; and (3) the **English Teaching** emphasis, which prepares students for teaching secondary-level English in the public school system.

The English Department offers a Folklore minor and an interdisciplinary American Studies major and minor. It also offers an English Teaching Minor, an English Minor (Standard Nonteaching), and a minor in British and Commonwealth Studies.

The English Department also offers specific courses supporting other fields of specialization, courses fulfilling University Studies requirements, and enriching educational experiences through opportunities for creativity and expression enhancing life-time activities.

### Admission and Graduation Requirements

The requirements for admission and graduation are commensurate with those described on pages 48-63 of this catalog. To remain in good standing and to obtain approval for graduation as English majors or minors, students must maintain a minimum grade point average of 2.75 in their major and minor courses.

All courses listed as major or minor subject courses must be taken on an *A-B-C-D-F* basis, and major or minor subject courses passed with less than a *C* grade must be repeated. Transfer students are required to complete at least 15 semester credits of major subject courses and 10 semester credits of minor subject courses in residence at USU.

Students in the English Teaching major and minor may also apply to the Secondary Teacher Education Program (STEP). See pages 418-419 for procedures and requirements pertaining to teacher licensure and admission requirements. See also the current edition of the *Guide to the Undergraduate Program in Secondary Education at USU*, available at the USU Bookstore.

### Course Requirements

**Core and Survey Requirements.** All English majors are required to complete the following courses as soon as possible before enrolling in upper-division courses: Engl 1110 (an orientation course); and three of the 2000-level literature survey courses. Exceptions are noted below under emphasis requirements.

**Literary Studies Emphasis.** This 49-credit emphasis is devoted to the study of literature. Its fundamental premise is that literature is a field of diverse representations that gives shape and meaning to human experience.

Students first complete three of the 2000-level survey courses, Engl 2140, 2150, 2160, and 2170, that provide a traditional overview of the major periods, authors, and genres of American and British literature. At the same time, students take an introductory course on literary theory, Engl 2100, which, in addition to introducing them to the methodologies of literary criticism, challenges received notions about the canon and literary history.

At the 3000 and 4000 levels, students closely examine the conventions and principles forming the more traditional survey courses. Students select 9 credits from Engl 3300, 3310, and 3320; complete Engl 4300 (Shakespeare); select 3 credits from Engl 4310, 4320, and 4330; and select 6 credits from Engl 4340, 4350, 4360, and 4370. Focusing on specific literary periods, authors, and genres, these courses invite students to think critically about how literature is constructed and organized as a field of knowledge. They also take a linguistics course (Engl 4200 or 4210), in which they study the structure and history of the English language.

At the 5000 level, students pursue advanced study of literature in relation to issues of gender and sexuality, regional and national boundaries, and cultural differences. These courses provide the advanced theoretical tools necessary to analyze the relationship between literature and culture (6 credits from Engl 5300, 5320, and 5340). These courses insist that literary texts both exist within and depend upon a complex network of other cultural representations. Students also select one elective course in authors or genres from Engl courses numbered 4300 through 4370.

The final course, a senior capstone seminar (Engl 5350), encourages graduating students to both synthesize and critique their differing educational experiences within the program.

**Professional and Technical Writing Emphasis.** This 49-credit emphasis prepares students for career opportunities in various writing-related careers in professional organizations. The emphasis consists of: (1) a theoretical foundation in rhetoric and linguistics, enabling students to assess any writing situation and adapt their writing to the context as audience-aware writers; and (2) writing practice in a variety of contexts using the most up-to-date tools of technology, so that students know how to write and why they are writing, thus preparing them for the ever-changing job markets of the twenty-first century.

Students begin their studies by completing one literature survey course (Engl 2140, 2150, 2160, or 2170) and two introductory professional writing courses (Engl 3400 and 3410) introducing students to the profession of writing and the current technologies used in all levels of text production. At the same time, students also take two courses (chosen from Engl 3450, 3460, and 5490) addressing rhetorical issues and strategies in the perception, reading, and writing of texts, and two courses in linguistics (chosen from Engl 4200, 4210, 4230, and 5210) acquainting students with the structure and diversity of the English language.

In addition, all Professional and Technical Writing students must take Engl 1120, Elements of Grammar, or pass the challenge exam offered by the Writing Center. Prerequisites for applications courses and internships must be passed with a grade of *B-* or higher.

Students then take courses in professional editing (Engl 4400), document design and graphics (Engl 4410), interactive media (Engl 5410), and publication production and management (Engl 5420). Along with these, students may also take courses in creative writing (Engl 3420, 3430, and 3440), as well as with more specific forms of writing, such as proposals, newsletters, and computer documentation (Engl 5400). Internships (Engl 4900) provide students with an opportunity to learn through hands-on experiences in a variety of organizations. Students complete the program by taking a capstone course (Engl 5430), in which they prepare portfolios, explore professional opportunities, and prepare to begin their careers.

**English Teaching Emphasis.** This 52-credit emphasis, leading to professional licensure in the teaching of secondary-level English, prepares prospective English teachers to participate actively in the many communities related to the profession. Students become well-versed in their academic subject matter (language, writing, literature, and multimedia), skilled in the methods of teaching the various components of the English curricula and in classroom management techniques, and committed to the achievement of students regardless of gender, race, or ethnic, religious, or socioeconomic background.

Students first complete 9 credits of literature survey courses selected from Engl 2140, 2150, 2160, and 2170 and 3 credits of literary theory (Engl 2100) to acquire a broad understanding of the traditional literary canon and the current theoretical foundations of English studies. They must also take Engl 1120, Elements of Grammar, or pass the challenge exam offered by the Writing Center. They then take Engl 3520, 4200, and 4220, which address the current understandings of the diversity of American language and culture as it impacts the English classroom. Students take courses in young adult literature (Engl 3510), Shakespeare (Engl 4300), and 15 more credits of upper-division literature and writing courses to become familiar with the spectrum of theoretical, ideological, and scholarly issues at stake in English studies today. To become familiar with the art of teaching the many components of the English curriculum, students take two pedagogical courses (Engl 4500 and 4510), which approach reading and writing as interdependent aspects of communication. If students wish to obtain professional licensure at graduation, they must fulfill the requirements of the 35-credit Secondary Teacher Education Program (STEP) prescribed by the Department of Secondary Education.

**American Studies Major.** Many important problems associated with the origin, evolution, and destiny of our culture transcend the boundaries of traditional subject areas. The American Studies major is an interdepartmental program providing students with the opportunity to integrate studies in various fields into a broad understanding of American culture and its antecedents. Because of its interdisciplinary nature, students have maximum freedom to pursue academic interests focusing on American culture by permitting them to choose areas of concentration and relevant courses from a variety of participating departments. The program's administration resides in the English Department and is supervised by The American Studies Committee, comprised of representatives from participating departments.

For admission and graduation, students must have and maintain a minimum grade point average of 2.75. All courses used to fulfill the major and minor requirements must be taken on an *A-B-C-D-F* basis, and major or minor subject courses passed with less than a *C* grade must be repeated. However, up to 3 credits of internship credit, which is recorded as *P/F*, may be used to fulfill the major requirements. Transfer students are required to take at least 15 credits of major subject courses and 10 credits of minor subject courses in residence at USU.

Students in American Studies have the option of pursuing either a Composite major of 51 credits, which provides a greater depth and breadth of understanding of American culture, or a Standard major of 33 credits, which also requires students to fulfill the requirements of an approved minor. Students must take 9 credits of coursework that will provide an appropriate foundation for further study in their selected clusters, of which 6 credits may be completed in lower-division courses. Students must also complete a 3-credit advanced seminar during their junior year (Engl 4620), and a 3-credit course involving a senior project (Engl 4690).

In addition, all American Studies majors and minors plan courses of study drawing on six interdisciplinary course clusters: (1) American Institutions and Ideas, (2) American Art and Literature, (3) American Culture and Diversity, (4) American Folklore, (5) Nature and the Environment, and (6) Studies in the American West. Students in the 51-credit Composite major must complete a minimum of 36 credits from among these clusters. Students in the 33-credit Standard major must take a minimum of 18 credits from the clusters. Students in both majors may substitute a 3-credit internship for one of the cluster courses.

**American Studies Minor.** American Studies minors must meet and maintain a 2.75 GPA admissions and graduation standard, complete the portfolio requirement, and complete the following 18-credit requirement. Students are required to complete 6 credits in foundations courses, 9 credits of courses drawn from the six interdisciplinary course clusters listed under the American Studies major, and the junior-level advanced seminar (Engl/Hist 4620). For the 9 cluster credits, at least 6 credits must be from one cluster, and two clusters must be represented. The courses of study must be approved by the American Studies advisor (Ray B. West 206A) at least one year in advance of graduation.

**English Teaching Minor.** English Teaching minor students must meet and maintain a 2.75 GPA for admission and graduation and complete the following 27-credit requirement: Engl 2140 or 2150; Engl 2160 or 2170; Engl 3510, 3520, 4200, 4220, 4300, 4500, 4510. Any deviation from this plan must have the approval of the English Department's Director of Undergraduate Studies (Ray B. West 204F).

**English Minor (Standard Nonteaching).** The standard nonteaching minor consists of 18 credits of various courses, 12 of which must be in upper-division coursework. Nine of the 18 credits must be earned in residence at USU. Advanced Placement and CLEP credit and credit from Engl 1010 and 2010 may **not** be counted toward this minor. The program must be approved by the Director of Undergraduate Studies at least one year prior to graduation.

**British and Commonwealth Studies Minor.** The 18-credit minor in British and Commonwealth Studies is an interdisciplinary program sponsored by the departments of English and History. Students must complete Engl/Hist 2040, then select four appropriate courses from an approved list, and conclude with Engl 5920 or Hist 4930, in which they complete an individual project concerning Britain and/or the Commonwealth. The program selected must be approved by the chair of the British and Commonwealth Studies Program at least one year prior to graduation. **Note:** Courses used to fulfill requirements for the English or History majors may **not** be used for this minor. For further information, contact either the English Department or the History Department.

### ***Additional Information and Updates***

English programs are constantly being updated. Students should therefore confer with the Director of Undergraduate Studies (Ray B. West 204F) or undergradutate advisor (Ray B. West 204E), or the American Studies advisor (Ray B. West 204E) for information about changes in requirements, scheduling, and sequencing of courses. Current requirement sheets are also available from the English Department (Ray B. West 201) and in the Science/HASS Advising Center (Student Center 302). Degree program information is also available at the department's website.

### ***Financial Support and Scholarships***

Scholarships, assistantships, grants-in-aid, and work-study programs are available through the University. In addition, the English Department employs a few students as tutors in The Writing Center and oversees various cooperative education and internship opportunities for students. Departmental scholarships are available on a competitive basis to juniors and seniors, as well as to some sophomores. Applications are accepted in January and February and are available in the college dean's office, Main 338.

## ***Graduate Programs***

### ***Admission Requirements***

In addition to the requirements specified on pages 72-73 (Admission Procedures), applicants for admission to the English Department graduate programs should have a BS or BA degree with an undergraduate major in a subject area relevant to the graduate program they desire to enter. The English Department accepts the Miller Analogies Test in place of the GRE general test, but encourages applicants to take the GRE. The department also requires a 5-10 page writing sample appropriate to the program the applicant desires to enter. The Technical Writing program has additional requirements; see <http://techcomm.usu.edu>.

International applicants from non-English-speaking countries who desire an MS or MA degree in English should have a BS or BA degree in English from an accredited, English-speaking university. Students whose command of written English is not adequate to the demands of writing a graduate thesis in English may be required to take courses in Intensive English or may be counseled to obtain a second bachelor's degree at USU (30 credits minimum).

The annual application deadline is January 15 for those who wish to be considered for a graduate instructor position, a Moyle Q. Rice Scholarship, or other form of financial aid. The final annual deadline is June 1 for all other applicants who wish to begin their course of study fall semester. Late applications will be considered on a space-available basis only.

Anyone who has not been accepted into a graduate program in the English Department must have permission from the department's director of graduate studies to enroll in English graduate courses.

### ***Degree Programs***

The Department of English offers courses of study leading to the MS and MA degrees in English and in American Studies. Applicants seeking the English degree may be admitted into the Literary Studies program, the Theory and Practice of Writing program, or the Technical Writing program. Applicants seeking the interdisciplinary American Studies degree may draw from almost any combination of courses dealing with American culture: literature, history, art, government, etc. Folklore is one of the major subject areas in American Studies, with courses in all aspects of folklore study, including public sector folklore.

For a more complete description of the Department of English graduate programs, see the department's website: <http://english.usu.edu>.

### ***English Program Requirements***

Applicants will be admitted to the English degree for one of three programs: Literary Studies (30 credits), Theory and Practice of Writing (30-33 credits), or Technical Writing (33 credits).

**Literary Studies.** The purpose of the graduate Literary Studies master's degree program is to introduce students to the professional practice of literary and cultural criticism. Approximately one-half of the incoming students in Literary Studies enter directly upon finishing their undergraduate degrees. The rest come to the graduate program with varied work backgrounds. For all students, however, the emphasis in the program is on *professionalism*. Most students pursue teaching as a profession, including

those who anticipate completing doctoral work in English and expect to teach in higher education, those who are already employed as teachers in secondary education or community colleges, and those who, after completing an undergraduate degree, are preparing for entry into teaching in secondary education or community colleges.

Literary Studies emphasizes three major components of professional practice: pedagogy, criticism, and research. All entering graduate students take two required courses, Teaching Literature (Engl 6310) and Critical Theory (Engl 6320), as early in their careers as possible. It is also expected, though not required, that many students in the program will be employed as graduate instructors, and will consequently take Practicum in Teaching English (Engl 6820). In Teaching Literature (Engl 6310) students examine pedagogical theory and engage in practical exercises involving the application of that theory to teaching situations, thus preparing both future doctoral students and future secondary educators to teach the introductory literature courses that lie immediately ahead in their careers. In Critical Theory (Engl 6320) students analyze the key methodological debates within literary and cultural studies and—most importantly—position themselves within those debates.

The majority of the program's credit hours are devoted to Seminar in Literary and Cultural Studies (Engl 6330). This is a repeatable course with topics changing each semester according to student need and faculty interest. There is no limit to the topics that can be offered. Students can expect to take five to seven seminars, choosing from topics that might include, for example, Fitzgerald and Hemingway, Victorian Popular Culture, Postmodern American Literature, Women's Western Fiction, British Fiction of the Blitz, Poems and Letters of Emily Dickinson, Chaucer, Postcolonial Literature and Theory, Political Shakespeare, Women Writers of the Commonwealth, and Regionalism in British Literature. The purpose of these varied courses is to immerse students within specialized fields of inquiry and to emphasize the production of professional-quality research and writing. Ultimately, the experience of the research seminars becomes the basis for the student's own independent research and writing, and the program's course of study culminates in the writing of a thesis (either Plan A or Plan B), under the guidance of a faculty mentor, on a topic selected by the student.

In addition to completing coursework and an independent project, students must also complete the Master of Arts degree by fulfilling the foreign language requirements as specified by the School of Graduate Studies (see page 77 of this catalog). Students interested in interdisciplinary work may take up to 6 credits in another area or department in lieu of the corresponding credits for Engl 6330.

Students employed in the department as graduate instructors must complete Practicum in Teaching English (Engl 6820) in lieu of 3 credits of Engl 6330.

The Literary Studies specialization is intended to be completed in two years (four semesters). By the time they complete it, graduate students will have redefined themselves as scholar-teachers—with their own individual voices, methods, and expertise—on the verge of professional careers in academics and education.

**Theory and Practice of Writing.** Theory and Practice of Writing offers students a chance to study writing theory in addition to encouraging the actual practice of writing. Most of the students in this program are pursuing careers involving the teaching of writing. After graduation, they may teach in two-year colleges or they may pursue doctoral study in a field such as Composition and Rhetoric. Alternatively, they may already be teaching at the

secondary level. Courses will introduce students to the field of Composition Studies and train them in rhetorical theory, research methods, and creative and technical writing, primarily from the teaching perspective.

Students in Theory and Practice of Writing must take Introduction to Composition Studies (Engl 6810). They should also take Advanced English Theory and Methods (Engl 6850) or, if they are employed as graduate instructors, Practicum in Teaching English (Engl 6820). Students may pursue either the MS or the MA degree; however, the department recommends the MA for those students planning to continue study at the doctoral level. Students may also choose between Plan A, Plan B, or Plan C. Plan A consists of 24 credits of coursework and 6 credits of thesis; Plan B consists of 27 credits of coursework and 3 credits of thesis; and Plan C consists of 33 credits of coursework.

**Technical Writing (online).** Technical Writing is designed for students who already have some training and/or experience as practitioners of technical writing. The program is entirely online, available to anyone, anywhere, via the Internet. The program's mission is to prepare students to enter or reenter nonacademic workplaces, not just as practitioners, but also as developers and managers of technical documents. When they finish the program, students will be qualified to determine and defend writing policy and practices in their workplaces.

To prepare students for these leadership roles, the program provides them with a strong theoretical understanding of their profession. In their online graduate seminars, students will read widely in research and theory relating to workplace writing practices. They will critically examine both the theories and the practices, and they will explore ways in which each can enhance the other. They will also learn how to manage teams of writers, and they will explore ethical issues in the profession. The program will balance the theoretical training with opportunities for students to improve their own practical skills as technical writers, learning how to apply theory and current technology to the production of a variety of technical documents. This practical training will include multimedia presentations and graphic design.

The program is designed primarily for nontraditional students—working professional writers who want to enhance their credentials and build a strong theoretical understanding of their profession. However, it may also accept some traditional students who have just finished their undergraduate studies.

Students in Technical Writing must complete 33 credits under the Plan C option. Courses may be taken in any sequence. Students in this program pursue the MS degree. They must complete a portfolio (3 credits of Engl 6490) and an internship (6 credits of Engl 6900).

### ***American Studies Program Requirements***

Those applicants who have been admitted to the American Studies degree will work out a program of study with either the American Studies advisor or the Folklore advisor. Generally, students develop their programs with an emphasis in American literature, folklore, or history. Interdisciplinary connections with many other departments at USU are possible. Students may choose to emphasize either the Standard program or the Folklore program, which includes a public folklore track. The American Studies degree requires 30 credits, with a preference for the MA and the Plan A (thesis) options, although the MS and the Plan B options are also accepted.

Students in the standard program must take American Studies Theory and Method (Engl 6600) early in their course of study.

Students in the Folklore program must take Folklore Theory and Method (Engl 6700) early in their course of study. Students selecting the public folklore track will follow the same requirements as students in the Folklore program, with the following exception. All students in the public folklore track are required to take Folklore Fieldwork (Engl 6720), Public Folklore (Engl 6730), and Graduate Internship (Engl 6900).

Of special interest to students in American Studies are the *Western Historical Quarterly* and the *Western American Literature* journals published at USU, which often provide editorial and clerical positions for graduate students. Also, The Mountain West Center for Regional Studies sponsors lectures and programs and provides research assistance for students working in the field of regional studies. The Merrill Library is a regional depository for federal publications and receives 60,000 to 70,000 government titles each year. The library's Special Collections contain thousands of historical photographs, an immense store of pioneer diaries and papers, and a strong collection of books and manuscripts relating to the west, the pioneers, the Mormons, cowboys, and cowboy poetry. The Fife Folklore Archives, named after Utah folklorists Austin and Alta Fife and recognized as one of the best folklore archives in the country, contains over 3,400 books on folklore and folklore-related topics. The Special Collections also serve as the national repository for the American Folklore Society's Papers, over 50 linear feet of records and documents accumulated during the 114-year history of the organization.

### General Requirements

All candidates for the MS and MA degrees must meet the School of Graduate Studies requirements (see pages 73-79 of this catalog). Only grades of *B-* or better will be accepted for credits in support of the degree programs; however, students must maintain an overall GPA of 3.0 to remain in the program.

All candidates must complete a comprehensive examination covering the material of their graduate program; however, the nature of this examination varies according to the particular program and the advice of the candidate's supervisory committee.

All candidates are required to successfully defend their Plan A thesis or Plan B papers. After successfully defending their Plan A thesis, students must submit a department-approved final draft to the thesis coordinator in the Graduate School office (Main 164). After successfully defending their Plan B papers, students must submit a department-approved copy to University Library Special Collections (Merrill Library 143).

All candidates who are first-year graduate instructors are required to take Practicum in Teaching English (Engl 6820) during their first semester. The candidate's supervisory committee will determine whether English 6820 will be accepted as part of the candidate's graduate program.

### Financial Assistance

The Department of English has a limited number of graduate instructor positions and Moyle Q. Rice Scholarships available on a competitive basis for both English and American Studies graduate students. Additional financial aid is available through the *Journal of Western American Literature*. All applicants whose application materials are received by January 15 will automatically be considered for possible scholarship awards. All applicants who wish to be considered for a graduate instructorship should contact the director of graduate studies in the English Department. The application deadline for instructorships is January 15.

## English Courses (Engl)

**Engl 0010. Writing Tutorial.** Provides additional instruction for students whose score on the ACT is 16 or less, or who are advised into the course on the basis of writing diagnosis given the first day of class in Engl 1010. (3 cr) (F,Sp,Su)

**Engl 1010 (CL). Introduction to Writing: Academic Prose.** Students learn skills and strategies for becoming successful academic readers, writers, and speakers, such as how to read and write critically, generate and develop ideas, work through multiple drafts, collaborate with peers, present ideas orally, and use computers as writing tools. (3 cr) (F,Sp,Su)

**Engl 1030 (BHU). Understanding Literature.** Introduction to fiction, drama, and poetry of different periods and cultures. (3 cr) (F,Sp,Su)

**Engl 1110. English Orientation.** Introduction to English as a profession. Reviews career opportunities for English majors. (1 cr) (F,Sp)

**Engl 1120. Elements of Grammar.** Introduction to the study of the English sentence. Discussion of punctuation and usage to facilitate editing, as well as clarity and precision in writing. (3 cr) (F,Sp) ©

**Engl 1600. American Cultures in Film.** Introduction to major ethnic groups in America and their treatment in recent feature films. Also taught as Hist 1600. (3 cr) (F)

**Engl 1710 (BHU). Introduction to Folklore.** Introduction to major genres of folklore (folk narrative, custom, folk music and song, vernacular architecture and arts), folk groups (regional, ethnic, occupational, familial), and basic folklore research method (collecting and archiving). Also taught as Anth 1710 and Hist 1710. (3 cr) (F)

**Engl 2010 (CL). Intermediate Writing: Research Writing in a Persuasive Mode.** Writing of reasoned academic argument supported with appropriately documented sources. Focuses on library and Internet research, evaluating and citing sources, oral presentations based on research, and collaboration. Prerequisites: Completion of 30 credits, and one of: Engl 1010 or AP score of 3 or ACT score of 29. (3 cr) (F,Sp,Su)

**Engl 2030 (BHU). Introduction to Shakespeare.** Introduction to comedies, histories, tragedies, and nondramatic poetry for nonmajors. (3 cr) (F)

**Engl 2040 (BHU). British and Commonwealth Cultures.** Introduction to the diverse cultures of the British Isles and the Commonwealth of the present day. Particular emphasis on regional identity in relation to multiculturalism and internationalization. Also taught as Hist 2040. (3 cr) (Sp)

**Engl 2100. Introduction to Literary Theory.** Introduction to fundamental questions and arguments within the field of literary criticism. Explores a variety of theoretical approaches to literary texts. This course, required for students in the Literary Studies and English Teaching emphases, should be taken *before* registering for 3000 or higher literature courses. (3 cr) (F,Sp)

**Engl 2140. British Literary History: Anglo-Saxon to 18th Century.** Survey of British literature from the Anglo-Saxon period through the 18th century. (3 cr) (F,Sp,Su) ©

**Engl 2150. British Literary History: Romanticism to Present.** Survey of British literature from Romanticism to the present. (3 cr) (F,Sp,Su)

**Engl 2160. American Literary History: Colonialism to 1865.** Survey of American literature from the colonial period to 1865. (3 cr) (F,Sp,Su)

**Engl 2170. American Literary History: 1865 to Present.** Survey of American literary history from 1865 to the present. (3 cr) (F,Sp,Su)

**\*Engl 2720. Survey of American Folklore.** Principal ethnic, regional, and occupational folk groups in America. Relations between folklore and American history, lit-

erature, and society. Key genres in American folklore (narrative, art, song, etc.) and their role in American culture. Also taught as Anth 2720 and Hist 2720. (3 cr) (Sp)

**\*Engl 3020 (DHA). Perspectives in Linguistics.** In-depth study of linguistics for nonmajors. Topics vary according to faculty expertise. (3 cr) (Sp)

**Engl 3030 (DHA). Perspectives in Literature.** In-depth study of literature for nonmajors. Topics vary according to faculty expertise. (3 cr) (F,Sp)

**\*\*Engl 3040 (DHA). Perspectives in Writing and Rhetoric.** In-depth study of rhetoric and writing for nonmajors. Topics vary according to faculty expertise. (3 cr) (Sp)

**Engl 3050 (DHA). Masterpieces of World Literature.** In-depth study of masterpieces of world literature from the earliest times to the present. For nonmajors. (3 cr) (F,Sp)

**\*Engl 3070 (DHA). Perspectives in Folklore.** In-depth study of folklore for nonmajors. Topics vary according to faculty expertise. Also taught as Hist 3070. (3 cr) (F)

**Engl 3300. Period Studies in American Literature.** Exploration of single period or movement in literary history of the United States, or a comparative study of a topic during various periods. Periods and topics will vary. (3 cr) (F,Sp) ®

**Engl 3310. Period Studies in British Literature.** Exploration of single period or movement in British literary history, or a comparative study of a topic during various periods. Periods and topics will vary. (3 cr) (F,Sp) ® ©

**Engl 3320. Period Studies in World Literature.** Exploration of single period or movement in literary history outside the United States and Great Britain, or a comparative study of a topic during various periods. Periods and topics will vary. (3 cr) (F,Sp) ®

**Engl 3400 (CI). Professional Writing.** Introduces students to workplace writing as a profession, emphasizing transition from writing for academic audiences to writing for readers of workplace documents. Students learn to design and write professional documents for science, industry, business, and/or government. Enrollment limited to English majors *only*. (3 cr) (F,Sp)

**Engl 3410. Professional Writing Technology.** Examines technologies of professional writing. Students examine digital environments (computers, LANs, WANs, and the Internet), as well as the software studied while progressing through the Professional and Technical Writing emphasis curriculum. Enrollment limited to English majors *only*. (3 cr) (F,Sp)

**Engl 3420. Fiction Writing.** Covers basic elements of writing fiction: form, structure, plot, theme, characterization, dialogue, point of view, and imagery. (3 cr) (F)

**Engl 3430. Poetry Writing.** Covers basic elements of writing poetry: language, detail, voice, tone, literal and figurative imagery, rhythm, open and closed form, structure, and theme. (3 cr) (F)

**Engl 3440. Creative Nonfiction Writing.** Focuses on the essay as creative nonfiction, emphasizing persona, audience, purpose, tone, and style. Students study difference between fiction and nonfiction. Goal is to write publishable nonfiction. (3 cr) (F,Sp)

**Engl 3450. Reading Theory for Writers.** Provides thorough understanding of reading from the perspective of writers. Students learn how readers process written texts, how reading assists writing, how readability is measured, and how online texts affect reading. (3 cr) (F,Sp)

**Engl 3460. Modern Rhetorical Theory.** Teaches students to analyze rhetoric (the art of using language to influence other people) as it operates in a variety of texts.

Students learn to define and understand rhetorical situations and to evaluate rhetorical strategies chosen by other writers. (3 cr) (F,Sp)

**Engl 3510. Young Adult Literature.** Study of literature written specifically for adolescent audience, including realistic, fantasy, adventure, and historical fiction. Intended for those interested in teaching secondary school English. (3 cr) (F,Sp)

**Engl 3520. Multicultural American Literature.** Introduction to study of ethnically diverse literatures of the United States, including Native American, Asian American, Hispanic/Latino, and African American. (3 cr) (F,Sp)

**\*Engl 3530. Children's Literature.** Study of aesthetic merit of poetry and prose available for children, ages 1-12. Intended for those interested in teaching or writing for children. (3 cr) (Sp) ©

**\*Engl 3620. Native American Studies.** Multidisciplinary introduction to study of Native Americans, emphasizing folklore, history, anthropology, literature, traditions, and contemporary issues such as the environment. (3 cr) (F)

**\*Engl 3700 (CI). Regional Folklore.** Study of folklore and folklife as a regionalizing process. Regions examined through their folk culture include Brittany in Northwest France, the pine Barrens of New Jersey, and the Mormon cultural region of the Intermountain West. Also taught as Hist 3700. (3 cr) (F)

**Engl 3710 (CI). Folklore Colloquium.** Issues, problems, and methodologies in folklore study. Focus and instructor variable. Also taught as Hist 3710. (3 cr) (Sp) ®

**Engl 4200. Linguistic Structures.** Introduction to linguistic science: phonetics, phonology, morphology, and syntax, especially as relating to English. Exposure to other aspects of linguistic analysis, including language origins and linguistic diversity. (3 cr) (F,Sp,Su)

**Engl 4210. History of the English Language.** Introduction to linguistic history of English, beginning with its Indo-European roots and continuing through Old English and Middle English to Modern English. Covers sociolinguistic aspects of English use, as well as strict grammatical history. (3 cr) (Sp)

**Engl 4220. Ethnic Literacy.** Examines the diversity of literacy skills in American ethnic groups. Topics include effects of socio-economic status, child-rearing practices, first and second language acquisition, American dialects, etc. (3 cr) (F,Sp)

**\*\*Engl 4230. Language and Society.** Covers sciences of sociolinguistics and anthropological linguistics. Introduces concepts dealing with relationship of language to society and culture, and interaction of language with society and culture. (3 cr) (F)

**Engl 4250. Playwriting.** Study of dramatic theory and sample plays, combined with practice in writing short plays. Students must write a minimum of three plays. Prerequisite: Thea 1210. Also taught as Thea 4250. (3 cr) (F)

**Engl 4300. Shakespeare.** Selected works of William Shakespeare, with attention to biographical and cultural contexts. (3 cr) (F,Sp) ®

**\*\*Engl 4310. American Writers.** Selected works of either a single author or a closely related group of authors based in the United States, with attention to biographical and cultural contexts. (3 cr) (F) ®

**\*Engl 4320. British Writers.** Selected works of either a single author or a closely related group of authors based in Great Britain, with attention to biographical and cultural contexts. (3 cr) (Sp) ®

**\*Engl 4330. World Writers.** Selected works of either a single author or a closely related group of authors based outside the United States, with attention to biographical and cultural contexts. (3 cr) (F) ®

**\*\*Engl 4340. Studies in Prose Fiction.** Analysis of the genre of prose fiction, emphasizing nature and evolution of specific forms. (3 cr) (Sp) ®

**\*Engl 4350. Studies in Poetry.** Analysis of the genre of poetry, emphasizing nature and evolution of specific forms. (3 cr) (F) ®

**\*Engl 4360. Studies in Drama/Film.** Analysis of dramatic and cinematic genres, emphasizing nature and evolution of specific forms. (3 cr) (Sp) ®

**\*\*Engl 4370. Studies in Nonfiction Prose.** Analysis of the genre of nonfiction prose, emphasizing nature and evolution of specific forms. (3 cr) (F) ®

**Engl 4400. Professional Editing.** Editing of technical and scientific documents, working with deadlines, different levels of editing, editing marks, working with groups of editors and clients, and total document design, including graphics. Prerequisites: Engl 3400 and 3410. Enrollment limited to English majors *only*. (3 cr) (F)

**Engl 4410. Document Design and Graphics.** Explores elements of page layout, graphic design, type fonts, and design of documents to suit client's needs. Prerequisites: Engl 3400 and 3410. Enrollment limited to English majors *only*. (3 cr) (F,Sp)

**Engl 4420. Advanced Fiction Writing.** Offers advanced study in art and skill of writing publishable fiction. Relies on workshop method. Prerequisite: Engl 3420 or equivalent. (3 cr) (Sp)

**Engl 4430. Advanced Poetry Writing.** Provides capstone course for undergraduate students desiring to write publishable poetry. Relies on workshop method. Prerequisite: Engl 3430 or equivalent. (3 cr) (Sp)

**Engl 4500 (CI) . Teaching Writing.** Prepares students to teach writing at secondary level. Teaches appropriate pedagogical techniques for teaching writing for a variety of purposes and contexts to diverse students. Techniques taught include designing effective writing assignments, responding constructively to student writing, assessing student writing, and incorporating technology into writing courses. (3 cr) (F,Sp)

**Engl 4510 (CI). Teaching Literature.** Prepares students to teach literature, including print literature, film, television, and print journalism. Explores variety of pedagogical strategies for teaching diverse literary traditions to students of various backgrounds and developmental levels. (3 cr) (F,Sp)

**\*\*Engl 4610. Western American Literature.** Examines major themes and important writers (both "popular" and "literary") in western regional writing. Investigation of significance of environment, history, gender, and ethnicity in a variety of genres. Appropriate for American Studies majors and minors. (3 cr) (F)

**Engl 4620 (CI). Advanced Seminar in American Studies.** Builds upon foundation courses in American Studies and introduces students to theory and methods. Prepares students for the senior project. Required for American Studies majors and minors. Should be taken after completion of 12 credits in the major, but prior to completion of 21 credits. Also taught as Hist 4620. (3 cr) (Sp)

**\*Engl 4630. American Nature Writers.** Interdisciplinary study of historical, social, literary, and environmental contexts of nature writing. Examines key authors, major theories, enduring concerns (e.g., conservation, preservation, and management), and current issues (including gender and ethnicity). Appropriate for American Studies majors and minors. (3 cr) (F)

**Engl 4640 (CI). Studies in the American West.** Interdisciplinary course in American Studies, exploring the region of the West through the analysis of literary texts, historical sources, and socio-cultural materials. Also taught as Hist 4640. (3 cr) (F)

**Engl 4690 (CI). American Studies Capstone Seminar.** Required for students majoring in American Studies. Supports design and writing of senior thesis. Each student selects a topic integrating insights from classes taken by the individual student for the American Studies major. Also taught as Hist 4690. (3 cr) (Sp)

**\*\*Engl 4700. Folk Material Culture.** Introduction to folklife studies, emphasizing patterns of expressive culture (material, verbal, and customary) in selected folk groups. In-depth examination of vernacular primary sources, including documentary and feature films. Also taught as Hist 4700. (3 cr) (Sp)

**Engl 4750. Advanced Folklore Workshop: Fife Conference.** Focuses on one theme or topic in folklore, and offers lectures from nationally prominent scholars in the area. Taught during one week, every day and all day. To receive grade, student must write critical paper. Also taught as Hist 4750. (3 cr) (Su) ®

**Engl 4900. Internship/Cooperative Work Experience.** Offers credit for professional experience obtained outside the classroom, prior to graduation. Requires statement of professional goals and summary report following the experience. Prerequisite: Departmental approval. (1-15 cr) (F,Sp) ®

**Engl 4910. Tutoring Practicum.** Introduction to tutoring, and seminar for tutors working in the Writing Center. Repeatable for up to 2 credits. (1 cr) (F,Sp) ®

**\*Engl 5210. Topics in Linguistics.** Provides students with opportunity to study topics which are not regularly taught, but which are designed to enrich understanding of linguistics. Typical topics include Old English, roots of English in Germanic, discourse analysis, and English as a world language. (3 cr) (F) ®

**Engl 5300 (CI). Literature and Gender.** Exploration of cultural relations between literature and gender. Topics vary. (3 cr) (Sp) ®

**Engl 5320 (CI). Literature and Cultural Difference.** Exploration of relations between literature and cultural difference. Topics vary. (3 cr) (Sp) ®

**Engl 5340 (CI). Studies in Literary and Cultural Theory.** Applications in literary and cultural studies. Topics vary. (3 cr) (F) ®

**Engl 5350 (CI). Literary Studies Capstone.** Communicative intensive capstone course in which students synthesize and assess their knowledge of the discipline. Should be taken during the senior year. Enrollment limited to English majors *only*. (3 cr) (Sp)

**Engl 5400. Specialized Documents.** Students in the Professional and Technical Writing emphasis prepare documents frequently encountered in business and government, including proposals, environmental impact statements, brochures, and newsletters. Prerequisites: Engl 3400 and 3410. Enrollment limited to English majors *only*. (3 cr) (F,Sp) ®

**Engl 5410. Interactive Media.** Students in the Professional and Technical Writing emphasis examine process of publishing online documents, studying multimedia, hypermedia, and hypertext environments. Students build complex CD-ROM environments, and also study help file authoring and Web page design. Prerequisites: Engl 3400 and 3410. Enrollment limited to English majors *only*. (3 cr) (F,Sp) ®

**Engl 5420. Publications Production.** Students in the Professional and Technical Writing emphasis examine process of publishing printed documents, beginning with idea and ending with hard copy, printed and bound. Prerequisites: Engl 3400 and 3410. Enrollment limited to English majors *only*. (3 cr) (Sp)

**Engl 5430 (CI). Professional Writing Capstone.** Capstone course for students in Professional and Technical Writing emphasis, in which students develop a professional portfolio of their own writing. Should be taken during the senior year. Enrollment limited to English majors *only*. (3 cr) (F,Sp)

**Engl 5490. Usability Studies: Theory and Practice.** Study of current approaches to improving user experiences with technologies and their related texts through research-based changes to product design and documentation. Prerequisite: Engl 3450 or 3460. (3 cr) (Sp) ®

**Engl 5550. English Teaching Capstone.** Students prepare a portfolio of their best work; synthesize and assess their knowledge of the field and their teaching, reading, and writing strengths; and evaluate the program through formal reflection on their own professional growth. Enrollment limited to English majors *only*. (3 cr) (Sp)

**Engl 5700. Folk Narrative.** Forms and functions of folk narrative genres: myth, legend, folktale, memorate, and ballad. Also taught as Anth 5700 and Hist 5700. (3 cr) (Sp)

**Engl 5900. Senior Honors Seminar.** Capstone course for students enrolled in English Honors Program. Prerequisite: Enrollment in English Honors Program. (1-3 cr) (F,Sp,Su) ®

**Engl 5910 (CI). Senior Honors Thesis.** Students work in conjunction with English faculty member to write a thesis. Prerequisite: Enrollment in English Honors Program. (1-6 cr) (F,Sp,Su) ®

**Engl 5920. Directed Study.** Provides students with opportunity to work individually with faculty member. Contract for work to be completed must be signed by faculty member and student, then filed with English Department. (1-3 cr) (F,Sp,Su) ®

**Engl 6310. Teaching Literature.** Introduction to theory and practice of teaching literature. Students read and discuss theoretical materials, as well as practice different classroom techniques. (3 cr) (Sp)

**Engl 6320. Critical Theory.** Study of major theoretical methods and arguments in literary and cultural studies, emphasizing both the history of the discipline and the application of theory to specific texts. (3 cr) (F)

**Engl 6330. Seminar in Literary and Cultural Studies.** Seminars devoted to specific topics in literary and cultural studies, emphasizing the presentation and publication of critical writing. (3 cr) (F,Sp,Su) ®

**\*Engl 6400. Advanced Editing.** Examines complex roles editors assume in creating technical and nontechnical documents. Principal components include working with substance of documents, mediating the writer-reader relationship, and exemplifying the application of rhetorical theory in editing. (3 cr) (Sp)

**Engl 6410. Theory and Research in Professional Communication.** Introduction to contemporary theories of written discourse. Emphasizes the implications of these theories for research in professional communication. (3 cr) (F)

**\*\*Engl 6420. Usability Studies and Human Factors in Professional Communication.** Examines concepts and practices of usability studies and human factors in the design and production of print and online documents. Emphasizes developing objectives, criteria, and measures for conducting tests in the lab and field. (3 cr) (Sp) ®

**\*Engl 6430. Publications Management.** Covers processes for developing and producing publications, including information development cycles, supervision, and budgets. (3 cr) (Sp)

**Engl 6440. Studies in Culture and Professional Communication.** Covers topics in rhetorical, critical, and cultural theory, emphasizing their application to contemporary practices in professional communication. (3 cr) ®

**\*Engl 6450. Reading Theory and Document Design.** Examines how reading theory interacts with rhetoric of graphics, layout, and type to influence the way documents are designed for maximum information and readability. (3 cr) (F)

**Engl 6460. Studies in Digital Media.** Focuses on the production of advanced digital media documents. Examination of theories underlying such publications, plus the related hardware and software. Topics vary. (3 cr) (F,Sp) ®

**\*\*Engl 6470. Studies in Specialized Documents.** Focuses on writing and design of specific genres in professional communication. Genres include environmental impact statements, software documentation, proposals, manuals, annual reports, newsletters, and fact sheets. Topics vary. (3 cr) (F) ®

**Engl 6480. Studies in Technology and Writing.** Study of theoretical aspects of technologies affecting writing in professional contexts. Course topics may include an examination of the history of computing, rhetorics of hypertext, or theories of communication in virtual space. Topics vary. (3 cr) ®

**Engl 6490. Portfolio.** Design and preparation of a portfolio containing at least five documents, each accompanied by a justification and discussion. (3 cr) (F,Sp,Su)

**Engl 6600. American Studies Theory and Method.** Provides students with theory and method of graduate-level research in American Studies. Also taught as Hist 6600. (3 cr) (F)

**\*Engl 6610. Seminar on the American West.** Readings and research on topics in the American West. Interdisciplinary focus suitable for graduate students in History and American Studies. Also taught as Hist 6610. (3-4 cr) (F)

**\*\*Engl 6620. Seminar in Native American Studies.** Readings and research on topics in Native American history and culture. Interdisciplinary focus suitable for graduate students in History and American Studies. Also taught as Hist 6620. (3-4 cr) (F)

**\*Engl 6630. Studies in Film and Popular Culture.** Offered annually on a rotating basis by professors in folklore and English (Cultural Studies, Literature, British and Commonwealth). Topics and theoretical approaches vary, but the primary focus is on feature films. Also taught as Hist 6630. (3 cr) (Sp) ®

**Engl 6700. Folklore Theory and Method.** Serves as orientation for new graduate students in folklore. Introduces students to comparative annotation, folklore indices, oral-formulaic theory, performance theory, contextual analysis, and other approaches. Also taught as Hist 6700. (3 cr) (F)

**\*\*Engl 6710. Regional Folklore.** Study of folklore and folklife as a regionalizing process. Regions examined through their folk culture range. Also taught as Hist 6710. (3 cr) (Sp)

**Engl 6720. Folklore Fieldwork.** Basic methodology class for folklorists and oral historians. Students learn interviewing techniques and other methods for observing and recording the performance of tradition and traditional history. Also taught as Hist 6720. (3 cr) (Sp)

**\*\*Engl 6730. Public Folklore.** Provides history and analysis of governmental involvement in protecting, promoting, and otherwise manipulating and utilizing cultural heritage. Also taught as Hist 6730. (3 cr) (F)

**\*Engl 6740. Folk Narrative.** Covers principal narrative genres in folk tradition (myth, tale, legend, ballad) and the basic theories for their analysis and discussion. Also taught as Hist 6740. (3 cr) (Sp)

**Engl 6750. Advanced Folklore Workshop (the Fife Conference).** Intensive workshop focusing on a topic in folklore. Brings in nationally known experts as lecturers and discussants. Students attend all sessions, then write a critical paper during the summer semester. Also taught as Hist 6750. (3 cr) (Su)

**\*Engl 6760. Cultural and Historical Museums.** Examines outdoor cultural and historical museums, examining their function in modern multi-cultural societies. Also taught as Hist 6760. (3 cr) (Sp)

**Engl 6770. Seminar in Folklore and Folklife.** Conducts close, professional-level study of major areas of folklore and folklife research. Also taught as Hist 6770. (3 cr) (F) ®

**\*\*Engl 6810. Introduction to Composition Studies.** Introduces students to graduate work in the field of composition studies. Students learn topics, issues, scholars, scholarly practices, and scholarly forums of the field; and also explore a focused research topic in the field. (3 cr) (F)

**Engl 6820. Practicum in Teaching English.** Introduction to teaching writing, designed specifically for graduate instructors teaching in the English Department writing program. Focuses on theory and practice of teaching writing, specifically Engl 1010, but also prepares graduate instructors for further teaching responsibilities. (3 cr) (F)

**\*\*Engl 6830. Rhetorical Theory.** Covers intellectual traditions of rhetoric from classical times to the present. As students study major theories, theoreticians, and controversies in the field, they come to understand rhetoric as the study of relations between discourse, knowledge, and power. (3 cr) (Sp)

**\*Engl 6840. Research Methods in Composition.** Survey of research methods used in the study of composition, emphasizing qualitative and quantitative approaches to understanding teaching, learning, and the writing classroom. (3 cr) (Sp)

**\*\*Engl 6850. Advanced English Theory and Methods.** Focuses on theory and practice of teaching English. Explores various philosophical positions in the field and examines their practical implications. Covers theories and methods relevant to both process and product of teaching English in an integrated language arts curriculum. (3 cr) (Sp)

**\*Engl 6860. Teaching Technical Writing.** Prepares students to teach general-purpose technical writing courses at secondary or undergraduate level. Students read and discuss articles on technical writing and practice writing a series of technical documents. (3 cr) (Sp)

**\*Engl 6870. Teaching Creative Writing.** Prepares students to teach creative writing at a variety of levels, including secondary, junior college, community college, and four-year university. Enrollment limited to graduate students only. (3 cr) (F)

**\*\*Engl 6880. Topics in Creative Writing.** Course changes topics as follows: poetry, fiction, and nonfiction. In each topic, students learn to write at an advanced

level and learn to evaluate creative writing using workshop and peer group methods. Enrollment limited to graduate students only. (3 cr) (F) ®

**Engl 6890. Studies in Writing and Rhetoric.** Provides students and faculty with opportunity for in-depth study of timely topics. (3 cr) ®

**Engl 6900. Graduate Internship.** Format and credit limit vary for different programs in the department. See program advisor for details and approval to enroll in this course. (1-15 cr) (F,Sp,Su) ®

**Engl 6920. Directed Study.** (1-6 cr) (F,Sp,Su) ®

**Engl 6970. Thesis.** (1-6 cr) (F,Sp,Su) ®

**Engl 6990. Continuing Graduate Registration.** (1-3 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

Department of  
***Environment and Society***

***College of Natural Resources***

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**Professors** *Clifford B. Craig*, geographic education, community development, rural planning, economic geography, geography of Utah; *Steven E. Daniels*, natural resource policy, collaborative community processes; *James J. Kennedy*, policy and administration of natural resource and environmental management; *Richard S. Krannich*, natural resource policy and sociology; *Jack M. Payne*, Vice President and Dean for University Extension, conservation program administration, agriculture and natural resource policy; *H. Charles Romesburg*, natural resources research methods and natural resources ethics; *Derrick J. Thom*, land use, population and settlement, rural development, remote sensing, geography of Africa; *Richard E. Toth*, bioregional and water resources analysis, planning, and management; **Associate Professors** *Ted J. Alsop*, physical geography, climatology, geomorphology, photogrammetry, geography of North America; *Dale J. Blahna*, natural resource sociology, policy, outdoor recreation, and interpretation; *Mark W. Brunson*, social and psychological aspects of forest and rangeland management; *Steven W. Burr*, recreation resources, outdoor recreation and natural resource-based tourism, rural community development; *D. Layne Coppock*, rangeland ecology, management, and policy; international pastoral and agropastoral development; community-based natural resource management; *Joanna L. Endter-Wada*, cultural anthropology, natural resource policy and sociology; *Robert J. Lilieholm*, natural resource management and economics, land use planning, sustainable development; *Robert H. Schmidt*, wildlife policy, wildlife damage management; **Assistant Professors** *Nicole L. McCoy*, natural resource economics; **Adjunct Assistant Professors** *David T. Anderson*, landscape planning and analysis, interpretation of vernacular landscapes; *Janet A. Anderson*, natural resource sociology, outdoor recreation and interpretation, USU Libraries; *Janet M. Eisenhauer*, rural sociology and economics; *Tamsin C. McCormick*, environmental education, geology; *Bruce M. Pendery*, forest policy; *Nancy Huffman Shea*, environmental education; *Douglas G. Wachob*, environmental education, vertebrate ecology; **Adjunct Instructors** *Carla G. Heister*, natural resource library management; *Katherine S. Voth*, wildland/urban interface fire fuels management and student internships; **Senior Lecturer** *Michael F. Butkus*, recreation resources management and planning, interpretive planning; **Lecturers** *Judith A. Kurtzman*, natural resource policy, *Barbara Middleton*, environmental education

**Degrees offered:** Bachelor of Science (BS) in Environmental Studies; BS, Master of Science (MS), and Doctor of Philosophy (PhD) in Recreation Resource Management; BS, Bachelor of Arts (BA), MS, and Master of Arts (MA) in Geography; MS in Bioregional Planning (offered jointly with Department of Landscape Architecture and Environmental Planning)

**Vision/Mission:** The vision of the Department of Environment and Society is one of bringing people and science together for healthy communities and enduring ecosystems. The mission of the department is based on three goals: (1) to promote scholarship and creativity in the discovery, synthesis, and transfer of knowledge relating to the human dimensions of natural resource and environmental management; (2) to apply social science concepts and approaches to better understand human-environment interactions at a range of spatial scales; and (3) to enhance the effectiveness of policies, planning, and administrative processes that affect sustainable use of the natural world.

To this end, the department's academic programs provide undergraduate and graduate students with a balanced exposure to the social, physical, and biological sciences within an interdisciplinary framework. This combination has great relevance for students aspiring to careers in natural resource and environmental policy, planning, management, education, and science, as well as careers in geography. The program is designed to provide students with a working knowledge of the human aspects of ecosystems and a speaking knowledge of the biophysical aspects, as well as experience using "state of the art" tools and techniques for integrating this knowledge.

## ***Undergraduate Programs***

### ***Objectives***

The department offers three undergraduate degrees: Environmental Studies, Geography, and Recreation Resource Management. Each of these degrees offers a balanced exposure to key ideas and principles of the social, biological, and physical sciences, placing special emphasis on the human dimensions of natural resources and environmental management. The department's

goal is to train professionals who can lead the way toward finding and keeping a sustainable balance between protecting the environment and enhancing human societies.

Departmental programs offer learning experiences in the classroom and in the field, frequent individual contacts with faculty as teachers and advisors, and opportunities to take part in student and professional organizations. Seasonal employment, internships, and other activities promoting hands-on experience in natural resource and geographic professions are strongly encouraged.

The **Environmental Studies** curriculum is designed for students who wish to acquire a broad understanding of natural resources and human-environment relationships, together with the technical background needed to understand environmental issues. In many ways, the curriculum provides a traditional “liberal arts education” with a strong natural resources emphasis. Moreover, it offers flexibility for the development of either specialization or breadth of content to match the student’s interests.

The **Geography** curriculum provides a broad background in the basic themes of geography—human (cultural), physical, and regional geography—with a particular focus on environmental and earth resources geography. In addition, students acquire technical geographic analysis skills. Students also have the opportunity to study in a systematic, regional, or technical area of geography.

The **Recreation Resource Management** curriculum prepares students for careers in managing outdoor recreation settings, such as public forests and rangelands, state and national parks, and wilderness areas. Because these jobs require an understanding of both the land and the people who visit it, the major offers courses in both the natural and social sciences, along with an emphasis on communication skills.

## Requirements

**Admission Requirements.** Admission requirements for the Department of Environment and Society are the same as those described for the College of Natural Resources (see pages 100-101).

**Graduation Requirements.** All Natural Resources core courses and all courses listed as major subject courses must be taken on an *A-B-C-D-F* basis. The grade point average for all courses taught by the College of Natural Resources must be 2.5 or higher.

All students earning undergraduate degrees in the College of Natural Resources (except those majoring in Geography or Geography Teaching) must complete six core courses in natural resource science and management. In addition, students must complete a series of basic lower-division courses providing the disciplinary foundation for natural resource professions before moving on to professional coursework. Equivalents of these foundation courses may be taken at many two- and four-year colleges. Some foundation and core courses may also be used toward the University Studies requirements, as shown by the University Studies designations listed in parentheses following the course numbers.

### Environmental Studies Major

The Environmental Studies major consists of 92 credits. This total includes the College of Natural Resources core, lower-division foundation, professional courses, and a specialization option of 15 or more credits.

*Lower-division Foundation:* Biol 1210, 1220 (BLS); Chem 1110; Engl 1010 (CL), 2010 (CL); Math 1050 (QL); Spch 1050 (CI); Stat 2000 (QI); USU 1300 (BAI).

*College of Natural Resources Core:* EnvS 2340 (BSS); Geog 1130 (BPS) or Geol 1150 (BPS); NR 2220, 3000, 3600 (QI), 4000.

*Professional Coursework:* AWER 3700; EnvS 1990, 4000 (DSS), FRWS 3100, 3250 (or 5610 or 5640), 3500; NR 5000; Soil 3000.

*Specialization Option:* Students work with their faculty advisor to develop a specialization option fitting their interests and career goals. The option consists of 15 or more credits, and may include any approved University minor or a suite of courses meeting the student’s particular needs. *Examples* of specialization options include:

*Environmental Interpretation:* Art 2810; Anth 3110 or 4110 (DSS); EnvS 4600, 5110; Spch 5250.

*Environmental Policy:* EnvS 4110, 4130, 5300; PolS 3810 (DSS) or 4810, 4820 (DSS).

*Geographic Analysis:* AWER 3900, 4750, 4930, 5930; Geog 3850 or EnvS 5100.

### Geography Major

The Geography major consists of 60-61 credits, including the College of Natural Resources core, lower-division foundation, and professional courses. After meeting the University Studies, USU upper-division, and geography major requirements, students may take the remainder of their 120 required credits in any discipline from any department. Students interested in using their elective credits to develop a field of specialization should consult with their advisor to select appropriate courses.

*Lower-division Foundation:* Geog 1030 (BSS), 1130 (BPS), 1140, 2030 (BSS); Math 1050 (QL); Stat 2000 (QI).

*College of Natural Resources Core:* EnvS 2340 (BSS); NR 2220, 3000, 3600 (QI), 4000.

*Professional Coursework:* Geog 4200 (CI); 6-7 credits of techniques courses; and 14 credits of geography electives. Students should request a major requirement sheet from the department office and consult their faculty advisor for a list of specific techniques and elective courses.

### Geography Teaching Major

The teaching major in Geography consists of both the geography courses (36-37 credits) and the Secondary Teacher Education Program (STEP) (35 credits). For details about the STEP, students are referred to the geography major requirement sheet, or the STEP information listed in the Department of Secondary Education section (pages 418-419). Students may select their remaining geography credits from courses numbered 2000 or above. It is recommended that students take additional regional, systematic, technology in geography education, or classroom technology practicum credits. All electives must be coordinated with a geography education advisor. A geography teaching major also requires a teaching minor in another field of study.

*Lower-division Foundation:* Geog 1030 (BSS), 1130 (BPS), 1140, 2030 (BSS), 4200 (CI).

*Professional Coursework:* AWER 4930; Geog 3850, 4300, 4800, 4850.

### Recreation Resource Management Major

The Recreation Resource Management major consists of 95 credits, including the College of Natural Resources core, lower-division foundation, and professional courses. For most students, these courses will cover all but 9 credits of the University Studies requirement.

*Lower-division Foundation:* Biol 1210, 1220 (BLS); Chem 1110; Engl 1010 (CL), 2010 (CL); Math 1050 (QL); Soc 1010 (BSS); Spch 1050 (CI); Stat 2000 (QI); USU 1300 (BAI).

*College of Natural Resources Core:* EnvS 2340 (BSS); Geog 1130 (BPS) or Geol 1150 (BPS); NR 2220, 3000, 3600 (QI), 4000.

*Professional Coursework:* AWER 3700; EnvS 1990, 3300, 4000 (DSS), 4130, 4500 (CI), 4600 or 5110, 4750, 5300; FRWS 3250, 3500, 4520; NR 5000; PRP 4400; Soc 3500 or 4620 (DSS); Soil 3000; 3 credits of special topics or special projects courses (EnvS 4920 or 4950).

### Environment and Society Minors

The department offers minors in Environmental Studies, Geography, Geography Teaching, and Recreation Resources. Students in all University majors may complete a Geography, Geography Teaching, or Recreation Resources minor. The Environmental Studies minor is open to all majors, *except* those in the College of Natural Resources. Because the same courses cannot be counted toward both a student's major and minor, students must take additional courses beyond those listed here if their majors require courses that are also included in the minor. Students wishing to minor in the above areas should contact the department to meet with the designated advisor for that minor.

The **Environmental Studies** minor totals 17-19 credits and includes NR 2220, 3000, and 4000, plus two of the following courses: EnvS 4000 (DSS); NR 3600 (QI); or any approved upper-division course in ecology, policy, economics, or assessment.

The **Geography** minor totals 25 credits and includes AWER 3900; EnvS 1710; and Geog 1030 (BSS), 1130 (BPS), 1140, 2030 (BSS), 2230, 3850, 4200 (CI).

The **Geography Teaching** minor totals 23-24 credits and includes Geog 1030 (BSS), 1130 (BPS), 1140, 2030 (BSS), 3850, 4200 (CI), 4300, 4800, 4850 (or AWER 4930); and 3 elective credits from courses numbered 2000 or above. All electives must be coordinated with the geography education advisor. An approved teaching major in another subject is also *required*.

The **Recreation Resources** minor totals 15 credits and includes EnvS 3300, 4130, 4500 (CI), 4600; plus one of the following: EnvS 4000 (DSS), 4750, or 5110.

### Financial Assistance

The main opportunities for undergraduates to find financial support through grants, work-study, and loans are listed on pages 22-25 in the *Financial Aid and Scholarship Information* section. In addition, more than 30 scholarships for eligible students in the College of Natural Resources are listed on pages 37-38 of the same section. Some students may be able to find paid internships

with private or governmental organizations, or work for a faculty member on a research project. Interested persons should contact the department for more information on financial assistance for undergraduate students.

### Additional Information

For additional information about the Bachelor of Science requirements, course sequencing, and departmental specialization options and their related coursework, as well as updated information describing current programs and courses offered by the Department of Environment and Society, visit the Environment and Society main office, Natural Resources 201, or visit: <http://www.cnr.usu.edu> and link to the departmental website.

## Graduate Programs

### Admission Requirements

See general admission requirements on pages 72-73. Applicants for graduate study in the Department of Environment and Society should have a bachelor's degree from an accredited college or university, a cumulative GPA of at least 3.0 (out of 4.0), and GRE scores (quantitative and verbal) above the 40th percentile. Foreign students should submit a TOEFL score of at least 550. Exceptions to these standards will be considered on a case-by-case basis. Written statements of interest help match applicants with faculty advisors. A faculty member must agree to serve as the major professor in order for an applicant to be accepted. Prospective students are encouraged to contact faculty members early in the application process to investigate mutual interests, projects, and prospects for financial support.

The department's graduate programs focus on providing students with a broad foundation in the social and natural sciences as they relate to the study, planning, and management of ecosystems. The curriculum is designed to enhance interdisciplinary integration by emphasizing current and future environmental issues facing humanity. Coursework and research are focused on problem solving through application of social research methods, case studies, computer mapping, and other analytical techniques.

The department values intellectual, academic, and social diversity in the applicants for graduate study. Mature professionals seeking education to augment life experiences, or practical training to pursue new career paths, are also encouraged to apply. Knowledge gaps will be identified early in a student's program and addressed on a case-by-case basis through agreements between students and their graduate advisory committees.

### Degree Programs

The department offers opportunities for graduate study through the MS, MA, PhD, and graduate certificate programs listed below. The department also offers opportunities to participate in a college-wide Master of Natural Resources (MNR) program administered through the Dean's Office of the College of Natural Resources. This program is described more fully on page 374.

The MS degree requires a minimum of 30 credits, of which 24 must be in residence. Candidates for the MA must complete the requirements for the MS, with the addition of at least two years

(approximately 16 credits) of an approved foreign language or some other demonstration of foreign language proficiency. There are two options available in both the MS and MA programs. The **Plan A** requires students to complete coursework, as well as a research thesis. The **Plan B** is a nonthesis, terminal degree, based largely on coursework and a professional paper or project.

For the PhD degree, there is a more variable amount of required coursework, as well as a research dissertation. Compared to the MS degree, the PhD degree has a greater emphasis on theory, research methods, writing research proposals, and publishing research in peer-reviewed outlets.

**Bioregional Planning.** Graduate education in bioregional planning recognizes the importance of how the biophysical attributes of a region influence the human dimensions of settlement and culture. The reciprocal is also addressed. The two-year Master of Science degree in Bioregional Planning, offered jointly with the Department of Landscape Architecture and Environmental Planning, presents an interdisciplinary core of courses and faculty for the purpose of addressing complex issues in the areas of environmental analysis, planning, and policy. Emphasis is placed on four problematic content areas associated with environmental planning: social/behavioral, biophysical, economic, and public policy. The spatial focus is on planning for large regional landscapes with dispersed populations with a primary economic base in agriculture, energy development, tourism/recreation, retirement communities, and natural resources. The program prepares future planners and managers to work within an interdisciplinary environment, providing better alternatives for decisions and policy implementation. Bioregional planning is practiced in both the private and public sectors, which may include offices of the National Park Service, U.S. Forest Service, Bureau of Land Management, and various state, county, and community organizations. For further information, see page 320.

**Geography.** Graduate education in Geography provides opportunities for students to gain advanced technical knowledge and skills in formal specializations that include: (1) Human-Environment Interactions, (2) Geographic Information Systems, (3) International Rural Development, (4) Geographic Education, and (5) Environmental Education.

**Recreation Resource Management.** Graduate education in Recreation Resource Management provides opportunities for students to gain advanced knowledge and skills in topics such as: (1) outdoor recreation behavior and attitudes, (2) resource-based conflict and crowding, (3) natural resource-based tourism, (4) natural history interpretation, and (5) integration of outdoor recreation with protected area management or rural development.

### ***Graduate Certificate Programs***

Faculty in the Department of Environment and Society also administer two graduate certificate programs, including **Natural Resource and Environmental Policy (NREP)** and **National Environmental Policy Act (NEPA)**. By meeting certain core requirements, students are able to obtain a certificate in one or both of these areas complementing their degree program. See pages 372-373 for a description of the NREP Program. The NEPA certificate is subject to final approval by the Board of Regents; details of this program can be found in the online version of the catalog.

### ***Proposed Degrees and Certificates***

The department has several degree and certificate programs in the proposal stage, with the objective of having them available for the Fall 2003 semester. MS, MA, and PhD degrees in **Human Dimensions of Natural Resources and Environment** would provide opportunities for students to gain knowledge and skills in the social aspects of ecosystem management and planning. Plan C (MS and MA) degrees in **Geography**, based solely on coursework, would be available *only* for elementary or secondary teachers seeking a master's degree in Geographic Education or Environmental Education. A graduate certificate in **Natural Resource and Environmental Education** would provide students having an interest in this area with an opportunity to complement their matriculation in a wide array of degree programs currently offered by the University. Contact the department for the status of these offerings.

### ***Research***

The generation of new knowledge through research is one of the key contributions that an academic department makes to professions and society at large. Research is also a major venue for the interaction of graduate students and faculty in the Department of Environment and Society. Although faculty and students work on many different issues, the research strives to be interdisciplinary and focuses on merging the relevant social and natural sciences. Work is undertaken in Utah and beyond, including several projects elsewhere in the United States and in developing nations. Funding comes from a variety of public and private sources. The department houses one institute and three programs that also collaborate on research. These include the Institute for Outdoor Recreation and Tourism, the Natural Resource and Environmental Policy Program, the Geographic Education Program, and the Environmental Education Program.

### ***Financial Assistance***

General aspects of financial support for graduate students at Utah State University are listed on pages 71-72 in the *Graduate Financial Assistance* section. This includes important information on the University-wide policies and terms of reference for research and teaching assistantships, graduate tuition obligations and benefits, Western Regional Graduate Programs, and competitive University-wide fellowships and scholarships.

The Department of Environment and Society intends that all graduate students be financially supported. Graduate research assistantships are available through major professors having contracts, grants, or other awards. Internships may also be created on a case-by-case basis. A student may want to author or co-author a proposal with a faculty member to fund a new initiative. There are also open competitions for graduate scholarships and fellowships through the College of Natural Resources. The department also has a few graduate teaching assistantships where graduate students typically help instructors with teaching, grading, or recitation in large courses. Interested persons should contact the department early in the application process for more information on financial assistance for graduate students. Prospective students may also visit <http://www.cnr.usu.edu> and link to the departmental website.

## *Environment and Society* *Courses (EnvS)*

**EnvS 1710. Human Impact on Environment.** Provides assessment of natural and man-related processes acting together to modify the global environment. Examines nature of global environmental change and contribution of human species to this change. (3 cr) (Sp)

**EnvS 1990. Professional Orientation.** Introduction to forestry, outdoor recreation, environmental studies, and related careers. Offers new students an orientation to College of Natural Resources faculty, college and University programs, careers in natural resources, and professional societies. (1 cr) (F)

**EnvS 2250. Introductory Internship/Co-op.** Introductory-level educational experience in internship/cooperative education position approved by department. (1-3 cr) (F,Sp,Su) ®

**EnvS 2340 (BSS). Natural Resources and Society.** Examines human values, uses, and management of natural settings at the individual, community, and societal levels. Topics include: psychological responses to nature, history of U.S. park and natural resource management, environmental sociology and politics, and nature in non-Western cultures. (3 cr) (F,Sp)

**EnvS 3300. Fundamentals of Recreation Resources Management.** Principles of wildland recreation management including: characteristics of recreation use and users, introduction to planning concepts, management of wildland recreation facilities and infrastructure, and integration with other natural resource uses. (3 cr) (F)

**EnvS 3330. Environment and Society.** Emphasizes how human actions modify the physical environment and how physical systems affect human systems and the changes occurring in the meaning, use, and importance of resources at a global and regional scale. (3 cr) (Sp)

**EnvS 3600 (DSC). Living With Wildlife.** Reviews history and development of wildlife management programs in the United States. Explores diversity of attitudes toward wildlife, which affect development and evolution of wildlife management programs. Development and analysis of case histories of contemporary and controversial wildlife management decisions. (3 cr) (Sp)

**EnvS 4000 (DSS). Human Dimensions of Natural Resource Management.** Focuses on balancing science and social values in ecosystem management and decision-making. Topics include environmental justice, communication and behavior change strategies, landscape perception and attitudes, resource-dependent communities, public involvement, and conflict management. (3 cr) (F)

**EnvS 4110 (d6110).<sup>1</sup> Fisheries and Wildlife Policy and Administration.** Examination of policy issues and administrative approaches in fish and wildlife management, with particular emphasis on nonbiological issues facing wildlife managers and administrators. (3 cr) (F)

**EnvS 4130. Recreation Policy and Economics.** Fundamentals of public land recreation administration, including funding, laws and regulations, partnerships, and government agency culture. Application of nonmarket and regional economics to wildland recreation. Relationship of outdoor recreation to tourism. (3 cr) (F)

**EnvS 4250. Advanced Internship/Co-op.** Directed and evaluated cooperative education or work experience for undergraduates in public and private organizations. (1-9 cr) (F,Sp,Su) ®

**EnvS 4400. Forest Management and Economics.** Integrates economic and decision-making tools in management of forest resources for multiple uses over extended time periods. Prerequisites: NR 4000, FRWS 4270. (4 cr) (Sp)

**EnvS 4500 (CI). Wildland Recreation Behavior.** Social, psychological, and geographic influences on human behaviors in wildland recreation settings. Emphasis on critical problems affecting public land recreation management. (3 cr) (Sp)

**EnvS 4600. Natural Resource Interpretation.** Planning processes and techniques for providing interpretive programs developed for wildland recreation areas and visitor centers. Evaluation and planning of visitor information efforts. (3 cr) (F)

**EnvS 4750. Wildland Recreation Planning and Management.** Planning and management tools for wildland recreation management. Biophysical impacts of recreation. Biophysical and social aspects of and integration of recreation with other natural resource uses. Prerequisites: EnvS 4130, 4500, and senior standing. (3 cr) (Sp)

**EnvS 4920. Special Projects in Recreation Management.** Participation in special projects to assist public recreation agencies or nonprofit organizations, while gaining hands-on experience in recreation management, planning, and monitoring. Many experiences entail intensive, short-duration efforts away from campus. (1-3 cr) ®

**EnvS 4950. Special Topics.** Individual study and research upon selected environmental and societal problems. (1-3 cr) (F,Sp,Su) ®

**EnvS 4960. Directed Readings.** Individual reading research on selected environmental and societal readings. (1-3 cr) (F,Sp,Su) ®

**EnvS 4970. Undergraduate Research.** Individual or team research. Prerequisite: Advisor approval. (1-3 cr) (F,Sp,Su) ®

**EnvS 4980. Undergraduate Seminar.** Intended to bring upperclassmen up-to-date on environmental and societal topics. (1 cr) (Sp)

**EnvS 5100 (d6100). Methods of Environmental and Ecological Mapping.** Mapping in the field from aerial photography and satellite data to mapping environmental regions and establishing a GIS data base. (3 cr)

**EnvS 5110. Environmental Education.** Covers teaching about the environment, and using the environment and the natural world to teach other subjects, with a strong emphasis on participation and on practicing teaching techniques. (3 cr) (Sp)

**EnvS 5300. Natural Resources Law and Policy.** Legal and administrative regulation of forests and associated resources (water, air, fish, wildlife, and scenery). Emphasis on agency organizational culture, federal legislation, court cases, administrative procedures, and federal natural resources agencies' interactions with tribal, state, and local governments. (2 cr) (F)

**EnvS 5320. Water Law and Policy in the United States.** Introduction to policies, laws, institutions, and practices guiding western water allocation, emphasizing how to efficiently and equitably allocate increasingly scarce supplies. Explores reserved water rights, water markets, stream adjudication, public trust doctrine, basinwide management, and riparian management. (3 cr) (F)

**EnvS 5450. Rangeland Economics and Management.** Senior capstone course preparing students to conduct economic evaluations and prepare inventories and management plans for private ranching operations and large tracts of public rangeland. Prerequisite: Permission of instructor. (5 cr) (F)

**EnvS 5540 (d6540). Land Use and Resource Assessment.** Provides understanding of land use, land capability, techniques and methods of resource assessment, and their role in development planning. (3 cr) (F)

**EnvS 5550 (d6550). Environment, Resources, and Development Policy.** Environment, natural resources, and development policy in Third World, emphasizing sustainable development, farming systems, agro-pastoralism, desertification, and land use. (3 cr) (F)

**EnvS 5700 (d6700). History of Geographic Thought.** Acquaints students with aims, methods, and accomplishments of geography as a professional field and a discipline in the past, present, and future. (3 cr) (F)

**EnvS 6000. Human Dimensions in Natural Resources Graduate Seminar.** Focuses on balancing science and social values in ecosystem management and decision-making. Topics include environmental justice, communication and behavior change strategies, landscape perception and attitudes, sociology of resource-dependent communities, and conflict management. Students attend lectures concurrent with EnvS 4000, but attend one additional discussion section per week. (3 cr) (F)

**EnvS 6100 (d5100). Methods of Environmental and Ecological Mapping.** Mapping in the field from aerial photography and satellite data to mapping environmental regions and establishing a GIS data base. (3 cr)

**EnvS 6110 (d4110). Fisheries and Wildlife Policy and Administration.** Examination of policy issues and administrative approaches in fish and wildlife management, with particular emphasis on nonbiological issues facing wildlife managers and administrators. (3 cr) (F)

**EnvS 6130. Policy Aspects of Wildland Recreation.** Political, legal, and economic bases for wildland recreation management. Relationship between outdoor recreation and tourism. Lectures concurrent with EnvS 4130. Also includes weekly discussion session focusing on relevant scientific research and policy analyses. (3 cr) (Sp)

**EnvS 6240. Graduate Internship/Co-op.** Graduate-level educational experience in internship/cooperative education position approved by department. (1-9 cr) (F,Sp,Su) ®

**\*EnvS 6350 (d7350). Wildlife Damage Management Policy.** Review and analysis of state and national policies associated with wildlife damage management issues. While often extremely controversial, these issues have significant impacts on food and fiber production, public health and safety, and wildlife conservation. Includes investigation of policies and techniques, and outlining of decision-making processes. Emphasizes issue identification and human dimension factors. (3 cr) (Sp)

**\*EnvS 6400. Ecological Aspects of Wildland Recreation.** Assessment of current knowledge and knowledge gaps concerning impacts of wildland recreation on wildlife, plants, soil and water resources, and processes. Strategies for coexistence of recreation visitors and nonhuman ecosystem elements. (3 cr) (Sp)

**\*EnvS 6420. Advanced Forest Management.** Advanced study of forest-level planning on public and private lands using mathematical programming techniques. (2 cr) (Sp)

**EnvS 6500. Behavioral Aspects of Wildland Recreation.** Social and psychological analysis of visitor behavior in outdoor recreation settings. Sources of recreation management problems and practical and theoretical basis for management practices. Lectures concurrent with EnvS 4500. Separate discussion sessions focus on research concerning recreation behavior. (3 cr) (F)

**\*\*EnvS 6530. Natural Resources Administration.** Organizational structures and processes common in natural resources administration on federal and state levels, and how they impact career development and land management. (2 cr) (F)

**EnvS 6540 (d5540). Land Use and Resource Assessment.** Provides understanding of land use, land capability, techniques and methods of resource assessment, and their role in development planning. (3 cr) (F)

**EnvS 6550 (d5550). Environment, Resources, and Development Policy.** Environment, natural resources, and development policy in Third World, emphasizing sustainable development, farming systems, agro-pastoralism, desertification, and land use. (3 cr) (F)

**EnvS 6600. Advanced Natural Resource Interpretation.** Planning processes, techniques, and evaluation procedures for using information and education to influence human behavior and increase benefits to visitors in natural settings. Leadership of teams involved in producing interpretive plans and materials. (3 cr) (F)

**EnvS 6700 (d5700). History of Geographic Thought.** Acquaints students with aims, methods, and accomplishments of geography as a professional field and a discipline in the past, present, and future. (3 cr) (F)

**EnvS 6750. Advanced Recreation Planning and Management.** Proactive and problem-solving tools for addressing challenges facing managers of public lands where outdoor recreation takes place. Students serve as team leaders for capstone exercises. Prerequisites: EnvS 6130, 6500; or equivalent. (3 cr) (Sp)

**EnvS 6800 (d7800). Environment and Society Departmental Seminar.** (1 cr) (F,Sp) ®

**\*\*EnvS 6810. Natural Resources Research Design.** Covers generation of practical research hypotheses and their testing in the natural resource research context. Written reports, such as journal articles, in the natural resources fields are deconstructed according to research methodologies. Prerequisite: Any statistics course which includes hypothesis testing and confidence intervals. Prerequisite: Stat 2000 or higher. (3 cr) (Sp)

**EnvS 6820. Natural Resources Research Integrity.** Given as a seminar, and including invited speakers, course covers responsible professional behavior in natural resources research and management, with topics ranging from regulations for laboratory animal welfare to performance of honest research and management in the natural resources professions, where studies are seldom replicated and planning horizons can be decades away, and checks for ultimate validity not performed. As a term project, each student devises and defines his or her code of natural resources professional integrity. Recommended prerequisite: EnvS 6810. (2 cr) (F)

**EnvS 6870. Ecology Seminar.** The Ecology Center schedules regular seminars throughout the school year with ecological scientists from other institutions participating. Ecology majors are required to attend a minimum of 10 such lectures. Students should register for fall semester, but attend through spring semester. Also taught as AWER 6870, Biol 6870, and FRWS 6870. (1 cr) (F) ®

**EnvS 6900. Graduate Special Topics.** Offers credit for special assignments, reading, and seminars beyond regularly scheduled courses. (1-6 cr) (F,Sp,Su) ®

**EnvS 6910. Directed Study.** (1-6 cr) (F,Sp,Su) ®

**EnvS 6960. Graduate General Ecology.** General concepts, history, and issues in all major areas of the science of ecology including: environmental biophysics; and physiological, behavioral, evolutionary, community, ecosystem, and applied ecology in both terrestrial and aquatic environments. Also taught as AWER 6960, Biol 6960, and FRWS 6960. (5 cr) (F)

**EnvS 6970. Thesis Research.** (1-12 cr) (F,Sp,Su) ©

**EnvS 6990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ©

**\*EnvS 7350 (d6350). Wildlife Damage Management Policy.** Review and analysis of state and national policies associated with wildlife damage management issues. While often extremely controversial, these issues have significant impacts on food and fiber production, public health and safety, and wildlife conservation. Includes investigation of policies and techniques, and outlining of decision-making processes. Emphasizes issue identification and human dimension factors. (3 cr) (Sp)

**EnvS 7800 (d6800). Environment and Society Departmental Seminar.** (1 cr) (F,Sp) ©

**EnvS 7900. Graduate Special Topics.** Offers credit for special assignments, reading, and seminars beyond regularly scheduled courses. (1-6 cr) (F,Sp,Su) ©

**EnvS 7910. Directed Study.** Offers credit for special assignments, reading, and seminars beyond regularly scheduled courses. (1-6 cr) (F,Sp,Su) ©

**EnvS 7970. Dissertation Research.** (1-12 cr) (F,Sp,Su) ©

**EnvS 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ©

## *Geography Courses (Geog)*

**Geog 1030 (BSS). World Regional Geography.** Survey of world cultural regions, with an analysis of political, economic, and resource patterns in their physical setting. (3 cr) (F,Sp) ©

**Geog 1130 (BPS). Physical Geography.** Geographic analysis of physical processes and spatial distribution of natural elements (i.e., the atmosphere, hydrosphere, lithosphere, and biosphere). (3 cr) (F,Sp,Su) ©

**Geog 1140. Physical Geography Lab.** Laboratory exercises in natural physical geography. Provides initial field and laboratory experiences in the earth system. Required for all geography majors. Prerequisite: Geog 1130 (may be taken concurrently). (1 cr) (F,Sp)

**Geog 2030 (BSS). Human Geography.** Spatial study within selected socio-cultural settings, including cultural landscapes, rural-urban linkages, languages, religions, politics, and economic activities. (3 cr) (F)

**Geog 2130. Population Geography.** Spatial analysis of demographic data emphasizing global distribution, population growth, measures of density, migration, settlement, and economic development. (3 cr) (Sp)

**Geog 2230. Economic Geography.** Introduction to analysis of world patterns of economic activities (production, consumption, and exchange), with emphasis on factors of industrial location and natural resource exploitation. (3 cr) (F)

**Geog 3430. Political Geography.** Study of relationship between Earth, people, and the state. Global political phenomena studied from a geographic perspective. Ex-

plores impact of natural resources territorial seas and the nature of the state. Also taught as PolS 3430. (3 cr) (Sp)

**Geog 3610. Geography of Rural/Urban Planning.** Analysis of the organization and interrelationships of urban-city and rural space. Emphasizes spatial planning of rural-urban environments to improve quality of life, internal structure of cities, and applied principles and practices of community planning. Field trips and applied class projects integrated into lectures and demonstrations. (3 cr) (F)

**Geog 3850. Map and Air Photo Interpretation.** Addresses theoretical and practical nature of maps, fundamental photogrammetry, issues of scale, and geographic referencing systems. Ends with an introduction to remote sensing. After successfully completing this course, students will be able to understand basic mapping processes, make precise distance/direction/area map and photogrammetric measurements, interpret natural and man-made features from maps and photographs, and understand fundamental interpretations of remote sensing imagery. (3 cr) (F)

**Geog 4200 (CI). Regional Geography.** Analysis of physical and cultural geography for a variety of regions. Can be repeated for each different region as offered (e.g., Pacific Rim, Africa, Middle East, Europe, Asia, Latin America, and North America). (3 cr) (F,Sp,Su) © ©

**Geog 4300. Geography Education Classroom Practicum.** Allows geography education students to participate in actual geography classroom teaching with experienced geography teachers. Students observe, work with individuals and groups of students, team-teach lesson(s) with the teacher, and self-teach individual lesson(s). (1-3 cr) (F,Sp,Su) ©

**Geog 4800 (d6800). Teaching Geography.** Designed specifically for geography education/social studies education students preparing to teach grades K-12. Exploration of national and state standards and core curriculum, as well as state-of-the-art geography education technology and teaching resources. Students develop teaching lessons, and gain classroom teaching experience with local geography teachers. (3 cr) (Sp)

**Geog 4850. Cartographic Design.** Techniques used in design and construction of maps, charts, and map projections. (3 cr) (Sp)

**Geog 5650 (DSS) (d6650). Developing Societies.** Reviews how sociology, cultural geography, and economic anthropology analyze processes of globalization in postcolonial societies. Examines changing livelihoods, patterns of spatial incorporation and societal evolution, and emergent policy problems associated with rapid socioeconomic change. Also taught as Anth 5650/6650 and Soc 5650/6650. (3 cr) (F)

**Geog 5810 (d6810). Geography Education Inservice Workshop.** Assists classroom teachers in broadening their perspective of Geography Education through increased knowledge, improving their geographic techniques, methods, and teaching resources for their classrooms. (3 cr) (F,Sp,Su)

**Geog 5900 (d6900). Geography Field Practicum.** Designed for geography students involved in field research and/or internships. Provides opportunity for students to gain practical applied experience in their specialized academic emphasis in geography. (1-4 cr) (F,Sp,Su) ©

**Geog 5970. Classroom Technology in Geography Education.** Design, development, and application of contemporary technologies and multimedia classroom teaching resources for preservice and inservice geography education teachers. (3 cr) (F,Su)

**Geog 6200. Advanced Regional Geography.** Critical analysis of world's regions, focusing on analysis and synthesis of a region's economic, political, population, and cultural themes in the context of physical environment and global processes. Repeatable for different regions. (3 cr) (F,Sp,Su) ®

**Geog 6650 (d5650). Developing Societies.** Reviews how sociology, cultural geography, and economic anthropology analyze processes of globalization in postcolonial societies. Examines changing livelihoods, patterns of spatial incorporation and societal evolution, and emergent policy problems associated with rapid socioeconomic change. Also taught as Anth 6650/5650 and Soc 6650/5650. (3 cr) (F)

**Geog 6800 (d4800). Teaching Geography.** Designed specifically for geography education/social studies education students preparing to teach grades K-12. Exploration of national and state standards and core curriculum, as well as state-of-the-art geography education technology and teaching resources. Students develop teaching lessons, and gain classroom teaching experience with local geography teachers. (3 cr) (Sp)

**Geog 6810 (d5810). Geography Education Inservice Workshop.** Assists classroom teachers in broadening their perspective of Geography Education through increased knowledge, improving their geographic techniques, methods, and teaching resources for their classrooms. (3 cr) (F,Sp,Su)

**Geog 6900 (d5900). Geography Field Practicum.** Designed for geography students involved in field research and/or internships. Provides opportunity for students to gain practical applied experience in their specialized academic emphasis in geography. (1-4 cr) (F,Sp,Su) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

*Department of*  
***Family and Human Development***  
*College of Family Life*

**Interim Head: Professor Shelley L. Knudsen Lindauer**, alternative child care, gender role development, early childhood education, curriculum administration, socialization, development in infancy and early childhood

Office in Family Life 211, (435) 797-1501

**Child Development Laboratory Director: Professor Shelley L. Knudsen Lindauer**, alternative child care, gender role development, early childhood education, curriculum administration, socialization, development in infancy and early childhood

**Gerontology Certificate Program Coordinator: Assistant Professor Kathleen W. Piercy**, midlife, older adults and family caregiving, family policy, qualitative methodology

**Graduate Program Coordinator: Associate Professor Randall M. Jones**, adolescent development, identity, problem behavior, prevention, research methods

**Marriage and Family Therapy Program Director: Associate Professor Thorana S. Nelson**, marriage and family therapy, gender, family therapy training and supervision

**FAX** (435) 797-3845

**E-mail** teresab@cc.usu.edu

**WWW** <http://www.usu.edu/fhd>

**Professors** *Ann M. Berghout Austin*, alternative child care and family life, development from birth to 12 years of age; *Thomas R. Lee*, parenting, family life education, family resiliency; *Brent C. Miller*, marriage and family relationships, adolescent pregnancy, adoption, research methods; **Adjunct Professors** *Frank R. Ascione*, prosocial development, moral development, developmental psychopathology; *Sarah Rule*, methods of early intervention, applications of technology to staff development, improvement of service delivery systems; **Professors Emeritus** *Glen O. Jenson*, rural family, in-law and grandparent role performance, family life education, work/family challenges, family issue identification; *Jay D. Schvaneveldt*, marriage and family studies, family life education, international families, theory and methods; **Associate Professors** *Scot M. Allgood*, family therapy process, assessment, and marital studies; *D. Kim Openshaw*, marriage and family therapy, research and application, typological and intervention strategy advancement of youthful sexual offending, theoretical conceptualization of self-esteem, martial arts and mental health related syndromes; *Lori A. Roggman*, infant social development, attachment, parenting stress, play across the life span, physical attractiveness, early intervention; **Assistant Professors** *Marcelo Diversi*, Latino families, adolescent development, youth culture, qualitative methods; *Sylvia Niehuis*, premarital relationships, transition from courtship to marriage, marriage preparation, prediction of marital outcomes, longitudinal research methods; *Maria C. Norton*, geriatric mental health, psychosocial and biological factors, research methodology and epidemiology; **Adjunct Assistant Professor** *Carol M. Baumann*, child welfare, foster care, adoption; **Senior Lecturer** *Deborah B. Ascione*, marriage, human development, child abuse and neglect; **Lecturers** *Susan L. Ericksen*, undergraduate practicum coordinator, undergraduate advisor, marriage and family therapy, professional development; *Farol Ann G. Nelson*, early childhood education, child development, parent education, experiences in the arts for early childhood; **Adjunct Clinical Lecturer** *Victor H. Nelson*, marriage and family therapy, gender issues

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), and Master of Science (MS) in Family and Human Development; BS and BA in Early Childhood Education; Master of Family and Human Development (MFHD); specialization in Family and Human Development in the Family Life Doctor of Philosophy (PhD)

**Undergraduate emphases:** *BS, BA in Family and Human Development*—Family and Community Services, Human Development, Deaf Education; *BS, BA in Early Childhood Education*—licensure, K-3rd grades; **Graduate specializations:** *MS*—Adolescence and Youth, Adult Development and Aging, Infancy and Childhood, Marriage and Family Relationships, Marriage and Family Therapy

**Gerontology Certificate Program:** The Gerontology Certificate Program at Utah State University is administered through the Department of Family and Human Development, and is open to all majors. Students preparing for careers in the field of aging complete selected aging-related coursework, including a supervised field practicum in a gerontological setting. For a list of requirements for this interdisciplinary certificate, contact the department. A minimum GPA of 2.75 is required for the Gerontology Certificate.

## Undergraduate Programs

### Objectives

The Department of Family and Human Development offers a program designed to prepare students for careers as family and human development specialists in agencies serving children and other family members throughout the life span. Majors study a curriculum which ranges from infancy through old age, and from marital formation to marital dissolution through death or divorce. These classes help students develop the knowledge and skills necessary to deal professionally with current issues and problems confronting families and children in the nation and the world.

Student majors in Family and Human Development are required to complete a practicum experience, which is arranged with the practicum coordinator locally or in other geographical areas. Types of practicum sites include state agencies, hospitals, pre-schools and child care centers, nursing homes, senior citizen centers, parenting programs, detention centers, crisis intervention programs, public schools, head start programs, and after-school programs. Practicum experience in the Deaf Education and Human Development emphases includes the Adele and Dale Young Child Development Lab setting. Students majoring in Early Childhood Education complete a formal internship in the Adele and Dale Young Child Development Labs and in primary school grades as part of this focus.

Majors in Family and Human Development, as well as in Early Childhood Education, receive the necessary preparation for graduate study in a family and human development related field or employment. Early Childhood Education majors acquire a teaching license so they can also teach in the public schools.

In addition to preparation for advanced study or job opportunities, FHD majors receive increased knowledge and skills in topics which will enhance their personal and family lives. Preparation for marriage, parenthood, and family relationships is a central concern in the department.

All majors in the department are accredited by the American Association of Family and Consumer Sciences. Licensure in Early Childhood Education is also available.

**Gerontology Certificate.** Students pursuing the Gerontology Certificate must take additional courses and complete a gerontology practicum as required for certification. A complete list of requirements may be obtained in Family Life 214 or by calling (435) 797-2387.

**Certified Family Life Educator (CFLE).** Students who complete the Family and Community Services emphasis are eligible to apply for the Certified Family Life Educator credential through the National Council on Family Relations.

**Honors Program.** The Department of Family and Human Development participates in the University Honors Program. Students can graduate with Departmental Honors. For further information, see the *Honors Program* section on pages 285-286, or access the Honors Program home page at:

<http://www.usu.edu/honors>.

### Requirements

**Departmental Admission Requirements.** Students with less than 24 semester credits can declare a premajor in FHD (code PFHD). Completion of at least 24 semester credits (including FHD 1500 and 2400) with a cumulative GPA of 2.75 is required

for admission into the major (code FHD). Students who have met these requirements should bring a copy of their transcript and the Change of Major form to FL 214 to obtain a signature from the undergraduate advisor.

**College of Family Life Requirement.** FHD majors, like other majors in the College of Family Life, must complete the college orientation course, FL 1100 (2 cr., spring semester).

**Background Check.** All students will be required to pass a background check prior to participation in a practicum experience (FHD 4980).

**Departmental Program Requirements.** The department has several regulations governing students' academic progress:

1. The *P/D+*, *D*, and *F* option cannot be used for courses required in the FHD major or minor.
2. A required course can only be repeated *once* to improve a grade.
3. An overall cumulative GPA of 2.75 is required to enter the major, and a cumulative 2.75 GPA is required for graduation. A GPA of 2.75 in FHD major courses is also required for graduation.
4. All major requirements, as described below, must be completed.

All majors in the department (except ECE majors) complete a common departmental core of 24 semester credits, and then choose an emphasis in Family and Community Services, Human Development, or Deaf Education as shown below.

**FHD Family and Community Services and Human Development Emphases Core Courses:** FHD 1500, 2400, 2610, 3110, 3120, 3130, 3210, 3510, 3530 3540, 4220, 4230, 4240, 4900, 4980<sup>2</sup>; and Psy 2800 or Soc 3120.

**Family and Community Services Emphasis:** FHD 3500 (1 credit), 4540, and HEnv 3350.

**Human Development Emphasis:** FHD 3500 (1 credit concurrently with FHD 3510, and 1 credit concurrently with FHD 3520), 4550, and 4960<sup>1</sup>.

**Deaf Education Emphasis:** The Deaf Education emphasis is designed to provide a unique and rich experience for students desiring to work with infants and young children who are deaf or hard of hearing and their families. The program enables the student to major in Family and Human Development on the undergraduate level with an emphasis in Deaf Education. Upon successful completion of this emphasis, students may apply to the graduate Early Childhood Communicative Disorders program in the Department of Communicative Disorders and Deaf Education (see page 188). Students completing the master's program will have the skills necessary to work as parent advisors/early interventionists in agencies and programs serving infants and very young children who are deaf or hard of hearing and their families. These early intervention programs (also called parent-infant programs, or PIP programs) are in every state of the country.

<sup>1</sup>To get on a waiting list, students must apply for FHD 4960 at least three semesters in advance of taking the class. Apply in Family Life Building, room 214.

<sup>2</sup>Students must apply for the FHD 4970 and 4980 practicums at least one full semester in advance of taking these classes. Apply in Family Life Building, room 214.

The Deaf Education emphasis requires the following courses: FHD 1500, 2400, 2610, 3110, 3120, 3130, 3210, 3500, 3510, 3520, 4220, 4550, 4900, 4960, 4980; Psy 2800 or Soc 3120; ComD 2500, 2910, 3080, 3910, 5610, 5630, 5640, 5650, 5680, 5730; SpEd 4000, 5010, 5060.

**FHD Minor.** The minor in FHD is designed to offer a knowledge base for understanding families and human development, to enhance the training of majors in other academic disciplines. A minor in FHD requires 15 semester credits of FHD coursework, including FHD 1500 and 2400. The remaining credits can be selected from any other undergraduate courses, except FHD 2250, 2500, 3130, 4550, 4800, 4900, 4950, 4960, 4970, 4980, and 4990. The *P/D+*, *D*, *F* option cannot be used for courses taken for the minor. No more than 6 transfer credits may be used toward the FHD minor. Minor requirement advising sheets are available in FL 214.

**Early Childhood Education (ECE) Major Requirements.** Majors in early childhood education are licensed to teach in preschool, kindergarten, and grades 1-3. Several practica and field experiences with children are provided, and a subject matter minor is selected (e.g., science, language arts, etc.). This major is a cooperative effort between the Department of Family and Human Development and the Department of Elementary Education. Students are required to complete a student teaching practicum in a preschool program, a kindergarten, and in the public schools grades 1, 2, or 3. Additional materials describing the ECE major in the Department of Family and Human Development are available from the advisors in FL 214.

### ***Additional Information***

For more detailed information about the Family and Human Development and Early Childhood Education majors, see advisement guides available in FL 214. These guides also provide details about minors, recommended electives, and the gerontology certificate. Students should also check with the department for current requirement sheets, which are updated each year. These guidelines and requirements are also available on the department's home page at <http://www.usu.edu/fhd>.

### ***Financial Support***

In addition to the scholarships, assistantships, grants-in-aid, and work-study programs available through the University, the College of Family Life and the Department of Family and Human Development also give several tuition waivers, scholarships, and other types of support each year. Students should inquire at the Dean's Office in Family Life 205, the departmental office in Family Life 211, or the Financial Aid Office in Student Center 106.

## ***Graduate Programs***

### ***Admission Requirements***

See general admission requirements on pages 72-73. Students may use either the GRE or MAT for application for all specializations in the MS degree, but the GRE is required for the PhD program. Additional assessment is required for admission to the MS marriage and family therapy emphasis. An applicant's MAT score, or the GRE verbal and quantitative scores, should be at or above the 40th percentile. Applications are expected to be completed by January 15, except in unusual circumstances.

### ***Degree Programs***

Graduate students receive a strong research and theoretical base in family relationships and human development. In addition to the core courses required for each of the specializations, students have the opportunity to achieve their program goals with a wide range of other graduate courses in the department, as well as designated courses in related programs at USU. Graduate students also engage in independent study, practica, and other specialized professional experiences that help them to acquire specific skills.

The department provides advanced graduate education and training for students to (1) establish the professional competency necessary for employment in research, teaching, marriage and family therapy, extension, and administration; (2) develop skills necessary for agency administration in the field of family and child care services; (3) receive clinical training in marriage and family therapy; and (4) develop the skills for supervisory responsibilities in child development laboratories, child-care facilities, and adolescent programs.

**MS in Family and Human Development.** Students in the MS program complete a research thesis that makes a contribution to knowledge in family studies or human development.

All students in the MS Marriage and Family Therapy specialization also complete required clinical experiences. The MS Marriage and Family Therapy specialization satisfies basic educational requirements for Utah State licensure in marriage and family therapy and clinical membership in AAMFT. The Marriage and Family Therapy specialization is accredited by the Commission on Accreditation for Marriage and Family Therapy Education.

**PhD Specialization in Family and Human Development.** Students in the PhD specialization complete a major research dissertation that makes a significant contribution to the theoretical and empirical knowledge in family studies or human development.

### ***Specializations***

The department offers the Master of Science (MS) degree in Family and Human Development and the Master of Family and Human Development (MFHD) degree. The college offers the doctorate degree (PhD) with a specialization in Family and Human Development. The MS degree has specializations in Adolescence and Youth, Adult Development and Aging, Infancy and Childhood, Marriage and Family Relationships, and Marriage and Family Therapy. With the exception of Marriage and Family Therapy, these emphases are also available in the Family and Human Development PhD specialization. Further information may be obtained from the department and by accessing the department's home page at <http://www.usu.edu/famlife/fhd>.

### ***Course Requirements***

The core substantive courses for the master's degree are FHD 6030, 6060, and 6070. Master's students also complete course requirements under their chosen specialization in Family Relations, Marriage and Family Therapy, or Human Development. Elective courses and thesis topics are individualized with each student by faculty supervisory committees.

Doctoral core courses are FHD 7060, 7070, and 7080. Doctoral students also complete topical seminars, methods and statistics courses, research and teaching internships, comprehensive exams, and dissertation research. For more specific information, see the department's *Graduate Student Handbook*.

## Research

The department has three major child development laboratories, other research labs, and marriage and family therapy facilities that are available for research and training in the graduate program. The department enjoys a long history of research activities with preschools, public schools, extension programs, and other agencies throughout the state, and is building a program of gerontology research.

Recent faculty and graduate student research projects have been funded by the state Office of Child Care and the Office of Juvenile Justice, and by the national Office of Head Start, the Office of Adolescent Pregnancy Programs, Child Trends Inc., the National Institute of Child Health and Human Development, the U.S. Department of Agriculture, and the Kellogg Foundation.

## Financial Assistance

Extensive teaching, research, and extension graduate assistantships are available for applicants for both the MS and PhD degrees. Attractive fellowships are available for strong PhD students with high GPA and high GRE scores. When an applicant's folder is complete, it is reviewed by the Graduate Admissions and Finance Committee, which makes specific recommendations regarding admission and financial support. Assistantships and fellowships typically include waivers for out-of-state tuition. Some students pay the regular in-state tuition, but this is in transition, and doctoral student in-state tuition benefits are provided for doctoral student teaching assistants and research assistants beginning Fall 2000.

## Career Opportunities

Recent recipients of advanced degrees have found employment in public schools, academic departments at colleges and universities, research centers, hospitals, Head Start, child-care programs, social services, mental health agencies, private and clinical practice settings, extension services, and related agencies that teach about, study, or serve individuals and families.

## Additional Information and Updates

The department publishes a *Graduate Student Handbook* providing more detail about graduate program admission and requirements. Graduate programs also are described more fully on the department's home page at <http://www.usu.edu/famlife/fhd>.

# Family and Human Development Courses (FHD)

**FHD 1500 (BSS). Human Development Across the Lifespan.** Overview of human development across the lifespan, from conception to death. (3 cr) (F,Sp) ©

**FHD 2250. Seminar and Practicum in Early Childhood Education.** Orientation to current philosophies, teaching techniques, and curricula found in programs for young children. Practicum experience as a student aide in an early childhood education program. Prerequisite: Admission to teacher education or instructor's permission. (4 cr) (F,Sp)

**FHD 2400 (BSS). Marriage and Family Relationships.** Overview of couple and family relationships, including marriage, child bearing and rearing, intergenerational relationships, and alternative family forms. (3 cr) (F,Sp) ©

**FHD 2500. Child Development Associate Training.** Training provided by an approved instructor and following an approved curriculum that leads to the fulfillment of requirements for the National Child Development Associate (CDA) credential. Elective credits granted for this course. (2 cr) (F,Sp) ®

**FHD 2550. CDA Practicum.** During *and* after the coursework associated with FHD 2500, students fulfill a practicum. At the conclusion of FHD 2500, the CDA advisor/trainer conducts a comprehensive observation of the CDA candidate and the CDA observation instrument is completed and included as part of application materials submitted for the final assessment by the CDA granting organization (Council for Early Childhood Professional Recognition). When the CDA candidate receives the CDA credential, then he or she receives credit for FHD 2550. Prerequisite: FHD 2500. (6 cr) (F,Sp,Su)

**FHD 2610. Parenting and Child Guidance.** Review of parenting styles and child guidance philosophies with emphasis on principles and techniques. (3 cr) (F,Sp) ©

**FHD 3110. Human Sexuality.** Development and expression of human sexual values, attitudes, and behaviors in family and cultural contexts. Prerequisites: FHD 1500, 2400. (3 cr) (F,Su)

**FHD 3120. Abuse and Neglect.** Causes, treatment, and laws regarding family violence, including child abuse and neglect, partner abuse, and elder abuse. Prerequisites: FHD 1500 or Psy 1100. Also taught as Psy 3120. (3 cr) (F,Sp) ©

**FHD 3130 (QI). Research Methods.** Common methodologies used in current family and human development research. Emphasis on becoming a knowledgeable and informed consumer of research. Enrollment limited to FHD majors. Prerequisite: Stat 1040. (3 cr) (F,Sp)

**FHD 3210. Families and Cultural Diversity.** Similarities and differences in family patterns and functions in terms of race and ethnicity, gender, social class, and international development. Prerequisites: FHD 1500, 2400. (3 cr) (F,Sp)

**FHD 3500. Interdisciplinary Lab.** Practical experience in laboratory setting with children birth through two years of age or children in the middle years. Lab supplements/complements course content of either FHD 3510 or 3520. Prerequisites: Junior standing and FHD 1500, 2610. Corequisite: FHD 3510 or 3520. (1 cr) (F,Sp,Su) ®

**FHD 3510. Infancy and Early Childhood.** Development and growth of the child from conception to five years. Physical, social, and emotional growth; and parenting skills. Prerequisites: Junior standing and FHD 1500, 2610. (3 cr) (F,Sp,Su)

**FHD 3520. Children in the Middle Years.** Growth and development of normal children. Guidance principles related to behavior of children at these age levels. Prerequisites: Junior standing and FHD 1500, 2610. (3 cr) (F,Sp,Su)

**FHD 3530. Adolescence.** Social, psychological, and physical aspects of adolescence in modern societies. Social and cultural expectations and influences on adolescents stemming from the family, peers, school, and the community. Prerequisites: Junior standing and FHD 1500. (3 cr) (F,Sp)

**FHD 3540. Adult Development and Aging.** Interdisciplinary perspective on developmental issues in adulthood and old age. Biosocial, cognitive, and psychosocial changes in older adults in family, community, cultural, and socio-political contexts. Prerequisites: Junior standing and FHD 1500, or instructor's permission. (3 cr) (F,Sp)

**FHD 4220. Family Crises and Interventions.** Normative and nonnormative stressors provoking individual and family crises. Principles and techniques for family interventions. Prerequisites: Junior standing, FHD 2400, and FHD/Psy 3120. (3 cr) (F,Sp)

**FHD 4230. Families and Social Policy.** Local, state, and federal policies with implications for individuals and families across the lifespan. Prerequisites: Junior standing and FHD 2400. (3 cr) (F,Sp)

**FHD 4240. Social and Family Gerontology.** Social, cultural, and family contexts of aging. Intergenerational family relations in later life. Social policies and services affecting older adults and their families. Prerequisites: Junior standing and FHD 2400. (3 cr) (F,Sp)

**FHD 4540. Family Life Education Methods.** Introductory course focused on theory, principles, and skills necessary to prepare, present, and evaluate family life education programs and workshops. (3 cr)

**FHD 4550. Preschool Methods and Curriculum.** Use of materials, equipment, and activities in planning and implementing curricula for preschool children. Prerequisites: Junior standing and FHD 1500. (3 cr) (F,Sp)

**FHD 4800. FHD Senior Honors Project/Thesis/Seminar.** Thesis/project in area of student's choice, selected and prepared in consultation with an advisor drawn from the FHD faculty. Includes oral presentation and discussion of senior thesis/project. (3-6 cr) (F,Sp,Su)

**FHD 4900 (CI). Pre-Practicum Skills.** Acquisition and integration of interpersonal skills, conflict resolution, and ethical decision-making for active participation in FHD practica. Enrollment limited to FHD majors. Prerequisites: Junior standing, FHD 2610, 3120. (3 cr) (F,Sp)

**FHD 4950. Gerontology Integration.** Integration of gerontology coursework and practicum. Written paper requires approval by FHD Gerontology Coordinator. (1 cr) (F,Sp,Su)

**FHD 4960. Practice Teaching in Child Development Laboratories.** Intensive teaching practicum in the Child Development Lab program. Arrangements need to be made at least one year in advance. Prerequisites: Junior standing and FHD 4550. (3 or 6 cr) (F,Sp,Su)

**FHD 4970. Gerontology Practicum.** Placement experience in gerontology settings. Practical opportunities to apply theory, knowledge, and skills. Prerequisites: Senior standing and FHD 3540, 4240. Apply one semester in advance. (1-6 cr) (F,Sp,Su) ®

**FHD 4980. Practicum.** Placement experience in applying skills and knowledge in community agencies. Enrollment limited to FHD majors. Prerequisites: Junior standing and FHD 4900; must have completed a total of 30 FHD credits and the practicum application. (1-12 cr) (F,Sp,Su) ®

**FHD 4990. Readings and Conference.** Directed independent study of topics preselected by faculty and student. Instructor permission required before registration. (1-6 cr) (F,Sp,Su) ®

**FHD 5550. Interdisciplinary Workshop.** (1-3 cr) (F,Sp,Su) ®

**FHD 5830. Seminar Working with Peers on Multidisciplinary Teams.** Seminar for discussion of topics pertaining to how teams work with children, with and without disabilities, in a practicum. Students are assigned to a team for planning and problem solving throughout the semester. Also taught as SpEd 5830. (1 cr) (Sp)

**FHD 6010. Survey of Family Relations Research.** Overview and critique of substantive areas of research in marriage and the family. Prerequisite: FHD 2400 or equivalent. (3 cr) (F)

**FHD 6020. Survey of Human Development Research.** Examines contemporary research and developmental issues. Highlights social development from social-historical and social change framework. Prerequisite: FHD 1500 or equivalent. (3 cr) (Sp)

**FHD 6030. Research Methods.** Overview of methods for studying family relations and human development, including sampling, measurement, research design, and data analyses/interpretations. Research proposal required. Prerequisite: FHD 3130 or equivalent. (3 cr) (Sp)

**FHD 6060. Human Development Theories.** Overview of major developmental theories, including contributions from philosophical, personality, and learning theories. Explores epistemology, ethology, and systems theories relating to human development. Prerequisite: FHD 1500 or equivalent. (3 cr) (F)

**FHD 6070. Family Theories.** Critical review and assessment of theories in family research, along with construction and application of family theory. Prerequisite: FHD 2400 or equivalent. (3 cr) (F)

**FHD 6200. Topical Seminar in Family Relations.** Selected issues in family relations. Usually offered once per year. Semester taught will vary. (3 cr) ®

**FHD 6310. Survey of Marriage and Family Therapy.** Overview of marriage and family therapy models. Historical development of marriage and family therapy as a profession and a practice. Restricted to FHD Marriage and Family Therapy master's students. (3 cr) (F)

**FHD 6320. Foundations of Marriage and Family Therapy.** Epistemological and philosophical directions of marriage and family therapy, beginning with early applications of General Systems theories and cybernetics through constructivist and postmodern frameworks. (3 cr) (F)

**FHD 6330. Marriage and Family Therapy Practice I: Traditional Approaches.** Traditional approaches to marriage and family therapy, with a focus on individual and couple issues, including sexuality and personality issues within a systems framework. Prerequisite: FHD 3110 or equivalent. (3 cr) (Sp)

**FHD 6340. Marriage and Family Therapy Practice II: Contemporary Approaches.** Contemporary approaches to marriage and family therapy. Focuses on couple and family interaction issues, including conflict, parenting, and other common family problems. (3 cr) (Sp)

**FHD 6350. Clinical Practice in Marriage and Family Therapy.** Selected clinical issues in marriage and family therapy. (3 cr) (Sp) ®

**FHD 6360. Ethical and Professional Development in Marriage and Family Therapy.** Ethical, legal, and professional issues in marriage and family therapy. (3 cr) (F)

**FHD 6370. Assessment in Marriage and Family Therapy.** Development, application, and interpretation of major individual and family assessment techniques used in marriage and family therapy practice and research. (3 cr) (Sp)

**FHD 6380. Topical Seminar in Marriage and Family Therapy.** Selected issues in marriage and family therapy. (1-3 cr) (F,Sp,Su) ®

**FHD 6390. Practicum in Marriage and Family Therapy.** Supervised clinical experience in marriage and family therapy. Prerequisites: Admission to Marriage and Family Therapy emphasis and instructor's permission. (1-6 cr) (F,Sp,Su) ®

**FHD 6500. Topical Seminar in Human Development.** Selected issues in human development. Usually offered once per year. Semester taught will vary. (3 cr) ®

**FHD 6900. Topical Seminar in Family and Human Development.** Selected issues in family and human development. Usually offered once per year. Semester taught will vary. (3 cr) ®

**FHD 6960. Readings and Conference.** Directed independent study of topics preselected by faculty and student. Prerequisite: Instructor's permission. (1-6 cr) (F,Sp,Su) ®

**FHD 6970. Thesis Research.** Research for master's thesis, arranged with advisor. Prerequisite: Advisor's permission. (1-6 cr) (F,Sp,Su) ®

**FHD 6980. Graduate Practicum.** Application of family and human development skills and knowledge in a supervised setting, as arranged by advisor. Prerequisite: Advisor's permission. (1-9 cr) (F,Sp,Su) ®

**FHD 6990. Continuing Graduate Advisement.** Continuing registration to complete thesis requirements. Prerequisite: Six credits of FHD 6970. (1-3 cr) (F,Sp,Su) ®

**FHD 7060. Advanced Research and Theory in Human Development.** Critical review of research and theories in human development. Prerequisite: FHD 6060 or equivalent. (3 cr) (F)

**FHD 7070. Advanced Research and Theory in Family Relations.** Critical review of research and theories in marriage and family relationships. Prerequisite: FHD 6070 or equivalent. (3 cr) (Sp)

**FHD 7080. Professional Development.** Capstone course for doctoral students, emphasizing issues related to professional development (e.g., grant writing, publishing, vitae development, interview skills, developing a research agenda, networking, ethics, professional conduct, teaching, etc.). (3 cr) (F)

**FHD 7200. Topical Seminar in Family Relations.** Selected issues for advanced professionals in family relations. Usually offered once per year. Semester taught will vary. (3 cr) ®

**FHD 7500. Topical Seminar in Human Development.** Selected issues for advanced professionals in human development. Usually offered once per year. Semester taught will vary. (3 cr) ®

**FHD 7900. Topical Seminar in Family and Human Development.** Selected issues for advanced professionals in family and human development. Usually offered once per year. Semester taught will vary. (3 cr) ®

**FHD 7960. Readings and Conference.** Directed independent study of topics preselected by faculty and student. Prerequisite: Instructor's permission. (1-6 cr) (F,Sp,Su) ®

**FHD 7970. Dissertation Research.** Research for dissertation, as arranged with advisor. Prerequisite: Advisor's permission. (1-9 cr) (F,Sp,Su) ®

**FHD 7980. Advanced Graduate Practicum.** Professional supervision of doctoral students, applying general principles from the study of research in family and human development. Prerequisite: Advisor's permission. (1-9 cr) (F,Sp,Su) ®

**FHD 7990. Continuing Graduate Advisement.** Continuing registration to complete dissertation requirements. Prerequisite: Twenty credits of FHD 7970. (1-9 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

Department of  
**Forest, Range, and Wildlife Sciences**  
 College of Natural Resources

**Interim Head: Associate Professor** *David W. Roberts*, forest ecology, forest modeling, vegetation ecology  
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**Professors** *John A. Bissonette*, Leader, Utah Cooperative Fish and Wildlife Research Unit, landscape ecology, terrestrial vertebrate ecology; *James E. Bowns*, range ecology; *F. E. "Fee" Busby*, Dean of College of Natural Resources, effects of livestock grazing; *Martyn M. Caldwell*, Director Ecology Center, plant physiological ecology; *Michael R. Conover*, animal behavior, wildlife damage management; *Raymond D. Dueser*, Associate Dean of College of Natural Resources, terrestrial ecology, mammalian biology; *James N. Long*, forest ecology, silviculture; *John C. Malechek*, rangeland management; *Frederick D. Provenza*, range animal production; *Neil E. West*, rangeland desertification/condition/trend; *Michael L. Wolfe*, wildlife ecology and management; **Research Professor** *Frederick F. Knowlton*, Predator Ecology and Behavior Project, predator ecology, behavior and management; **Adjunct Professors** *Douglas A. Johnson*, plant ecophysiology; *Jesse A. Logan*, forest insect ecology, disturbance ecology, dynamical systems analysis; **Professors Emeriti** *Thadys W. Box*, range management; *Theodore W. Daniel*, silviculture; *John A. Kadlec*, wetlands ecology, wildlife management; *Ronald M. Lanner*, forest genetics, dendrology; *Frederic H. Wagner*, wildlife ecology, natural resources policy; *John P. Workman*, range economics; **Associate Professors** *Frederick A. Baker*, forest pathology, computer applications; *Roger E. Banner*, range extension specialist; *Christopher A. Call*, vegetation manipulation/management; *Thomas C. Edwards, Jr.*, Utah Cooperative Fish and Wildlife Research Unit, spatial ecology, habitat modelling, biostatistics; *Michael J. Jenkins*, disturbance ecology and management, insects, fire, snow avalanches; *Michael R. Kuhns*, forestry extension specialist, urban forestry, tree physiology; *Terry A. Messmer*, fisheries and wildlife extension specialist, wild ungulate and waterfowl management, wetlands ecology, private land management, conservation communication; *Brien E. (Ben) Norton*, grazing ecology, international range management; *R. Douglas Ramsey*, remote sensing, geographic information systems, landscape ecology, spatial analysis; *Eugene W. Schupp*, plant population ecology and restoration ecology; *Helga Van Miegroet*, forest soils and biogeochemistry; **Extension Associate Professor** *Charles W. Gay*, Associate Vice President for Extension and Associate Director of Cooperative Extension; **Research Associate Professor** *Leila McReynolds Shultz*, plant taxonomy and geography; **Adjunct Associate Professors** *Dale L. Bartos*, range ecology; *Mark W. Brunson*, social science aspects of forest and rangeland management; conservation ecology, biometrics, spatial ecology; *D. Layne Coppock*, animal production systems/technology transfer and international pastoral development; *John L. Crane Jr.*, environmental resource management; *Thomas A. Jones*, native grass breeding; *Kenneth C. Olson*, grazing livestock nutrition; *James A. Pfister*, poisonous range plants; *Michael H. Ralphs*, poisonous plants/grazing management; *Robert H. Schmidt*, wildlife policy, wildlife damage management; **Associate Professor Emeritus** *Gar W. Workman*, wildlife ecology and management; **Assistant Professors** *Nicole L. McCoy*, natural resource economics; *Karen E. Mock*, conservation genetics and applied molecular ecology; *Ronald J. Ryel*, plant physiological ecology; **Extension Assistant Professor** *Richard C. Etchberger*, Uintah Basin Campus, wildlife-habitat relationships, natural resources education; **Research Assistant Professors** *Thomas J. DeLiberto*, Predator Ecology and Behavior Field Station, veterinary medicine of wild species; *Eric M. Gese*, Predator Ecology and Behavior Field Station, predator behavior and ecology; **Non-tenure-track Assistant Professor** *Barbara J. Bentz*, forest entomology; **Adjunct Assistant Professors** *Thomas A. Monaco*, research ecologist; *William C. Pitt*, Acting Station Leader and wildlife research biologist, Predator Ecology and Behavior Field Station; **Assistant Professor Emeritus** *Barrie K. Gilbert*, wildlife ethology, behavioral ecology; **Adjunct Instructors** *Carla G. Heister*, natural resource library and information systems; *Jon Keith Schnare*, timber harvest planning and logging methods; **Lecturer** *Laura O'Brien*, remote sensing, geographic information systems, web-based instruction

**Degrees offered:** Bachelor of Science (BS), Master of Science (MS), and Doctor of Philosophy (PhD) in Forestry; BS in Rangeland Resources; BS in Fisheries and Wildlife; MS and PhD in Ecology; MS and PhD in Range Science; and MS and PhD in Wildlife Biology

**Undergraduate emphases:** *Fisheries and Wildlife*—Conservation Biology, Problem Wildlife Management, and Wildlife; *Rangeland Resources*—Rangeland Ecology, Rangeland Restoration, Rangeland Resource Specialist, and Rangeland Stewardship

**Graduate specializations:** *MS, PhD in Ecology*—Conservation Biology, Wildlife Ecology; *MS, PhD in Wildlife Biology*—Conservation Biology, Problem Wildlife Management, Wildlife Management

## Undergraduate Programs

### Objectives

The Department of Forest, Range, and Wildlife Sciences offers three undergraduate degrees: Forestry, Rangeland Resources, and Fisheries and Wildlife. These degree programs offer broad educational opportunities for students interested in the analysis and management of forest and rangeland ecosystems and their associated wildlife populations. The department's philosophy of education is to promote a broad interdisciplinary approach to natural resources analysis, management, and science.

### Requirements

**Admission Requirements.** Admission requirements for the Department of Forest, Range, and Wildlife Sciences are the same as those described for the College of Natural Resources on pages 100-101.

**Graduation Requirements.** All Natural Resources core courses and all courses listed as major subject courses must be taken on an *A-B-C-D-F* basis. A grade of *C-* or better is required for all Forest, Range, and Wildlife Sciences courses used to meet the requirements for a major or minor in the department. The grade point average for all courses taught by the College of Natural Resources must be 2.5 or higher.

In addition to completing the University Studies course requirements, all students earning an undergraduate degree in the College of Natural Resources must complete six core courses (college core) in natural resource science and management: EnvS 2340 (BSS); Geog 1130 (BPS) or Geol 1150 (BPS); NR 2220, 3000, 3600 (QI), and 4000. Students must also complete a series of basic lower-division courses providing the disciplinary foundation for the natural resource professions before moving on to professional coursework. Some foundation and core courses may be used toward the University Studies requirements, as indicated by the University Studies designations listed in parentheses following the course numbers.

The first two years of study in the Department of Forest, Range, and Wildlife Sciences are designed to provide students with a sound background in the natural sciences, an introduction to the field of natural resources management, and an introduction to their respective major. The last two years are designed to provide an advanced understanding of natural resource management and science, depth concentration in the major, and experience with the integration of scientific and management concepts across a diversity of disciplines and management scenarios. Students are expected to enroll for 15 or more credits of coursework per semester.

**Bachelor of Science in Forestry.** Students must meet the course requirements for University Studies, the college core, and the majors curriculum listed below, including a required four-week summer camp (FRWS 3100). Supporting math and science courses include: Biol 1210, 1220 (BLS); Chem 1110; Engl 1010 (CL), 2010 (CL); Math 1100 (QL); Spch 1050 (CI); Stat 2000 (QI); USU 1300 (BAI). Forestry core courses include: AWER 3700; EnvS 1990 or FRWS 1990; EnvS 3300, 4000 (DSS), 4400, 5300; FRWS 3220, 3250, 3500, 4270, 4300, 4520, 4540, 5420 (CI), 5510; NR 5000; Soil 3000.

**Bachelor of Science in Rangeland Resources.** Students must meet the course requirements for University Studies, the college core, and the following majors curriculum. Supporting math and science courses include: Biol 1210, 1220 (BLS); Chem 1210, 1220 (BPS), 1230; Math 1100 (QL); Stat 2000 (QI) or 3000 (QI). Rangeland Resources core courses include: Econ 1550 (BSS); FRWS 1990, 2910, 3500, 4450, 4980, 5410 (QI/CI), 5610; Soil 3000.

For information about required courses in the emphasis areas, students should confer with a departmental advisor.

**Rangeland Resources Minor.** Students wishing to complete a minor in Rangeland Resources should contact the department head in NR 210.

**Bachelor of Science in Fisheries and Wildlife.** The Fisheries and Wildlife major is jointly administered by the Department of Forest, Range, and Wildlife Sciences (FRWS) and the Department of Aquatic, Watershed, and Earth Resources (AWER). Students interested in the Fisheries and Wildlife—Wildlife emphasis and the Fisheries and Wildlife—Problem Wildlife Management emphasis should declare the major in FRWS. Those interested in the Fisheries and Wildlife—Conservation Biology emphasis may declare the major in either FRWS or AWER.

Students in the Fisheries and Wildlife major must meet the course requirements for University Studies, the college core, and the following majors curriculum. Supporting math and science courses include: Biol 1210, 1220 (BLS); Chem 1210, 1220 (BPS), 1230, 1240; Math 1050 (QL), 1100 (QL); Phyx 2110; Stat 3000 (QI). Fisheries and Wildlife core courses include: AWER 3100 (CI), 3110, 4500; FRWS 3200 (CI), 3210, 3300, 3400, 4400 (or AWER 4510), 4980, and one management core course (see major requirement sheet for listing of courses). Elective courses are chosen in consultation with a faculty advisor and may include one of the following areas of emphasis.

Students pursuing the **Fisheries and Wildlife—Conservation Biology** emphasis are required to take Biol 3200 (QI), 5250 (CI); FRWS 5800. Students are also strongly encouraged to take AWER 6750.

Students pursuing the **Fisheries and Wildlife—Problem Wildlife Management** emphasis are required to take Biol 5560, 5580; FRWS 5100, 5300.

Students pursuing the **Fisheries and Wildlife—Wildlife** emphasis are required to take Biol 3400; Biol 5560 or 5580; FRWS 3500, 5070.

**Fisheries and Wildlife Minor.** The minor is designed for students with a strong background in biology. Approval of the department head and completion of a minimum of 19 credits are required. Course requirements include: AWER 3100 (CI); FRWS 3200 (CI); NR 2220, 3000; and two of the following courses: EnvS 4110; FRWS 3300, 3400, 5400.

### Financial Assistance

The main opportunities for undergraduates to find financial support through grants, work-study, and loans are listed on pages 22-25 in the *Financial Aid and Scholarship Information* section. In addition, more than 30 scholarships for eligible students in the College of Natural Resources are listed on pages 37-38 of the same section. Some students may be able to find paid internships with private or governmental organizations, or work for a faculty

member on a research project. Interested persons should contact the department for more information on financial assistance for undergraduate students.

### ***Additional Information***

The undergraduate program may be tailored to individual student needs with the help of a faculty advisor. For additional information about the degree requirements, course sequencing, and departmental specialization options and their related coursework, as well as updated information describing current programs and courses offered by the Department of Forest, Range, and Wildlife Sciences, visit the Forest, Range, and Wildlife Sciences main office, Natural Resources 206, or visit <http://www.cnr.usu.edu> and link to the departmental website.

## ***Graduate Programs***

### ***Admission Requirements***

The Department of Forest, Range, and Wildlife Sciences offers opportunities for graduate study through MS and PhD degree programs in Ecology, Forestry, Range Science, and Wildlife Biology. The department also offers opportunities to participate in a college-wide Master of Natural Resources (MNR) degree program administered through the College of Natural Resources. The MNR is described more fully on page 374.

The programs of instruction and research leading to graduate degrees in the department are available only to students meeting high scholastic standards who are accepted for study by the departmental faculty. Students desiring entrance to these graduate programs should contact the department head for information concerning eligibility.

USU School of Graduate Studies general admission requirements are described on pages 72-73. Applicants for graduate study in the department should have a bachelor's degree from an accredited college or university, a cumulative GPA of at least 3.0 (out of 4.0), and GRE scores (quantitative and verbal) above the 40th percentile. Foreign students should submit a TOEFL score of at least 550. Exceptions to these standards will be considered on a case-by-case basis. Written statements of interest help match applicants with faculty advisors. A faculty member must agree to serve as the major professor in order for an applicant to be accepted for study. Prospective students are encouraged to contact faculty members early in the application process to investigate mutual interests, projects, and prospects for financial support.

A natural resources baccalaureate degree is not required for admission to the department, although a sound background in the natural sciences is strongly recommended. Students lacking the requisite background will work with their supervisory committee to address deficiencies.

### ***Degree Programs***

The MS degree is offered for students motivated toward a management or administrative career in natural resources management. The MS may be obtained through either a Plan A (research thesis) or Plan B (nonthesis) program, as described on page 77. The **Plan A** option requires a thesis based on original research conducted by the student. The **Plan B** option is recommended for professional forestry, rangeland, or wildlife managers who do not

desire research training. The PhD degree is intended for students seeking a natural resources research or academic career. Comprehensive exams (both oral and written) are required in the doctoral program.

The minimum requirement for an MS degree is 30 credits, including at least 24 credits in residency and 6 credits of thesis research. The minimum requirement for a PhD degree is 60 approved graduate credits in addition to an MS degree, or 90 approved graduate credits with no MS degree. At least one year (a minimum of 32 credits), including a minimum of two consecutive semesters, of full-time registration must be in residence at USU.

With committee approval, graduate credit may be transferred from accredited graduate schools, provided the minimum residency requirement (including thesis and dissertation credit) at USU is met. Transfer credit, which must not have been used for any other degree, will be shown on official USU transcripts at completion of the degree.

### ***Research***

Cooperation with other departments and research centers of the University, as well as with government collaborators, permits strong graduate programs in all aspects of forest, range, and wildlife-related sciences. Particular mention should be made of the USU Ecology Center, in which the Forest, Range, and Wildlife Sciences Department is very active; the Utah Agricultural Experiment Station, which has a full program in both applied and basic research; the Utah Cooperative Fisheries and Wildlife Research Unit; the Predator Ecology and Behavior Field Station; the Jack H. Berryman Institute; the Center for Water Resources Research; the U.S. Forest Service Rocky Mountain Forest and Range Experiment Station; and the USDA Agricultural Research Service. The Institute for Land Rehabilitation, located within the department, acts as a clearinghouse of information on land reclamation, especially semiarid rangelands. The International Pastoral Production Institute, also located within the department, offers training in production systems for developing nations.

### ***Financial Assistance***

General aspects of financial support for graduate students at Utah State University are listed on pages 71-72 in the *Graduate Financial Assistance* section. This includes important information on the University-wide policies and terms of reference for research and teaching assistantships, graduate tuition obligations and benefits, Western Regional Graduate Programs, and competitive University-wide fellowships and scholarships. The College of Natural Resources also offers a limited number of Quinney Doctoral Fellowships for incoming doctoral students.

Graduate research assistantships may be available on a competitive basis to both MS and PhD students through major professors having contracts, grants, or other awards from the University, private sector, or government agencies. These assistantships vary in the amount of support offered, but they commonly offer a stipend to help cover living expenses and operating funds to carry out the research. Other benefits may include assistance with tuition and student health insurance, as well as opportunities to travel.

The department also has a few graduate teaching assistantships for students who help with teaching, grading, or recitation in large courses. These typically pay only a modest supplement on a semester basis, however, and are not sufficient to cover living expenses. Domestic PhD students on a research assistantship in some departmental degree programs are required to hold at least

one teaching assistantship during their program, to obtain experience in classroom (mainly undergraduate) instruction. MS students may also hold teaching assistantships, contingent upon availability of funds. Acceptance to pursue graduate study does not guarantee the student financial assistance.

### **Additional Information**

For more information about graduate programs and departmental faculty and their research emphasis areas, as well as updated information describing current programs and courses offered by the Department of Forest, Range, and Wildlife Sciences, visit the Forest, Range, and Wildlife Sciences main office, Natural Resources 206, or visit <http://www.cnr.usu.edu> and link to the departmental website.

## **Forest, Range, and Wildlife Sciences Courses (FRWS)**

**FRWS 1990. Professional Orientation.** Introduction to forestry, range, wildlife, and related careers. Offers new students an orientation to College of Natural Resources faculty, college and University programs, careers in natural resources, and professional societies. (1 cr) (F)

**FRWS 2200 (BLS). Ecology of Our Changing World.** Foundations of ecological and evolutionary relationships of organisms with other organisms and with the physical environment, emphasizing populations, communities, and ecosystems. Integration of basic science with applications of science to understanding human interactions with the environment. (3 cr) (F,Sp) ©

**FRWS 2210. Basic Wildfire Suppression.** Trains individuals in basic wildfire behavior and suppression. Qualifies student to function as a member of a wildfire suppression crew. (2 cr) (Sp)

**FRWS 2250. Introductory Internship/Co-op.** Introductory-level educational experience in internship/cooperative education position approved by department. (1-3 cr) (F,Sp,Su) ®

**FRWS 2300. Mushroom Identification.** Lecture course covering taxonomy, ecology, and importance of macro and micro fungi. Also taught as Biol 2300. (1 cr) (F)

**FRWS 2310. Mushroom Identification Lab.** Lab course acquainting students with basic fungal taxonomic groups. Students collect, preserve, and identify fungi they collect. Edible fungi prepared and eaten. Also taught as Biol 2310. (1-2 cr) (F) ®

**FRWS 2910. Professional Leadership Seminar.** Development of professional leadership and communication skills, including mission statements, time management, and team building. (1 cr) (F)

**FRWS 3050 (DSC). Ecology of Logan Canyon and Vicinity.** Examines natural and human-caused changes in biological and physical features in the local landscape through time. Emphasizes how ecological knowledge and a sense of place can help people to better understand local environmental issues. Also taught as Geol 3050. (3 cr) (F)

**FRWS 3100. Natural Resources Field Experience.** Fundamentals of ecology and field practice for natural resource managers, including basic measurements and field orientation. Graded pass/fail only. (6 cr) (Su)

**FRWS 3200 (CI). Wildlife Diversity.** Natural history (identification, distribution, life history, physiology, and behavior) of North American vertebrates, especially game birds and mammals and threatened species. Emphasis on ecological, behavioral, and evolutionary aspects of special relevance to management. Prerequisite: Biol 1220. (3 cr) (Sp)

**FRWS 3210. Wildlife Diversity Laboratory.** Laboratory and field course in species identification; techniques of sex/age determination; and interpretation of morphological, physiological, and behavioral adaptations. Prerequisite: FRWS 3200 (may be taken concurrently). (1 cr) (Sp)

**FRWS 3220. Biology of Woody Plants.** Introduction to biology of woody plants, including their morphological, anatomical, physiological, and reproductive attributes; evolutionary relationships; distribution patterns; and utility to humans. Prerequisite: Biol 1220 or permission of instructor. (4 cr) (F)

**FRWS 3250. Forest Ecology.** Principles and concepts of forest ecology. Forest environments, woody plant ecophysiology, forest ecosystem structure and function, and forest community ecology. (4 cr) (F)

**FRWS 3300. Management Aspects of Wildlife Behavior.** Principles, concepts, and mechanisms of animal behavior, emphasizing behavioral ecology, development, and comparative aspects of special relevance to management of fish and wildlife. (3 cr) (F)

**FRWS 3400. Fish and Wildlife Populations.** Explores fundamentals of how and why animal populations change over time. Strong quantitative approach used to show how these fundamentals apply to fisheries and wildlife management. Prerequisites: NR/Biol 2220, Math 1100. (3 cr) (F)

**FRWS 3500. Computer Applications in Natural Resources.** Advanced spreadsheet, graphics, aerial photography, and Geographic Information Systems for natural resource management. (3 cr) (F)

**FRWS 3750. Geographic Applications in Remote Sensing.** Overview of remote sensing systems, including principles, techniques, and applications of both aerial photography and satellite images. Provides information needed to understand and apply remote sensing to a wide range of resource applications. (3 cr) (Sp)

**FRWS 4000. Fundamentals of Grazing Land Management.** Explores ecological basis for sustainable land use under grazing by domestic and native herbivores. Explains how to translate knowledge of grazing impacts into rangeland management guidelines. (3 cr) (Sp)

**FRWS 4050. Urban Fish and Wildlife Management.** Concentrates on: understanding impacts of urbanization on wildlife and habitat; developing basic understanding of wildlife needs; completing urban wildlife habitat inventory; and preparing urban wildlife conservation and management plan. (3 cr) (F,Sp,Su) ©

**FRWS 4200. Wildlife Law Enforcement.** Review of principles of state and federal statute regulations pertaining to fish and wildlife. Discussion of rights of the individual, apprehension of violators, and collection of evidence and its use in court. (2 cr) (F)

**FRWS 4250. Advanced Internship/Co-op.** Advanced-level educational experience in internship/cooperative education position approved by department. (1-9 cr) (F,Sp,Su) ®

**FRWS 4270. Silviculture.** Application of principles and concepts from forest ecology to control the establishment, composition, structure, and growth of forests to achieve the objectives of management. Prerequisite: FRWS 3250. (4 cr) (F)

**FRWS 4300. Forest Measurements.** Measurements of timber in log, tree, and stand; log rules and scaling; statistical methods useful in analyzing forest data; and timber cruising practices. Prerequisites: Stat 2000, Math 1100, NR 3600, FRWS 3500. (3 cr) (Sp)

**FRWS 4400. Terrestrial Ecology Laboratory.** Field and laboratory analysis of terrestrial populations, communities, and ecosystems, with emphasis on hypothesis testing and decision-making. Prerequisites: NR/Biol 2220 (may be taken concurrently), Stat 3000. (3 cr) (F)

**FRWS 4450. Rangeland Plants.** Identification, ecology, and uses of plants on rangelands of western North America. (3 cr) (F)

**FRWS 4520. Wildland Fire Management and Planning.** Fire as a resource management tool, with applications in forest, range, and wildlife management. Fire ecology, policy, prescription planning, economics, behavior, and management. (2 cr) (Sp—2nd Half)

**FRWS 4540. Forest Harvest and Utilization.** Elements of timber harvest systems, including policies and practices for minimizing biophysical impacts. Utilization of wood resources. (2 cr) (F)

**FRWS 4810. Directed Reading in Wildlife Damage Management.** Focuses on wildlife damage management, especially as it reflects on both positive and negative human-wildlife interactions. For this reading course, students work with instructor to develop appropriate and rigorous reading program. (2 cr) (F,Sp,Su) ©

**FRWS 4950. Special Topics.** Individual study and research upon selected problems. Prerequisite: Advisor approval. (1-3 cr) (F,Sp,Su) ®

**FRWS 4960. Directed Readings.** Individual reading research on forest, range, and wildlife science readings. Prerequisite: Departmental approval. (1-3 cr) (F,Sp,Su) ®

**FRWS 4970. Undergraduate Research.** Individual or team research. Prerequisite: Advisor approval. (1-3 cr) (F,Sp,Su) ®

**FRWS 4980. Undergraduate Seminar.** Intended to bring upperclassmen up-to-date on topics in forest, range, and wildlife sciences. (1 cr) (F,Sp) ®

**\*FRWS 5000. Predator Ecology and Management.** Reviews biology, ecology, theory, management, and policy issues involving large vertebrate predators. Uses case histories to explore predation theory, population ecology, natural history, and management strategies. (3 cr) (Sp)

**FRWS 5070 (d6070).<sup>1</sup> Range Wildlife Relations.** Explores interactions on rangelands between wild and domestic ungulates, as well as other wildlife forms around the world, but with emphasis on western North America. Prerequisite: NR 3000 or equivalent. (3 cr) (F)

**FRWS 5100. Wildlife Management Laboratory.** Familiarizes students with variety of wildlife management and research techniques and strategies, including techniques to catch, mark, and restrain wild animals; monitoring wildlife populations; measuring physiological parameters; measuring habitat variables; assessing and preventing wildlife damage; and interpreting and analyzing biological data. (3 cr) (F)

**FRWS 5150. Conflict Management in Natural Resources.** Introduction to conflict management techniques for those involved in natural resource management. (2 cr) (Sp)

**FRWS 5220 (d7220). Community-based Conservation Partnerships.** Seeks to infuse ecology with applied conservation and management approaches. Conservation and management of natural resources requires an understanding of ecological rela-

tionships and strategies for working with diverse stakeholders. PhD-level students present their research. (3 cr) (Sp)

**FRWS 5250 (d6250). Remote Sensing of Land Surfaces.** Basic principles of radiation and remote sensing. Techniques for ground-based measurements of reflected and emitted radiation, as well as ancillary data collection to support airborne and satellite remote sensing studies in agriculture, geography, and hydrology. Prerequisites: Basic calculus and physics. Also taught as BIE 5250/6250 and Bmet 5250/6250. (4 cr) (Sp)

**\*\*FRWS 5270. Principles and Practices of Intensive Silviculture.** Familiarizes student with silvicultural methods appropriate for intensive forest management, including artificial regeneration and the assessment and control of basic growth and yield relations. Prerequisite: FRWS 4270. (3 cr) (Sp)

**\*FRWS 5290. Pastoral Production Systems.** Interdisciplinary approaches to understanding the dynamics of pastoral systems in economically developed and less-developed settings. Influences of culture, economics, and environment on resource management. Change and sustainability in pastoral systems. Innovations to enhance productivity or better mitigate risk. (3 cr) (Sp)

**FRWS 5300 (d7300). Wildlife Damage Management Principles.** Explains current legal, ethical, and biological principles for the control and/or management of problem vertebrate species. (3 cr) (Sp)

**FRWS 5350 (d6350). Wildland Soils.** Application of basic principles of soil science to wildland ecosystems. Effects of disturbance and land use on wildland soil properties. Role of soils in natural resource management. Prerequisites: Chem 1110; Soil 3000, and one additional upper-division Soils course, or permission of instructor. Also taught as Soil 5350/6350. (3 cr) (Sp)

**FRWS 5400. Community and Ecosystem Concepts in Fisheries and Wildlife Management.** Reviews factors controlling number of species, and their absolute and relative abundances in different habitats. Analyzes how species influence ecosystem structure and function (e.g., productivity, nutrient cycling, etc.). (3 cr) (Sp)

**FRWS 5410 (CI, QI). Vegetation Analysis for Livestock and Wildlife.** Methods and analytical procedures for measuring and assessing vegetation used by livestock and wildlife as forage and cover. Prerequisite: Stat 2000 or equivalent. (4 cr) (F)

**FRWS 5420 (CI). Forest Pathology.** Nature, cause, and management of forest diseases. Also taught as Biol 5420. (2 cr) (Sp)

**FRWS 5430. Advanced Forest Pathology.** In-depth exploration of forest pathology issues, focusing on ecosystem-level processes. (2 cr) (Sp)

**FRWS 5450 (d7450). Wildlife Sociobiology.** Examines wildlife communication, reproductive tactics, mating systems, parent-offspring conflicts, and social behavior. (3 cr) (Sp)

**FRWS 5460. Avalanche and Snow Dynamics.** Fundamentals of snow and avalanche dynamics. Avalanche safety, forecasting, hazard evaluation, and control. (2 cr) (Sp—first half)

**FRWS 5510. Forest Entomology.** Basic insect taxonomy, life histories, structure, and function. Ecological relationships, recognition, and management of insects of economic importance to forestry. Prerequisite: Basic entomology or biology. (2 cr) (F—1st Half)

**FRWS 5610. Wildland Ecosystems.** Structure, function, dynamics, classification, and multiple-resource management of terrestrial ecosystems found in the

Intermountain West. Prerequisites: Introductory courses in soils, plant identification, and ecology. (3 cr) (Sp)

**FRWS 5630. Range Vegetation Manipulation and Management.** Changing composition, structure, and productivity of range vegetation for multiple-use purposes by use of biological, chemical, mechanical, and pyric methods. Prerequisite: Course in general ecology. (3 cr) (F)

**\*FRWS 5640 (d7640). Riparian Ecology and Management.** Explores structure and function of riparian ecosystems and management options for maintaining sustainable ecological function. Prerequisite: NR/Biol 2220, AWER 3700. (3 cr) (Sp)

**FRWS 5650. Urban/Community Forestry.** Social, biological, and administrative aspects of managing urban/community forests, including field and classroom exercises and a management planning project. (3 cr) (Sp)

**FRWS 5660 (d6660). Principles of Geographic Information Systems.** Advanced introductory course in geographic information systems (GIS), with a focus on applications to natural resource research and management. Primary objective is learning basic functions of a GIS for use in data manipulation, data presentation, data inquiry, spatial analysis, modeling, and conversion of data into formats for use in other applications, such as reports and statistical analysis. For more information, visit the following website: <http://online.usu.edu/catalog>. (3 cr) (F,Sp,Su)

**FRWS 5670 (d6670). Principles of Remote Sensing.** Graduate-level introductory course covering principles, techniques, and applications of remote sensing. Designed to provide background necessary to make real use of remote sensing technologies in a variety of natural resource applications, or to stand alone as an up-to-date overview for those having a general interest in remote sensing technologies. For more information, visit the following website: <http://online.usu.edu/catalog>. (3 cr) (F,Sp,Su)

**FRWS 5680 (d6680). Natural Resource Applications of Geographic Information Systems and Remote Sensing Technologies.** Using the principles presented in the introductory courses, students in this project-based course research, apply, and evaluate geographic information systems and remote sensing technologies in relation to real-world, natural resource applications. Prerequisites: FRWS 5660/6660 and 5670/6670. For more information, visit the following website: <http://online.usu.edu/catalog>. (3 cr) (F,Sp,Su)

**FRWS 5710. Disturbance Ecology in Forested Systems.** Examines effects of disturbance on forest ecosystems. (3 cr) (Sp)

**FRWS 5750 (d6750). Applied Remote Sensing.** Covers the application of remote sensing to landcover mapping and resource monitoring at a quantitative level. Students instructed on the effects of atmosphere and surface interaction on the reflectance collected by electro-optical sensors, as well as on the proper use and interpretation of various calibration and classification algorithms. (3 cr) (Sp)

**FRWS 5800. Genetics in Conservation and Management.** Provides general background in conservation genetics. Lectures include some introductory population genetics and molecular techniques, theory, and evolution. After acquiring general understanding of these topics, students are exposed to molecular techniques during built-in hands-on laboratory experience. Recommended prerequisites: Evolution, population genetics, and/or genetics. (3 cr) (Sp)

**\*\*FRWS 5860. Poisonous Range Plants Affecting Livestock.** Poisonous plants of rangelands and their effects on grazing animals, especially livestock. Management practices to reduce or prevent poisoning. Also taught as ADVS 5860. (2 cr) (Sp)

**\*\*FRWS 6000. Grazing Systems.** Overview and analysis of various strategies for managing grazing on rangelands. Special attention given to ecological mechanisms by which a particular grazing system may benefit livestock production or the sustainability of rangeland resources. (2 cr) (Sp)

**FRWS 6050. Rangeland Fire Ecology and Fire Prescription Development.** Provides understanding of the role prescribed and natural fires have in western U.S. rangeland plant communities, and when fire can be used to achieve a specific plant community. Students learn basics of fire behavior and ignition techniques, and how to write prescribed fire use plans. (3 cr) (Su)

**FRWS 6070 (d5070). Range Wildlife Relations.** Explores interactions on rangelands between wild and domestic ungulates, as well as other wildlife forms around the world, but with emphasis on western North America. Prerequisite: NR 3000 or equivalent. (3 cr) (F)

**FRWS 6100 (d7100). Topics in Physiological Ecology of Wildlife.** Explores physiological ecology of wildlife, focusing on sensory factors influencing habitat selection, foraging, and mate choice. Prerequisites: Introductory coursework in biology, behavior, anatomy, and chemistry. Prerequisite: Permission of instructor. (3 cr) (Sp)

**\*FRWS 6150 (d7150). Concepts in Habitat Selection and Foraging Behavior.** Explores fundamental concepts of how animals choose resources within their environment. Employs various optimization models to derive principal hypotheses, design relevant experiments, and interpret field data. Explores real-world applications through extensive readings, commentaries, and problem sets. Prerequisite: NR/Biol 2220 or equivalent. (3 cr) (Sp)

**FRWS 6180. Molecular Population Genetics Laboratory.** Application of molecular techniques to population genetics, ecology, and systematics. Includes experimental and sampling design, and data analysis. Prerequisite: Biol 5170/6170 or permission of instructor. Also taught as Biol 6180. (5 cr) (F)

**\*\*FRWS 6200. Biogeochemistry of Terrestrial Ecosystems.** Inputs, outputs, and cycling patterns of major nutrients. Emphasis on mechanisms for transformations, factors influencing process rates, and the impacts of management and global change on nutrient cycles and air and water quality. Prerequisites: Biol 1220, Soil 3000, Chem 2300 or 2310, or permission of instructor. Also taught as Biol 6200 and Soil 6200. (3 cr) (F)

**FRWS 6240. Graduate Internship/Co-op.** Graduate-level educational experience in internship/cooperative education position approved by department. (1-9 cr) (F,Sp,Su) ®

**FRWS 6250 (d5250). Remote Sensing of Land Surfaces.** Basic principles of radiation and remote sensing. Techniques for ground-based measurements of reflected and emitted radiation, as well as ancillary data collection to support airborne and satellite remote sensing studies in agriculture, geography, and hydrology. Prerequisites: Basic calculus and physics. Also taught as BIE 6250/5250 and Bmet 6250/5250. (4 cr) (Sp)

**FRWS 6270. Advanced Silviculture.** In forestry, there is a trend toward more complex silviculture to implement increasingly complex stand-level objectives. This course covers important techniques used in the development and implementation of silvicultural prescriptions for this sort of stand management. Prerequisite: Permission of instructor. (3 cr) (Sp)

**FRWS 6350 (d5350). Wildland Soils.** Application of basic principles of soil science to wildland ecosystems. Effects of disturbance and land use on wildland soil properties. Role of soils in natural resource management. Prerequisites: Chem 1110; Soil 3000, and one additional upper-division Soils course, or permission of instructor. Also taught as Soil 6350/5350. (3 cr) (Sp)

**FRWS 6400. Ecology of Animal Populations.** Growth, fluctuation, balance, and control of animal populations. Prerequisite: NR/Biol 2220 or equivalent. (4 cr) (Sp)

**FRWS 6420. Vegetation Sampling Design.** Advanced intrastand vegetation sampling design and elementary (nonmultivariate) between stand comparisons, primarily

for research purposes. Prerequisites: Stat 5200; FRWS 6770 (or concurrent enrollment). (4 cr) (F)

**FRWS 6500. Biometry: Design and Analysis of Ecology Research.** Examines research design from statistical perspective, showing how data analysis is largely determined by research design and its implementation. Reviews statistical tools for analysis of ecological data in the context of design. Prerequisite: Graduate standing. (4 cr) (F)

**FRWS 6510. Topics in Spatial Ecology.** Seminars on analysis and interpretation of spatially explicit ecological data. Topics vary yearly, and range from spatial statistics to assessing uncertainty in environmental information systems to spatial analyses of plant and animal populations. Prerequisite: Graduate-level course in statistics. (1-3 cr) (Sp) ®

**FRWS 6610. Regional Terrestrial Ecosystems.** Synthesis of structural functional and regulatory processes and their interactions with humans in terrestrial ecosystems found in the Intermountain West and Great Plains. Prerequisites: NR/Biol 2220, Soil 3000; or equivalent courses. (3 cr) (Sp)

**FRWS 6660 (d5660). Principles of Geographic Information Systems.** Advanced introductory course in geographic information systems (GIS), with a focus on applications to natural resource research and management. Primary objective is learning basic functions of a GIS for use in data manipulation, data presentation, data inquiry, spatial analysis, modeling, and conversion of data into formats for use in other applications, such as reports and statistical analysis. For more information, visit the following website: <http://online.usu.edu/catalog>. (3 cr) (F,Sp,Su)

**FRWS 6670 (d5670). Principles of Remote Sensing.** Graduate-level introductory course covering principles, techniques, and applications of remote sensing. Designed to provide background necessary to make real use of remote sensing technologies in a variety of natural resource applications, or to stand alone as an up-to-date overview for those having a general interest in remote sensing technologies. For more information, visit the following website: <http://online.usu.edu/catalog>. (3 cr) (F,Sp,Su)

**FRWS 6680 (d5680). Natural Resource Applications of Geographic Information Systems and Remote Sensing Technologies.** Using the principles presented in the introductory courses, students in this project-based course research, apply, and evaluate geographic information systems and remote sensing technologies in relation to real-world, natural resource applications. Prerequisites: FRWS 5660/6660 and 5670/6670. For more information, visit the following website: <http://online.usu.edu/catalog>. (3 cr) (F,Sp,Su)

**FRWS 6700. Forest Ecology.** Structure and function of forest ecosystems. Woody plant ecophysiology, environmental biophysics, population and community ecology of forests. Forest vegetation dynamics and succession. Prerequisite: NR/Biol 2220 or equivalent. (3 cr) (Sp)

**FRWS 6710 (d7710). Landscape Ecology.** Focuses on landscape-scale patterns and processes, and ways of understanding ecological complexity. Explores conceptual underpinnings of larger-scale ecology. Emphasizes understanding of current peer-reviewed literature. (3 cr) (Sp)

**FRWS 6740. Physical Processes in Remote Sensing.** Assures that students are well-versed in the science and technology of remote sensing. Covers various algorithms and their ability to extract biophysical information from remotely sensed images. Helps students gain firm knowledge of the capabilities and limitations of these algorithms and their use in understanding landscape level biophysical interactions. (3 cr) (F)

**FRWS 6750 (d5750). Applied Remote Sensing.** Covers the application of remote sensing to landcover mapping and resource monitoring at a quantitative level. Students instructed on the effects of atmosphere and surface interaction on the

reflectance collected by electro-optical sensors, as well as on the proper use and interpretation of various calibration and classification algorithms. (3 cr) (Sp)

**FRWS 6770. Plant Community Ecology.** Theory and concepts of plant community ecology. Plant community composition, distribution in space, and dynamics in time. Species environmental response models, competition theory, statistical predictive models, and concepts of multivariate analysis in plant ecology. Prerequisites: NR/Biol 2220 or equivalent; and ecology core courses (may be taken concurrently). (3 cr) (F)

**FRWS 6800 (d7800). Forest, Range, and Wildlife Sciences Departmental Seminar.** Review of current research by graduate students and faculty. (1 cr) (F,Sp) ®

**\*FRWS 6850 (d7850). Population Ecology.** Using framework of mathematical modeling, reviews basic ecological processes (e.g., competition, predation, and environmental stresses) that determine numbers of individuals in plant and animal populations. (3 cr) (Sp)

**FRWS 6870. Ecology Seminar.** The Ecology Center schedules regular seminars throughout the school year with ecological scientists from other institutions participating. Ecology majors are required to attend a minimum of 10 such lectures. Students should register for fall semester, but attend through spring semester. Also taught as AWER 6870, EnvS 6870, and Biol 6870. (1 cr) (F) ®

**FRWS 6900. Graduate Special Topics.** Offers credit for special assignments, reading, and seminars beyond regularly scheduled courses. (1-6 cr) (F,Sp,Su) ®

**FRWS 6910. Directed Study.** Offers credit for special assignments, reading, and seminars beyond regularly scheduled courses. (1-6 cr) (F,Sp,Su) ®

**FRWS 6960. Graduate General Ecology.** General concepts, history, and issues in all major areas of the science of ecology including: environmental biophysics; and physiological, behavioral, evolutionary, community, ecosystem, and applied ecology in both terrestrial and aquatic environments. Also taught as AWER 6960, Biol 6960, and EnvS 6960. (5 cr) (F)

**FRWS 6970. Thesis Research.** Original research for MS degree on a problem in rangeland resources. (1-12 cr) (F,Sp,Su) ®

**FRWS 6990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

**FRWS 7000. Theory and Applications of Rangeland Ecosystem Management.** Application of range management principles, new theory, and public policy to on-the-ground decision-making in public and private lands. Field trips required. (3 cr) (F)

**\*FRWS 7030. Plant-Herbivore Interactions.** Emphasizes principles of self-organization as applied to plant (tolerance and avoidance of herbivory) and herbivore (food and habitat selection) behavior. Stresses importance of history and ongoing interactions with the environment in understanding the dynamics of plant-herbivore interactions. (3 cr) (Sp,Su)

**FRWS 7100 (d6100). Topics in Physiological Ecology of Wildlife.** Explores physiological ecology of wildlife, focusing on sensory factors influencing habitat selection, foraging, and mate choice. Prerequisites: Introductory coursework in biology, behavior, anatomy, and chemistry; and permission of instructor. (3 cr) (Sp)

**\*FRWS 7150 (d6150). Concepts in Habitat Selection and Foraging Behavior.** Explores fundamental concepts of how animals choose resources within their environment. Employs various optimization models to derive principal hypotheses, design relevant experiments, and interpret field data. Explores real-world applications

through extensive readings, commentaries, and problem sets. Prerequisite: NR/Biol 2220 or equivalent. (3 cr) (Sp)

**\*FRWS 7200. Plant Physiological Ecology.** Plant response to environmental factors; includes environmental biophysics, physical and physiological factors influencing productivity, water use, resistance to stress, reproduction, establishment of plants, and competition with neighboring plants. (3 cr) (Sp)

**FRWS 7220 (d5220). Community-based Conservation Partnerships.** Seeks to infuse ecology with applied conservation and management approaches. Conservation and management of natural resources requires an understanding of ecological relationships and strategies for working with diverse stakeholders. PhD-level students present their research. (3 cr) (Sp)

**FRWS 7300 (d5300). Wildlife Damage Management Principles.** Explains current legal, ethical, and biological principles for the control and/or management of problem vertebrate species. (3 cr) (Sp)

**FRWS 7310. Developing Careers in Research.** Seeking research positions, research funding, the grant proposal and publication process, research directions and career paths, budgeting, the tenure process, and research outside of universities. (1 cr) (F)

**FRWS 7400. Plant Population Ecology.** Dynamics of plant populations as influenced by interactions with their abiotic and, especially, biotic environments. Topics include dormancy and germination strategies, intra- and interspecific competition, facilitation, disturbance, herbivory, pathogenic and mutualistic fungi, pollination, seed dispersal, and vegetative reproduction. (3 cr) (F)

**\*\*FRWS 7420. Analysis of Vegetation Patterns.** Advanced treatment of vegetation sampling, classification, and ordination between stands over landscapes, designed primarily for researchers. Prerequisites: EC (core), FRWS 6420, 6770, Stat 5200, and familiarity with computers. (5 cr) (Sp)

**FRWS 7450 (d5450). Wildlife Sociobiology.** Examines wildlife communication, reproductive tactics, mating systems, parent-offspring conflicts, and social behavior. (3 cr) (Sp)

**FRWS 7640 (d5640). Riparian Ecology and Management.** Explores structure and function of riparian ecosystems and management options for maintaining sustainable ecological function. Prerequisite: NR/Biol 2220, AWER 3700. (3 cr) (Sp)

**FRWS 7710 (d6710). Landscape Ecology.** Focuses on landscape-scale patterns and processes, and ways of understanding ecological complexity. Explores conceptual underpinnings of larger-scale ecology. Emphasizes understanding of current peer-reviewed literature. (3 cr) (Sp)

**FRWS 7800 (d6800). Forest, Range, and Wildlife Sciences Departmental Seminar.** Review of current research by graduate students and faculty. (1 cr) (F,Sp) ®

**\*FRWS 7850 (d6850). Population Ecology.** Using framework of mathematical modeling, reviews basic ecological processes (e.g., competition, predation, and environmental stresses) that determine numbers of individuals in plant and animal populations. (3 cr) (Sp)

**FRWS 7900. Graduate Special Topics.** Offers credit for special assignments, reading, and seminars beyond regularly scheduled courses. (1-6 cr) (F,Sp,Su) ®

**FRWS 7910. Directed Study.** Offers credit for special assignments, reading, and seminars beyond regularly scheduled courses. (1-6 cr) (F,Sp,Su) ®

**FRWS 7970. Dissertation Research.** Original research and study for PhD degree on a problem in range science. (1-12 cr) (F,Sp,Su) ®

**FRWS 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

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<sup>1</sup> Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

# Department of Geology

## College of Science

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**Professors James P. Evans**, structural geology, structural petrology; *W. David Liddell*, marine ecology, paleoecology, sedimentology; **Professor Emeritus Robert Q. Oaks, Jr.**, sedimentary petrology, stratigraphy; **Associate Professors Donald W. Fiesinger**, igneous petrology; *Susanne U. Janecke*, tectonics, structural geology; *Peter T. Kolesar*, carbonate petrology; *Thomas E. Lachmar*, hydrogeology; **Assistant Professors Joel L. Pederson**, process geomorphology, Quaternary geology; *Bradley D. Ritts*, basin analysis; **Adjunct Associate Professors John C. Schmidt**, fluvial geomorphology; *Janis L. Boettinger*, soil mineralogy; **Research Assistant Professor Carol M. Dehler**, sedimentation, geochemical cycles

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), and Master of Science (MS) in Geology; BS in Composite Teaching in Earth Science

**Undergraduate emphases:** *BS in Geology*—Hydrogeology-Engineering Geology and Geoarchaeology; **Graduate Specializations:** *MS in Geology*—Hydrogeology, Igneous Petrology, Paleoecology, Sedimentary Geology, Structural Geology, Tectonics, and Geomorphology

## Undergraduate Programs

### Objectives

Geology is the study of the planet Earth, the materials of which it is made, the processes that act on these materials, the products formed, and the history of the planet and its life forms since its origin. Geology considers the physical forces that act within and on the Earth, the chemistry of its constituent materials, and the biology of its past inhabitants as revealed by fossil evidence. Geologists integrate biology, chemistry, engineering, mathematics, and physics in the study of our natural surroundings. The knowledge thus obtained is used by geologists to explore for energy, mineral, and water resources; to identify geologically stable sites for major structures; and to provide foreknowledge of some of the dangers associated with the mobile forces of a dynamic Earth. Geologists provide fundamental information required by modern society to plan for cultural and industrial development, reduce geological hazards, identify potential resources, and assist in the design of waste-disposal facilities.

The Department of Geology prepares students for professional careers in the geosciences and provides the background required for advanced studies. The department offers three options of study to meet the growing demand for geoscientists with training in general geology (BS in geology without an emphasis), hydroge-

ology-engineering geology, or geoarchaeology. All options provide exposure to the sciences and an appreciation of our physical surroundings. The BS program in Geology meets the curriculum standards established by the American Institute of Professional Geologists.

The department also offers the Composite Teaching Major in Earth Science to prepare teachers of earth science at the secondary school level. Requirements for this major meet or exceed the standards of the National Science Teachers Association. Those students who major in earth science should be aware that state licensure is required of secondary education teachers. The Composite Teaching Major in Earth Science fulfills the requirements that provide eligibility for licensure. Licensure requirements vary from state to state, and students should investigate the requirements for the states in which they intend to seek employment. Advising for the Secondary Teacher Education Program (STEP) and State of Utah secondary education licensure is provided by the USU Department of Secondary Education.

The Department of Geology is housed within the Geology Building, which is located at the northeast corner of the Old Main Quad. The Geology Building provides spacious, well-equipped teaching labs, classrooms, and facilities, including a display and study area for students, computer access, document room, map room, preparation facilities, and research labs.

## General College of Science Requirements

All general College of Science requirements are embedded within the various major requirements listed below. No extra coursework is required to fulfill the general college requirements.

### Requirements

**Departmental Admission Requirements.** New freshmen admitted to USU in good standing qualify for admission to this major. Transfer students from other institutions need a 2.2 GPA, and students transferring from other USU majors need a 2.0 GPA for admission to this major in good standing. Students seeking admission to the Composite Teaching Major in Earth Science should be aware that a 2.75 minimum GPA is required for admission to the Secondary Teacher Education Program (STEP) in the Department of Secondary Education. Students in the Hydrogeology-Engineering Geology emphasis must meet all College of Engineering GPA standards appropriate for the courses to be taken having either the Engr or CEE prefix.

**Field Trips and Labs.** Most Geology courses have required laboratories and/or field trips. Those enrolled are expected to dress properly for the conditions and observe safety precautions issued by the instructors. Most courses require modest lab fees.

**Bachelor of Arts Degree.** For a BA in Geology, the foreign-language requirement must be satisfied in addition to the Bachelor of Science in Geology requirements.

**Bachelor of Science Degree in Geology.** Three options of study are available for a BS in Geology: General Geology (BS in Geology without an emphasis), Hydrogeology-Engineering Geology Emphasis, and Geoarchaeology Emphasis. For a **BS in Geology (General Geology option)**, the following courses are required: Geol 1150, 3200, 3500, 3520, 3550, 3600, 3700, 4500, 4700, 5200; Chem 1210, 1220, 1230, 1240; Phyx 2210, 2220; Math 1210; Stat 3000; CS 1050 or CS 1700 or CEE 5190 or AWER 4930; 12-20 credits of Geology electives; and up to 8 electives in approved, science-related areas. For a list of approved courses, students should see the current major requirement sheet or consult their geology advisor.

For a **BS in Geology (Hydrogeology-Engineering Geology Emphasis)**, the following courses are required: Geol 1150, 3200, 3500, 3550, 3600, 3700, 4700, 5200, 5510, 5600; Chem 1210, 1220, 1230, 1240; Phyx 2210, 2220; Math 1210, 1220, 2250; Engr 2000, 2040, 2200; CEE 3030, 3500; CEE 3430 or 4300; Soil 3000 or 5130.

For a **BS in Geology (Geoarchaeology Emphasis)**, the following courses are required: Geol 1150, 3200, 3500, 3550, 3600, 3700, 4700, 5430, 5680; Chem 1210, 1220, 1230, 1240; Biol 1210, 1220; Math 1210; Stat 3000; CS 1050 or CS 1700 or CEE 5190 or AWER 4930; Anth 1030, 3250, 3300, 4250, 4350, 4360, 5300; Soil 3000 or 5130.

**Bachelor of Science Degree in Composite Teaching—Earth Science.** For the BS in Composite Teaching—Earth Science, the following courses are required: Geol 1150, 2500, 3200, 3500, 3550, 3600, 3700, 4700; Chem 1210, 1220, 1230, 1240; Phyx 1020, 2210, 2220; Math 1210; Stat 3000; CS 1050 or 1700; Phyx

3010 or 3030; EnvS 5110 or FRWS 2200; Bmet 2000; AWER 3000 or Geol 3300; Sci 4300; InsT 5200; ScEd 3100, 3210, 3300, 3400, 4200, 4210, 4300, 4400, 5300, 5500, 5600; SpEd 4000.

**Geology Minor.** A minimum of 18 credits is required for an approved minor in Geology. Required courses are Geol 1100 or 1150; and Geol 3200. Elective geology courses must be numbered 3500 or higher.

**Senior Thesis.** Geology majors in good academic standing may elect to complete a senior thesis. This is an endeavor which normally spans a year in its preparation and presentation. Senior thesis credits may be applied toward the elective requirements in the General Geology option. For further information, students should contact their geology advisor or the geology department head.

**Geology Honors.** Geology majors with a minimum GPA of 3.30 may elect to complete the requirements for the Geology Honors degree option. This is a departmental recognition which is separate from the University Honors program. For further information, students should contact their geology advisor or the geology department head.

## Graduate Programs

### Admission Requirements

See general admission requirements on pages 72-73. In addition, applicants must have acceptable GRE scores. Minimum scores of 40th percentile on the Verbal section and 40th percentile on the Quantitative section and a combined minimum of 1,000 are required. A member of the Geology faculty must agree to serve as the major professor for the applicant prior to acceptance.

Applications will be considered throughout the year, but program entry in fall semester is preferred. Students who wish to be considered for assistantships or other financial aid must have complete applications on file no later than February 15 for entry into the program the following fall semester.

### Prerequisites for Matriculation

Completion of a BS or BA in geology, biology, physics, chemistry, or engineering is required for matriculated status. Suggested prerequisite courses include: Chem 1210, 1220, 1230, 1240; Phyx 2210, 2220; Math 1210; Stat 3000; and CS 1050 or CS 1700 or CEE 5190 or AWER 4930. Deficiencies in geology are determined based on current USU undergraduate degree requirements for either the Geology or Hydrogeology-Engineering Geology option, as appropriate. The following geology courses or their equivalents are expected: Geol 1150, 3200, 3500, 3550, 3600, 3700, 4700, and 5200. It is expected that any deficiencies will be made up before the end of the first year of study.

### Degree Program

**Master of Science Degree.** The department offers advanced study and research opportunities leading to the MS degree in Geology. Although many research specialties require advanced courses selected primarily from Geology offerings, additional

courses may be selected from other departments on campus, such as Civil and Environmental Engineering; Plants, Soils, and Biometeorology; Biology; Mathematics and Statistics; Aquatic, Watershed, and Earth Resources; Environment and Society; and Forest, Range, and Wildlife Sciences.

### **Specializations**

Fields of specialization for graduate research include the following: hydrogeology, igneous petrology, paleoecology (including invertebrate paleontology), sedimentary geology (including petrology, basin analysis, sedimentation, stratigraphy, and petroleum geology), process geomorphology, Quaternary geology, structural geology, and regional tectonics.

### **Degree Requirements**

Only the Plan A thesis option is allowed for the MS degree in Geology. The recommended distribution is 20 credits of coursework and 10 credits of thesis to obtain the required 30 credits for the MS degree. A minimum of five 6000-level geology courses (other than Geol 6800) is recommended for the degree program. Only two grades of less than *B* (*C* to *B-*) will be accepted as part of the required degree program as listed on the "Program of Study for Master's Degree." A 3.0 grade point average must be obtained in required coursework as listed on the Program of Study. Thesis credits will be graded *P-F* only (i.e., no letter grade will be given). Geology graduate students using department or University facilities and/or under geology faculty supervision must register for a minimum of 3 credits every semester, up to and including the semester in which the thesis is cleared by the School of Graduate Studies. Registration may not be required during the summer.

### **Research**

There are six broad areas of research emphasis within the department: (1) sedimentary geology, (2) structural geology (3) regional tectonics, (4) igneous petrology and geochemistry, (5) geomorphology, and (6) hydrogeology.

Research in **sedimentary geology** is diverse: sedimentation and development of coral reefs and associated carbonate environments during Pleistocene and Holocene times, changes in shallow-water carbonate environments through early Paleozoic time, nonmarine siliciclastic depositional systems and petroleum reservoirs, geochemical provenance methods, and large-scale architecture of Mesozoic-Cenozoic intracontinental basins in Asia. Research activities are dominantly field-oriented, and often have a subsurface component. Studies are ongoing in the western United States, Mexico, the Caribbean, China, and west Africa.

Research in **structural geology** includes the examination of the mechanical and chemical evolution of fault zones, the development of fold-and-thrust structures in Idaho, Montana, Wyoming, and Utah, and the characterization of fluid-flow properties in fractured crystalline rocks.

Research in **regional and global tectonics** examines the structural and tectonic development of extensional structures in the Great Basin and Salton Trough, collisional and accretionary tectonics in Pakistan and the southern Appalachians, the relationship of ophiolites to active margin processes, and the application of ba-

sin analysis to the tectonics of basin formation and large scale crustal structures in China, Mongolia, Pakistan, and west Africa.

Research in **igneous petrology and geochemistry** focuses on the origin and evolution of basic to intermediate magmatic systems, and their relationship to global tectonic processes. Current projects include plume-related volcanism and its interaction with continental lithosphere in the Snake River Plain, Idaho, the origin and tectonic evolution of accreted arc terranes, the multi-stage origin of ophiolites, especially the Coast Range ophiolite of California, and the formation and evolution of lunar highlands crust.

**Geomorphology** research includes the study of climate and anthropogenic controls on landscape change and sedimentation; controls on alluvial stratigraphy; hillslope processes; numerical modeling of climate controls on basin stratigraphy; Quaternary landscape evolution of the Grand Canyon; and the integration and evolution of the Colorado River.

Research activity in **hydrogeology** includes wellhead protection in confined to semiconfined aquifers, the relationships between stream losses and water table depths, and the identification and geochemical characterization of groundwater recharge to surface streams.

Geology faculty members commonly interact with the faculty and staff of the Utah Water Research Laboratory; the College of Natural Resources; the Department of Plants, Soils, and Biometeorology; and the Department of Civil and Environmental Engineering.

### **Financial Assistance**

Departmental financial support for incoming graduate students consists primarily of graduate teaching assistantships, which are awarded on a competitive basis. There is often other financial support available, such as research assistantships, resulting from grants or other external funding. Students requesting financial support should apply directly to the department no later than February 15. Admission to the MS program does not guarantee financial assistance.

### **Additional Information**

Additional information on the research activities of faculty and graduate students may be obtained directly from the Department of Geology's website at <http://www.usu.edu/geoldept>.

## **Geology Courses (Geol)**

**Geol 1100 (BPS). Exploring the Changing Earth: Introduction to Geology.** Presents basic principles of geology using a framework of plate tectonics, the central unifying theory of geology. Introduction to earth materials (minerals and various kinds of rocks) and earth processes, both internal and external. Emphasizes the continuum of interrelated events and the various cycles existing both in and on our planet. Three lectures per week (even weeks); two lectures and one lab (odd weeks). (3 cr) (F,Sp,Su) ©

**Geol 1150 (BPS). The Dynamic Earth: Physical Geology.** Physical processes, both internal and external, shaping the Earth. Igneous, metamorphic, and sedimentary environments and products. Emphasizes geology as an applied science, relying on other basic sciences as tools for interpretation and understanding. Three lectures and one two-hour lab per week. (4 cr) (F,Sp)

**Geol 2250. Introductory Internship/Co-op.** Introductory educational work experience. (1-4 cr) (F,Sp,Su) ©

**Geol 2500. Geology Field Excursions.** Geologic features and processes observed in the field. Prerequisite: Geol 1100 or 1150. (1 cr) (F,Sp) ©

**\*Geol 3050 (DSC). Ecology of Logan Canyon and Vicinity.** Examines natural and human-caused changes in biological and physical features in the local landscape through time. Emphasizes how ecological knowledge and a sense of place can help people to better understand local environmental issues. Also taught as FRWS 3050. (3 cr)

**Geol 3100 (DSC). Natural Disasters.** Hazardous geologic processes affecting humans. Cause, prediction, avoidance, and frequency of natural disasters, including earthquakes, volcanic eruptions, tsunamis, landslides, floods, subsidence, meteorite impacts, and global changes. Topics discussed in the context of earth systems and cycles. Three lectures per week. Prerequisite: One Breadth Physical Sciences (BPS) course. (3 cr) (Sp)

**Geol 3110. Natural Disasters Laboratory.** Laboratory exercises and field trips highlighting the relation between humans and local geologic problems. One two-hour lab per week. Prerequisite: Geol 3100 (may be taken concurrently). (1 cr) (Sp)

**Geol 3200 (DSC). The Earth Through Time.** Investigates dynamic nature of Earth's physical and biological processes, and how these processes have shaped Earth's 4.5 billion-year history. Emphasis on interpretation of the story of the geologic record (rocks and landforms) and Earth's sequential physical and biological changes. Three lectures and one two-hour lab per week. Prerequisite: Geol 1100 or 1150. (4 cr) (Sp) ©

**Geol 3300 (DSC). Geology of the World's Oceans.** Geologic evidence for the development of ocean basins and continental margins through plate tectonic processes. Also, the interaction of the geo- and biospheres and their effect on the evolution of the oceans and atmosphere. Discussion of shoreline and marine environments, the organisms inhabiting them, and the physical and chemical processes in operation therein. Three lectures per week. Prerequisite: One Breadth Physical Sciences (BPS) course. (3 cr) (Sp)

**Geol 3500. Mineralogy and Crystallography.** Introduction to crystallography, crystal chemistry, and descriptive mineralogy. Three lectures and one three-hour lab per week. Prerequisites: Chem 1210 and Geol 1150. (4 cr) (Sp)

**Geol 3520. Optical Mineralogy and Petrography.** Introduction to the theory of optical crystallography. Determination of minerals using the petrographic microscope. One lecture and one lab per week. Prerequisite: Geol 3500. (2 cr) (F)

**Geol 3550 (CI). Sedimentation and Stratigraphy.** Classification and analysis of sedimentary rocks and structures, with an emphasis on the interpretation of ancient sedimentary environments. Controls on sedimentary processes over time. Principles of stratigraphic correlation. Three lectures and one lab per week. Prerequisite: Geol 3200. (4 cr) (F)

**Geol 3600. Geomorphology.** Geomorphic processes, origin of landforms and surficial deposits. Emphasizes fluvial and hillslope landscape elements, and surficial geologic mapping. Three one-hour lectures and one three-hour lab per week. Prerequisite: Geol 1100 or 1150 or Geog 1130. Also taught as AWER 3600. (4 cr) (F)

**Geol 3700. Structural Geology.** Examines the mechanisms, mechanics, and geometries of deformed rocks. Basic principles of rock deformation, stress and strain, fault and fold classifications, and the mechanisms by which rocks deform. Lab presents applications and techniques important for accurately describing and representing deformed rocks in maps and cross-sections, and how to interpret and present data on rock structures. Three lectures and one three-hour lab per week. Prerequisites: Geol 3550 and Phyx 2210. (4 cr) (Sp)

**Geol 4250. Advanced Internship/Co-op.** Advanced educational work experience. (1-4 cr) (F,Sp,Su) ©

**\*Geol 4500. Igneous and Metamorphic Petrology.** Origin, processes of formation, classification, and identification of igneous and metamorphic rocks. Study of igneous and metamorphic rocks in hand specimens and thin sections. Three lectures and one three-hour lab per week. Prerequisite: Geol 3500; corequisite: Geol 3520. (4 cr) (F)

**Geol 4700 (CI). Geologic Field Methods.** Collection, recording, and interpretation of geologic data requiring written reports, graphical formats, and oral presentations. Variety of field techniques used to examine variety of geologic deposits, features, and processes. Two extended labs per week. Half semester, early fall; may be paired with Geol 5630. Prerequisite: Geol 3700. (2 cr) (F)

**Geol 4900. Special Problems.** Directed study of selected topics. Written report required. Prerequisite: Permission of instructor. (1-4 cr) (F,Sp) ©

**Geol 5150 (d6150).<sup>1</sup> Fluvial Geomorphology.** Focuses on physical processes in streams that control their shape, plan form, slope, bed material, and distribution of channel bars. Emphasizes field analysis of these topics, and application of geomorphology to aquatic ecology and environmental restoration. Prerequisite: Geol/AWER 3600. Also taught as AWER 5150/6150. (4 cr) (F)

**\*Geol 5160 (d6160). Hillslope and Landscape Geomorphology.** Includes basics of hillslope weathering, transport, and hydrologic processes. Surveys classic and recent literature on hillslope-scale and landscape-scale geomorphic research. Three lectures and several Saturday field trips. Prerequisite: Geol/AWER 3600. Also taught as AWER 5160/6160. (3 cr) (Sp)

**\*Geol 5200. Geology Field Camp.** Integrative approach to examining geologic relationships in the field, deciphering geologic evolution of map regions, and interpreting the structure and distribution of rocks. Results presented in reports, maps, cross-sections, and graphical formats. Requires 40-45 hours of lab per week for 3.5-4.0 weeks. Prerequisites: Geol 3500, 3550, 3600, 3700, 4700. (5 cr) (Su)

**\*Geol 5410 (d6410). Introduction to Clay Mineralogy.** Introduction to and application of techniques, such as x-ray diffraction, differential thermal analysis, and chemical analysis, to study of clay minerals. Examination of the effects of clay mineral structures on physical and chemical properties. Three lectures and one lab per week; half semester. Prerequisite: Geol 3500. (2 cr) (Sp)

**\*Geol 5420. Metallic Mineral Deposits.** Origin and occurrence of metallic mineral deposits, study of representative ore suites, and field trips to active mines. Three lectures and one lab per week. Prerequisite: Geol 4500. (4 cr) (Sp)

**\*Geol 5430. Paleontology.** Survey of prominent microfossil and invertebrate taxa, including their diagnostic morphologic features, stratigraphic ranges, and environmental tolerances. Equips students with the necessary information and techniques to enable them to recognize and utilize fossils in stratigraphic and paleoenvironmental interpretation. Three lectures and one lab per week. Half semester; may be paired with Geol 5440. Prerequisite: Geol 3200. (2 cr) (F)

**\*Geol 5440 (CI) (d6440). Paleocology.** Interrelationships between various organisms and between organisms and their environment. Provides field, laboratory, and quantitative techniques for the interpretation of ancient environments and the analysis of past biotic interrelationships. Three lectures and one lab per week. Half semester; may be paired with Geol 5430. Prerequisite: Geol 5430. (2 cr) (F)

**\*Geol 5460 (d6460). Interpretation of Sedimentary Rocks I.** Detailed interpretation of sedimentary rocks, based on petrography and sedimentary characteristics. Source terranes, tectonic settings, depositional environments, and diagenetic changes during burial. Three lectures and two labs per week. Half semester; may be paired with Geol 5470. Prerequisites: Geol 3500 and 3550. (3 cr)

**\*Geol 5470 (d6470). Interpretation of Sedimentary Rocks II.** Application of field observations, hand-sample, thin-section, and x-ray diffraction analyses to the interpretation of chemical sedimentary rocks. Emphasizes determination of depositional environment and evaluation of diagenetic changes. Three lectures and one lab per week. Half semester; may be paired with Geol 5460. Prerequisites: Geol 3500 and 3550. (2 cr)

**Geol 5480 (d6480). Sedimentary Basin Analysis.** Detailed coverage of techniques of sedimentary basin analysis, including depositional systems, provenance, basin modeling, and fluid and heat flow history. Survey of types of sedimentary basins worldwide. Prerequisites: Geol 3500 and 3550. (3 cr) (F)

**\*Geol 5500 (d6500). Advanced Igneous Petrology.** Advanced concepts in the origin and evolution of magmatic systems, effects of different tectono thermal regimes on magma genesis, magma dynamics, and phase equilibria in magmatic systems. Concepts illustrated by rock suites from classic locations. Three lectures and three laboratory hours each week. Prerequisite: Geol 4500 or equivalent. (4 cr) (F)

**Geol 5510 (QI). Groundwater Geology.** Provides graduate students and senior undergraduates with understanding of fundamental principles of groundwater geology and hydrology, and helps prepare them for careers in hydrogeology or environmental geology. Three lectures per week. Prerequisites: Geol 1150 and Math 1210 or permission of instructor; Geol/AWER 3600 recommended. (3 cr) (F)

**Geol 5520 (CI) (d6520). Hydrogeologic Field Methods.** Methods of collection and analysis of field data for groundwater studies. Three lectures per week. Prerequisite: Geol 5510 or permission of instructor. (3 cr) (Sp)

**Geol 5530 (QI). Exploration Geophysics and Petroleum Exploration.** Applications of gravity, magnetics, electrical/electromagnetic methods, seismic reflection and refraction, borehole logging, and organic geochemistry in exploration for petroleum, groundwater, and ore bodies, and in amelioration of pollution. Three lectures and one two-hour lab per week. Prerequisites: Geol 3550, 3700, and Phyx 2220, or permission of instructor. (4 cr) (Sp)

**\*Geol 5540 (QI) (d6540). Quantitative Methods in Geology.** Application of various quantitative methodologies to geologic problems. Two lectures and one lab per week. (3 cr) (F)

**\*Geol 5550 (d6550). Geochemical Application of Electron Microprobe and X-Ray Fluorescence Analysis.** Theory and application of X-ray fluorescence spectrometry and the electron microprobe to problems in geochemistry and materials analysis. Two hours lecture and six hours laboratory per week. Prerequisite: Chem 1210 or equivalent, or permission of instructor. (4 cr) (Sp)

**Geol 5600. Geochemistry.** Application of thermodynamics, solution chemistry, phase diagrams, and both radioactive and stable isotopes to the understanding of earth processes. Three lectures per week. Prerequisite: Geol 3500. (3 cr) (F)

**\*Geol 5610 (d6610). Tectonic Evolution of North America.** Survey of tectonic styles and processes along plate margins, using the tectonic evolution of western North America as the prime example. Two lectures and one lab per week. Prerequisite: Geol 3700. (3 cr)

**\*Geol 5620 (QI) (d6620). Global Geophysics.** Application of physics to understanding geologic processes, the earth's interior, and the theory of plate tectonics. Two lectures and one two-hour lab per week. Prerequisites: Geol 3700 and Phyx 2220. (3 cr)

**\*Geol 5630. Photogeology.** Interpretation of geologic features on aerial photographs. Three two-hour labs per week. Half semester; may be paired with Geol 4700. Prerequisites: Geol 3600, 3700. (2 cr)

**Geol 5650. Senior Thesis.** Prerequisite: Permission of instructor. (1-4 cr) (F,Sp) ®

**\*Geol 5680 (d6680). Paleoclimatology.** Covers climate through the past four billion years of geologic time. Explores driving forces behind climate changes. Examines data and methods used in paleoclimate research. Includes discussion of literature and stresses local paleoclimate records. Three lectures per week, along with field trips. Prerequisite: Geol/AWER 3600 or permission of instructor. Also taught as AWER 5680/6680. (3 cr) (Sp)

**Geol 5900. Topics for Teachers.** Special topics in geology for elementary and secondary science teachers to provide an understanding of the geology of Utah and the

Western United States. Emphasis on field and lab activities. Prerequisite: Introductory geology course or permission of instructor. (1-4 cr) ®

**Geol 6150 (d5150). Fluvial Geomorphology.** Focuses on physical processes in streams that control their shape, plan form, slope, bed material, and distribution of channel bars. Emphasizes field analysis of these topics, and application of geomorphology to aquatic ecology and environmental restoration. Prerequisite: Geol/AWER 3600. Also taught as AWER 6150/5150. (4 cr) (F)

**\*Geol 6160 (d5160). Hillslope and Landscape Geomorphology.** Includes basics of hillslope weathering, transport, and hydrologic processes. Surveys classic and recent literature on hillslope-scale and landscape-scale geomorphic research. Three lectures and several Saturday field trips. Prerequisite: Geol/AWER 3600. Also taught as AWER 6160/5160. (3 cr) (Sp)

**\*Geol 6250. Mechanics and Processes in Earth Sciences.** Fundamentals of solid and fluid mechanics with applications to the earth sciences. Applications to rock deformation, fluid flow, glacier movement, and slope stability. Designed for graduate students in earth sciences and engineering. Two lectures, one lab per week. Prerequisites: Geol 3700, Math 1210; or permission of instructor. (3 cr) (F)

**\*Geol 6410 (d5410). Introduction to Clay Mineralogy.** Introduction to and application of techniques, such as x-ray diffraction, differential thermal analysis, and chemical analysis, to study of clay minerals. Examination of the effects of clay mineral structures on physical and chemical properties. Three lectures and one lab per week; half semester. Prerequisite: Geol 3500. (2 cr) (Sp)

**\*Geol 6440 (d5440). Paleoecology.** Interrelationships between various organisms and between organisms and their environment. Provides field, laboratory, and quantitative techniques for the interpretation of ancient environments and the analysis of past biotic interrelationships. Three lectures and one lab per week. Half semester; may be paired with Geol 5430. Prerequisite: Geol 5430. (2 cr) (F)

**\*Geol 6460 (d5460). Interpretation of Sedimentary Rocks I.** Detailed interpretation of sedimentary rocks, based on petrography and sedimentary characteristics. Source terranes, tectonic settings, depositional environments, and diagenetic changes during burial. Three lectures and two labs per week. Half semester; may be paired with Geol 6470. Prerequisites: Geol 3500 and 3550. (3 cr)

**\*Geol 6470 (d5470). Interpretation of Sedimentary Rocks II.** Application of field observations, hand-sample, thin-section, and x-ray diffraction analyses to the interpretation of chemical sedimentary rocks. Emphasizes determination of depositional environment and evaluation of diagenetic changes. Three lectures and one lab per week. Half semester; may be paired with Geol 6460. Prerequisites: Geol 3500 and 3550. (2 cr)

**Geol 6480 (d5480). Sedimentary Basin Analysis.** Detailed coverage of techniques of sedimentary basin analysis, including depositional systems, provenance, basin modeling, and fluid and heat flow history. Survey of types of sedimentary basins worldwide. Prerequisites: Geol 3500 and 3550. (3 cr) (F)

**\*Geol 6500 (d5500). Advanced Igneous Petrology.** Advanced concepts in the origin and evolution of magmatic systems, effects of different tectono thermal regimes on magma genesis, magma dynamics, and phase equilibria in magmatic systems. Concepts illustrated by rock suites from classic locations. Three lectures and three laboratory hours each week. Prerequisite: Geol 4500 or equivalent. (4 cr) (F)

**Geol 6520 (d5520). Hydrogeologic Field Methods.** Methods of collection and analysis of field data for groundwater studies. Three lectures per week. Prerequisite: Geol 5510 or permission of instructor. (3 cr) (Sp)

**\*Geol 6540 (d5540). Quantitative Methods in Geology.** Application of various quantitative methodologies to geologic problems. Two lectures and one lab per week. (3 cr)

**\*Geol 6550 (d5550). Geochemical Application of Electron Microprobe and X-Ray Fluorescence Analysis.** Theory and application of X-ray fluorescence spectrometry and the electron microprobe to problems in geochemistry and materials

analysis. Two hours lecture and six hours laboratory per week. Prerequisite: Chem 1210 or equivalent, or permission of instructor. (4 cr) (Sp)

**\*Geol 6610 (d5610). Tectonic Evolution of North America.** Survey of tectonic styles and processes along plate margins, using the tectonic evolution of western North America as the prime example. Two lectures and one lab per week. Prerequisite: Geol 3700. (3 cr)

**\*Geol 6620 (d5620). Global Geophysics.** Application of physics to understanding geologic processes, the earth's interior, and the theory of plate tectonics. Two lectures and one two-hour lab per week. Prerequisites: Geol 3700 and Phyx 2220. (3 cr)

**\*Geol 6680 (d5680). Paleoclimatology.** Covers climate through the past four billion years of geologic time. Explores driving forces behind climate changes. Examines data and methods used in paleoclimate research. Includes discussion of literature and stresses local paleoclimate records. Three lectures per week, along with field trips.

Prerequisite: Geol/AWER 3600 or permission of instructor. Also taught as AWER 6680/5680. (3 cr) (Sp)

**Geol 6800. Seminar.** (1-4 cr) ®

**Geol 6970. Thesis.** (1-9 cr) (F,Sp,Su) ®

**Geol 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

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\*This course is taught alternating years. Check with department for information about when course will be taught.

<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

Department of  
**Health, Physical Education and  
 Recreation**

*College of Education*

**Head: Associate Professor** *Arthur R. Jones*, recreation administration  
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**Professor** *Robert E. Sorenson*, health and wellness, stress management; **Professor Emeritus** *Lanny J. Nalder*, ACSM Board certified, corporate wellness, exercise physiology, preventive and post-coronary exercise rehabilitation; **Associate Professors** *Hilda Fronske*, motor learning; *Julie A. Gast*, community health, multicultural health issues, women's health; *Donna L. Gordon*, health promotion; *Edward M. Heath*, exercise physiology, sport science; *Dennis A. Nelson*, family recreation, multicultural education, recreation programming; *Rolayne Wilson*, elementary physical education; **Nontenure Assistant Professors** *Eadric Bressel*, biomechanics; *John M. Kras*, administration, history, philosophy and sociology of sport; *Frank E. White, Jr.*, outdoor recreation, therapeutic recreation; **Senior Lecturers** *Peter J. Mathesius*, conditioning, sport skills, and teaching methods; *Delphine C. Rossi*, school health education, holistic health; **Lecturer** *Raymond Corn*, conditioning; **Academic Advisors** *Mary Lou Reynolds*, *Suzanne D. Stones*

**Degrees offered:** Bachelor of Science (BS) in Health Education Specialist; BS in Parks and Recreation; BS in Physical Education; Master of Science (MS) and Master of Education (MEd) in Health, Physical Education and Recreation

**Undergraduate emphases:** *BS in Health Education Specialist*—School Health and Community Health; *BS in Physical Education*—Exercise Science, Pre-Physical Therapy, and Teaching; **Graduate specializations:** *MS*—Corporate Wellness, Exercise Science, and Health Education

## ***Undergraduate Programs***

### ***Objectives***

**Undergraduate Programs of Study.** The Health, Physical Education and Recreation (HPER) Department offers undergraduate programs of study designed to prepare USU students for successful careers in one of three areas: Health Education Specialist, Physical Education, or Parks and Recreation. Preparation is accomplished through well-rounded, rigorous course requirements.

**Activity Courses.** USU students are served by an extensive elective lifetime-skill activity course program. The number and diversity of courses encourages students to increase their lifetime participation skills and enjoy opportunities for creativity and expression. Students may also achieve and maintain a high level of personal fitness and adopt a preventive medicine life-style conducive to health and well-being.

**Recreational and Intramural Activities.** The intramural program is planned and conducted to meet the needs of all students regardless of skill or ability. The major objectives are to offer a wide variety of sports experiences, to encourage lifetime sports participation, to develop habits of fair play, and to provide leader-

ship experiences. The intramural concept not only embraces the traditional highly-organized program with teams, leagues, and tournaments, but also voluntary free play activities where opportunities are provided for physical recreation for all segments of the University community.

### ***Departmental Admission Requirements***

**Health Education Specialist Majors and Minor.** New freshmen, transfer students, and students from other USU majors who have at least a 2.75 total GPA qualify to enter the Health Education Specialist pre-major. Students must formally apply to the School Health emphasis and minor. Pre-major/minor coursework must be completed before application to the school health major or minor. Pre-major coursework for the School Health emphasis includes: Engl 1010, Breadth Humanities, NFS 1020, Biol 2000, Biol 2010, Math 1050 or Stat 1040 (or higher), Breadth Physical Sciences, FHD 1500, Breadth Creative Arts, and Breadth American Institutions. Pre-minor coursework for the School Health minor includes: Engl 1010, Biol 2000 or 2010, HEP 2500, Math 1050 or Stat 1040 (or higher), and NFS 1020. For application materials and deadlines, contact the HPER Department Main Office (PE 122). No formal application is required for the Community

Health emphasis; however, students must complete at least 30 credits and must have at least a 2.75 total GPA before they will be considered Health Education Specialist majors.

**Physical Education Majors and Minor.** New freshmen, transfer students, and other USU majors who have at least a 2.75 total GPA qualify to enter the Physical Education major. A 2.75 total GPA is also required for the Physical Education/Coaching minor. Students who are qualified to enter the Physical Education/Coaching minor should enroll in the advising office.

**Parks and Recreation Major and Minor.** New freshmen, transfer students and students from other USU majors who have at least a 2.5 total GPA qualify to enter the Parks and Recreation major or minor.

### Course Requirements

**Health Education Specialist Major.** All students in the Health Education Specialist major must complete the following 30 credit hour core: Biol 2000, 2010; NFS 1020; HEP 2000, 2500, 3000, 3200, 4000, 4200, 5000. In addition, students must complete requirements for either the Community Health Emphasis or the School Health Emphasis, and must achieve a C- or better grade in all HEP courses. A 2.75 total GPA is required for graduation.

**Community Health Emphasis.** The Community Health emphasis offers a program of study leading to a Bachelor of Science degree as a Health Education Specialist. The emphasis requires a total of 72 credits. Students must complete the Health Education Specialist 30-credit core, and the Community Health Education 36-credit core which consists of the following: HEP 3800, 3900, 4100, 4600; InsT 5400; MHR 3110; Psy 2800; PubH 5010, 5020; NFS 4480. Students must complete 6 credits of elective courses, taking at least one course from two of the following three areas: *Human Nature*: Anth 3110, 4130; FHD 1500, 3110, 3530; Psy 1010, 1100, 1210, 4240; Soc 2500, 3010, 3330; SW 2500; *Content and Methods in Education*: BIS 1400, 1550; JCom 1110, 2200, 3010; HEP 3100, 3400, 3500, 4400, 4500, 5700; NFS 2020; PEP 4100; Soc 3750; Spch 1050; *Organizational Dynamics in the Family and Community*: JCom 2300; FHD 3120; MHR 3820; PolS 3810; PubH 3120, 3310; Spch 2600, 3250; SW 2400, 3750; HEP 5000.

**School Health Emphasis.** The School Health emphasis offers a program of study leading to a Bachelor of Science degree as a Health Education Specialist, and is an approved teaching major through the Department of Secondary Education. The emphasis requires a total of 74 credits. It is also necessary for students to complete an approved teaching minor (credits will vary). Students must complete the Health Education Specialist 30 credit core, the Secondary Education 35 credit core, and the School Health Education 9 credit core. The School Health Education core includes: FHD 1500; HEP 3100, 4500; and the 35-credit professional education framework for secondary teacher preparation. (HEP 4400 is included in the professional framework.)

**School Health Minor.** The School Health minor requires a total of 32 credit hours. Required courses include: Biol 2000 or 2010; FHD 1500; HEP 2000, 2500, 3000, 3100, 3200, 4500, 5000; NFS 1020. (HEP 4400 is included in the professional framework.)

**Parks and Recreation Major.** The HPER Department offers a program of study leading to a Bachelor of Science Degree in Parks and Recreation. This program prepares students to become professionals in the areas of public, private, commercial, voluntary, and special service settings of parks and recreation. Graduates of the program will be capable of directing, planning, designing, managing, and administering parks and recreation programs. The Parks and Recreation major requires 52 credits. The following courses are required: PRP 1000, 2250, 2500, 3000, 3100, 3500, 3750, 3900, 4000, 4300, 4400, 4700, 4750, 5000; InsT 5400. In addition, the student must choose 8 credits from the following courses: LAEP 1030; EnvS 4130, 4500, 4600; HEP 2000, 3400; PRP 1500, 4200, 4280; up to 3 credits in activity courses numbered PE 1000-2000. Students must also complete an outside minor, which must be approved by the HPER Department. Instead of a minor, Parks and Recreation majors may elect to complete a Therapeutic Recreation Track (22 credits). Required courses include: Biol 2000, 2010; FHD 1500; Psy 1010, 3210. Students must also choose two courses from the following: Psy 1100, 1210, 2100; Reh 1010; Soc 3410; SpEd 4000. Additionally, students must complete PRP 4200 as part of their major electives. A 2.5 total GPA is required for graduation.

**Parks and Recreation Minor.** A minor in Parks and Recreation consists of a minimum of 20 credits of coursework selected from the core courses and electives listed below. The required courses in this minor include PRP 1000, 1500, 2500, 3000, and 3500. In addition, students must select 5 credits from the following courses: PRP 3900, 4000, 4280, 4300, 4400, and EnvS 4500.

**Physical Education Major: Exercise Science Emphasis.** The Physical Education Exercise Science emphasis consists of 51 credits of coursework leading to a Bachelor of Science Degree in Physical Education. The following courses are required: PEP 2000, 3100, 4100, 4200, 4400; HEP 2500; PE 3000. (The prerequisites for these courses include: Biol 2000, 2010; Math 1050.) No fewer than 5 credits must be taken from the following: HEP 2000, 3200, 3400; PEP 4000, 5070, 5430. A minimum of 4 credits (including lab) must be taken from the following: Biol 1010, 1020, 1210, 1220, 3200, 5190. At least 3 credits must be taken from the following: Chem 1010, 1110, 1120, 1130, 1210, 1220, 1230, 1240. No fewer than 3 credits must be selected from the following: Phyx 1100, 1200, 2110, 2120; Psy 1010, 2100, 2800, 3210; NFS 1020, 3020; Stat 1040. Three (3) different Physical Education Activity Classes must be taken to complete the required coursework. A 2.75 total GPA is required for graduation.

**Physical Education Major: Pre-Physical Therapy Emphasis.** The Physical Education Pre-Physical Therapy emphasis consists of 69 credits of coursework leading to a Bachelor of Science Degree in Physical Education. *Please note that it is the student's responsibility to check with the individual physical therapy schools concerning courses required for admission. The HPER Department will not guarantee admission into physical therapy school.* The following courses are required: PEP 2020, 3100, 4100, 4200, 4250, 4400; PE 3000; Phyx 2110, 2120. (The prerequisites for these courses include: Biol 2000, 2010; Math 1050; Math 1100 or 1210; Phyx 2110.) A minimum of 4 credits (including lab) must be taken from the following courses: Biol 1010, 1020, 1210, 1220, 3200, 5190. (The prerequisites for these courses include: Biol 1210, 1220, 3200; Math 1050; Chem 3700.) A minimum of 9 credits (including lab) must be taken from the following courses: Chem 1110, 1120, 1130; or Chem 1210, 1220, 1230, 1240. (The prerequisites for these courses include: Math 1050; Chem 1210, 1230.) A minimum of 6 credits must be taken

from the following courses: Math 1100 or 1210; Stat 1040 or Psy 2800. (The prerequisites for these courses include: Math 1050 for Math 1100; Math 1050 and 1060 for Math 1210; Math 0900, Stat 1040.) A minimum of 3 credits must be taken from the following courses: Psy 1210, 2100, 3210. (The prerequisite for these courses is Psy 1010.) A 3.0 total GPA is required to graduate.

**Physical Education Major: Teaching Emphasis.** The Physical Education Teaching emphasis requires 90 credits of coursework and leads to a Bachelor of Science Degree in Physical Education with a K-12 teaching license. The following courses are required: PEP 2000, 2100, 2200, 2300, 2400, 2500, 3050, 3100, 3200, 3350, 3400, 3500, 4000, 4100, 4200, 4350, 4400. (The prerequisites for these courses include: Biol 2000, 2010; Math 1050; HEP 2000; PE 3000.) Students must also complete PEP 4500 and two courses from the following: PEP 4600, 4700, 4800. In order to obtain a teaching license, students must complete the 35-credit Secondary Teacher Education Program (STEP). Students also need to complete a teaching minor. A 2.75 total GPA is required for graduation.

**Physical Education/Coaching Teaching Minor.** The Physical Education/Coaching teaching minor requires 23 credits of coursework, plus 20 credits of prerequisite courses. The following courses are required: PEP 3100, 3200, 4000, 4100, 4350, 4400. (The prerequisites for these courses include: Biol 2000, 2010; Math 1050; HEP 2000; PE 3000.) Students must complete three of the following courses: PEP 2100, 2200, 2300, 2400, 2500. Students must complete two of the following courses: PEP 3350, 3400, 3500. In addition, students must complete PEP 2050, 4500, and one of the following courses: PEP 4600, 4700, 4800. In order to obtain a teaching certificate, the following additional coursework is required: PEP 3300 or 4300, and PEP 4900. Courses within the Secondary Teacher Education Program (STEP) are also required.

### ***Additional Information***

Updated information concerning undergraduate courses and major or minor requirements can be obtained from the HPER Department, or check the departmental home page at: <http://www.coe.usu.edu/hper>.

### ***Financial Support***

The College of Education distributes scholarship applications beginning in January of each academic year. For information on those scholarships awarded by the HPER Department, please refer to the Scholarship Listing on pages 30-31 of this catalog.

## ***Graduate Programs***

Please refer to the general admission requirements on pages 72-73 of this catalog. In addition, the letters of recommendation must be written by professionals in health or physical education who know the applicant and his/her work well. Students with fewer than 12 credits of undergraduate health or physical education coursework must make up any deficiencies before being granted matriculated status. Basic competencies that have not been acquired through courses or experience may be obtained by completing prerequisite undergraduate courses without credit. Other nongraduate credit courses may be required by the admissions committee. Students with weak oral or written English skills will be required to take remedial work or complete undergraduate or Intensive English classes.

### ***Degree Programs***

**Master of Science.** The MS is available for students who plan to teach, provide community leadership, or do further graduate or research study.

**Master of Education.** The MEd is designed for students desiring to improve teaching competencies.

### ***Specializations***

MS students may select an area of emphasis for research and study from the following specializations: Corporate Wellness, Exercise Science, and Health Education.

### ***Course Requirements***

#### **Core Courses**

MS candidates specializing in *Corporate Wellness* must complete the following courses: Educ 6570; HEP 6400, 6800; PEP 6290, 6400, 6450, 6500, 6540, 6800, 6810; and Psy 6470.

MS candidates specializing in *Exercise Science* must complete PEP 6400, 6800, 6810, 6970; Educ 6570. Eleven credits must be selected from the following: PEP 6050, 6070, 6420, 6430, 6450, 6540, 6830; HEP 6100, 6400; Educ 6600.

MS candidates specializing in *Health Education* must complete Educ 6010, 6570, 6600; HEP 6100, 6600, 6800, 6970. Students must also complete 6 credits from the following: FHD 6020, 6060; HEnv 6210; HEP 6300, 6400, 6700, 6900, 6950; InsT 5230, 6350; MHR 6370; NFS 6200, 6210; PEP 6290, 6400, 6540; Psy 6470, 7700; PubH 5010, 5020, 5310; Soc 6460. Other courses may be selected on the basis of a student's need and interests, subject to the approval of the student's committee.

MEd candidates must complete Educ 6410, 6550, 6710; PEP 6050, 6070, 6400, 6420, 6430, 6690, 6800, 6830, 6960.

### ***Research***

Research areas include health promotion, health education, exercise science, corporate wellness, sport psychology, sport in society, biomechanics, and pedagogy.

### ***Financial Assistance***

Teaching and research assistantships are available through the HPER Department and are awarded on a competitive basis. Application for the assistantships must be made by March 15 to the department head. A formal application for admission must be submitted to the School of Graduate Studies at the same time as the application for an assistantship. A recipient of a graduate assistantship is usually eligible for a waiver for the out-of-state portion of his or her tuition.

### ***Additional Information***

Additional and/or updated information about graduate courses and programs may be obtained from the HPER Department, or check the departmental home page at: <http://www.coe.usu.edu/hper>.

## Health Education Professional Courses (HEP)

**HEP 2000. First Aid and Emergency Care.** Provides instruction and practical experience for the development of first aid knowledge, skills, and personal judgment. Focuses on recognizing emergencies, activating EMS, and providing direct care. (2 cr) (F,Sp,Su)

**HEP 2300. Cardiopulmonary Resuscitation.** Techniques and skills of adult, child, and infant airway management and cardiopulmonary resuscitation for the lay person (one rescuer). Taught according to current standards. (1 cr) (F,Sp,Su)

**HEP 2500. Health and Wellness.** Designed to enable students to enhance personal wellness by gaining understanding about the social, physical, spiritual, and emotional dimensions of health, and by applying different strategies for improving personal health behaviors. (2 cr) (F,Sp,Su)

**HEP 3000. Drugs and Human Behavior.** Students evaluate the historical and modern use, misuse, and abuse of drugs in relation to current concepts of physical, social, and emotional wellness. Special emphasis on educational and community strategies for prevention of drug-related problems. (3 cr) (F,Su)

**HEP 3100. School Health Programs.** Essentials of the existing paradigm of Comprehensive School Health Programs and their development in relation to current child health status. Assessment, planning, implementation, and evaluation. Prerequisite: Formal acceptance into the School Health Education Emphasis or School Health Minor or consent of instructor. (3 cr) (F)

**HEP 3200. Consumer Health.** Focuses on helping students become discriminating consumers of health information, health products, and health services. (3 cr) (F,Su)

**HEP 3300. Clinical Experience I.** Clinical experience in school health education. Prerequisite: Acceptance into School Health major or minor. (1 cr) (F,Sp)

**HEP 3400. Stress Management.** Concepts and principles of personal stress management, with special emphasis on effective stress management coping strategies, maximizing positive stress outcomes, and minimizing negative stress effects, to aid in obtaining and maintaining a balanced health homeostatic condition. (3 cr) (F)

**HEP 3500. Elementary School Health Education.** Explores child health status and the vital roles that the school/elementary teacher plays in enabling children to acquire healthful lifestyle behaviors while increasing their potential for academic success. (2 cr) (F,Sp)

**HEP 3800. Grant Proposal Writing.** Teaches practical skills needed to plan and write proposals for federal, state, local, and private funding. Students develop proposals in area in which they have developed expertise, and coordinate with a local agency for funding. Prerequisites: HEP 2500, Engl 2010, and passing score on Computer and Information Literacy Exam. (3 cr) (Sp)

**HEP 3900. Social Marketing in Health Education.** Explores social marketing techniques in health education for enhancing healthy behavioral change. Examines aids in health programming, including their implementation and evaluation. Prerequisites: HEP 2500 and passing score on Computer Information Literacy Exam. (3 cr) (Sp)

**HEP 4000 (CI). Introduction to Community Health.** Introduction to agencies, facilities, and programs playing a role in protection and promotion of health in the community. Special emphasis on competencies necessary for the health educator to function in a variety of community settings. Prerequisite: HEP 2500. (3 cr) (F)

**HEP 4100. Foundations of Community Health.** Professional preparation course for health education majors. Primary emphasis on ethical issues, behavioral and sociological theories used in the profession, philosophical issues, technology, and health education methodologies. Prerequisite: HEP 2500. (3 cr) (F)

**HEP 4200 (QI). Planning and Evaluation for Health Education.** Provides indepth study of planning, implementation, and evaluation of school and community health education programs. Students obtain hands-on experience planning a health education program. Prerequisites: HEP 4000; Math 1030 or Stat 1040. (3 cr) (Sp)

**HEP 4250. Advanced Cooperative Work Experience.** Professional level cooperative education work experience as student advances toward completion of the program. Prerequisite: Consent of instructor. (1-15 cr) (F,Sp,Su) ®

**HEP 4300. Clinical Experience II.** Clinical experience in school health education. Prerequisite: Acceptance into School Health major or minor. (1 cr) (F,Sp)

**HEP 4400. Creative Methods in Teaching Health Education.** Planning, designing, and evaluating comprehensive school health education curricula and instruction for secondary school students, utilizing various creative instructional strategies and materials. Participation in peer teaching experiences. Prerequisite: Junior standing and acceptance into School Health Education. (3 cr) (F,Sp)

**HEP 4500. Sexuality Education Within the Schools.** Emphasizes broad understanding of human sexuality, with specific focus on adolescent sexuality/behavior, age and topic appropriate instruction, state law, and effective curriculum/strategies for human sexuality education within the secondary schools. Prerequisite: Formal acceptance into the School Health Education emphasis or School Health minor, or consent of instructor. (3 cr) (Sp)

**HEP 4600. Field Work in Health Education.** Supervised student participation in school or community health programs or directed projects. Prerequisites: HEP 4000, 4100, and consent of instructor. (1-9 cr) (F,Sp,Su) ®

**HEP 4700H. Honors Senior Thesis.** Culminating experience within the department for honors students. Student works closely with faculty mentor in an extensive project in the student's area of interest. (1-6 cr) (F,Sp,Su)

**HEP 5000 (CI). Race, Class, and Gender Issues in Health.** Focuses on how multicultural issues affect health status and health choices. Special emphasis on how race, ethnicity, socioeconomic status, and gender impact health status and access to health care. Prerequisite: Junior standing. (3 cr) (Arr)

**HEP 5200.<sup>2</sup> International Health.** Explores meaning of "health" through the lens of different cultures. Provides an international comparison of health status, including morbidity and mortality data. Evaluates different programs, policies, and strategies for addressing international health problems. Prerequisite: Junior standing. (3 cr) (Arr)

**HEP 5500. Student Teaching Seminar.** Weekly seminar dealing with the professional practice of school health education. Prerequisite: HEP 4400. (2 cr) (F,Sp)

**HEP 5600. Student Teaching.** Practical experience teaching health in the public school system. Prerequisite: HEP 4400. (8 cr) (F,Sp)

**HEP 5700. Special Topics in Health.** In-depth review and discussion of special topics in health. (1-6 cr) (F,Sp,Su) ®

**HEP 5900. Independent Study.** Prerequisite: Consent of instructor. (1-3 cr) (F,Sp,Su) ®

**HEP 5950. Independent Research.** Prerequisite: Consent of instructor. (1-3 cr) (F,Sp,Su) ®

**HEP 6100. Current Trends in Health Promotion.** Focuses on trends and issues in the promotion of health behaviors in a variety of settings. Analyzes and challenges prevailing assumptions and philosophies in relation to health promotion. (3 cr) (F)

**HEP 6250. Graduate Cooperative Work Experience.** Professional level of education work experience in a cooperative education position for graduate students. Prerequisite: Consent of instructor. (1-15 cr) (F,Sp,Su)

**HEP 6300. Stress Management.** Explores concepts and principles of personal stress management, with special emphasis on effective stress management coping strategies, maximizing positive stress outcomes, and minimizing negative stress effects, thus aiding in obtaining and maintaining a balanced, healthy homeostatic condition. (3 cr)

**HEP 6400. Worksite Stress Management.** Concepts and principles of worksite stress management, with special emphasis on effective stress management coping strategies aiding in building a self-reliant workforce. (3 cr) (Sp)

**HEP 6600. Field Work in Health Education.** Supervised student participation in school or community health projects or directed projects. Prerequisite: Consent of instructor. (3 cr) (F,Sp,Su) ®

**HEP 6700. Special Topics in Health.** In-depth review and discussion of special topics in health. (1-6 cr) (F,Sp,Su) ®

**HEP 6800. Seminar in Health Behavior.** Explores current theoretical perspectives in relation to behaviors. Students critically examine theories commonly used in health education. Focuses on practical application of theory in health promotion programs. (3 cr) (F)

**HEP 6900. Independent Study.** Prerequisite: Consent of instructor. (1-3 cr) (F,Sp,Su) ®

**HEP 6950. Independent Research.** Prerequisite: Consent of instructor. (1-3 cr) (F,Sp,Su) ®

**HEP 6970. Thesis.** (1-9 cr) (F,Sp,Su) ®

**HEP 6990. Continuing Graduate Advisement.** (1-12 cr) (F,Sp,Su) ®

## *Physical Education Professional Courses (PEP)*

**PEP 2000. Introduction and History of Physical Education.** Acquaints P.E. students with four areas of physical education, including: the department, with respect to the University and the College of Education; the history of physical education; the effects of sociology on physical education; and future employment opportunities in the fields of physical education. (2 cr) (F,Sp,Su)

**PEP 2020. Introduction to Physical Therapy.** Introduces prephysical therapy students to the discipline of physical therapy and familiarizes them with its associated spectrum of opportunities and responsibilities. (2 cr) (F)

**PEP 2050. Sport Rules and Regulations of the Utah High School Athletic Association.** Knowledge of the rules and mechanics of officiating all Utah high school sports. (1 cr) (Sp)

**PEP 2100. Skills 1 (Swimming, Volleyball, Football).** Provides physical education majors and minors with the knowledge, skills, practice, and understanding of swim-

ming, volleyball, and football needed for successful participation. Exposes students to a variety of teaching methods for these three sports. (1 cr) (F,Sp)

**PEP 2200. Skills 2 (Lifetime Activities).** Provides physical education majors and minors with the knowledge, skills, practice, and understanding of lifetime activities needed for successful participation. Exposes students to a variety of teaching methods for these activities. (1 cr) (F,Sp)

**PEP 2300. Skills 3 (Softball, Basketball, Soccer).** Provides physical education majors and minors with the knowledge, skills, practice, and understanding of softball, basketball, and soccer needed for successful participation. Exposes students to a variety of teaching methods for these three sports. (1 cr) (F,Sp)

**PEP 2400. Skills 4 (Tennis, Badminton, Track and Field).** Provides physical education majors and minors with the knowledge, skills, practice, and understanding of tennis, badminton, and track and field needed for successful participation. Exposes students to a variety of teaching methods for these three sports. (1 cr) (F,Sp)

**PEP 2500. Rhythms and Movement.** Focuses on fundamental motor skills, mixers, aerobic, line, folk, ballroom, and square dance. Provides opportunities to practice rhythms and movement, as well as opportunities to practice teaching. Designed for physical education majors and minors. (1 cr) (F,Sp)

**PEP 3050. Physical Education in the Elementary School.** Prepares students to teach elementary physical education. Focuses on developmentally appropriate activities, locomotor and manipulative skills, fitness, games, rhythms, motor learning, and lesson planning. Students will teach physical education lessons in the elementary school. (3 cr) (F,Sp)

**PEP 3100. Athletic Injuries.** Care and prevention of common athletic injuries and standard taping techniques. Emphasizes recognition, first aid, and referral for these injuries. Taping techniques taught in a lab setting. (3 cr) (F,Sp)

**PEP 3200 (CI). Motor Learning and Skill Analysis.** Exploration of materials, methods, and mechanisms of learning and performing motor skills. A variety of sport skills taught in lab, using cues, demonstrations, feedback, and game-like drills. Performance of skill analysis for variety of sport skills. (3 cr) (F,Sp)

**PEP 3300. Clinical Experience I.** Public school clinical experience in physical education. Prerequisite: Admission into Teacher Education program. (1 cr) (F,Sp)

**PEP 3350. Methods of Individual and Dual Sports.** Prepares students by providing strategies and materials for implementing a quality physical education program in individual and dual sports. Discussion of lesson and unit planning, as well as student evaluation. Prerequisites: PEP 2200, 2400. (1 cr) (F,Sp)

**PEP 3400. Methods of Team Sports.** Prepares students by providing strategies and materials for implementing quality physical education program in team sports. Discussion of lesson and unit planning, as well as student evaluation. Prerequisites: PEP 2100, 2300. (1 cr) (F,Sp)

**PEP 3500. Methods of Fitness Education.** Emphasizes classroom components for teaching lecture/activity fitness course. Students peer teach in a lecture environment. Discussion of strategies and materials for planning and implementing a quality physical education academic fitness course. Includes lecture planning, presentation, unit preparation, and evaluation. Prerequisites: PE 3000, PEP 3350, 3400. (1 cr) (F,Sp)

**PEP 3600. Elementary Physical Education Practicum.** Prepares teachers to teach elementary physical education as a support minor. Prerequisite: PEP 3050. (3 cr) (Sp)

**PEP 3650. Movement Exploration for Elementary Teachers.** Covers creative movement and international folk dance. Experiences range from classroom management and curriculum development to large open-space activities and performance. Includes art and sound activities. (2 cr) (F)

**PEP 4000. Mental Aspects of Sports Performance.** Provides current knowledge of sport psychology. Applies this knowledge to teaching sports and coaching in public schools. Also taught as Psy 4000. (3 cr) (F,Su)

**PEP 4100. Exercise Physiology and Principles of Conditioning.** Designed to expose students to theory and application of exercise physiology and principles of training and conditioning. Laboratory experience provides hands-on practicum for concepts taught in the classroom. Prerequisites: Biol 2000, 2010, Math 1050. (4 cr) (F,Sp,Su) ®

**PEP 4150. Advanced Care and Prevention of Athletic Injuries.** Final preparation and competency demonstration of knowledge and skills prior to taking the national certification exam for the Athletic Training credential. Prerequisites: PEP 3100, instructor approval, and NATABOC certification eligibility. (3 cr) (F,Sp)

**PEP 4200 (QI). Biomechanics.** Understanding and application of human anatomical kinesiology and biomechanical principles fundamental to efficient human movement. In required concurrent one-hour lab, students obtain hands-on application of principles of anatomical kinesiology and biomechanics. Prerequisites: Biol 2000, 2010; Math 1050 or equivalent. (4 cr) (F,Sp) ®

**PEP 4250. Advanced Cooperative Work Experience.** Cooperative education work experience offers student opportunity to work in related field work of the major. Prerequisite: Instructor approval. (1-10 cr) (F,Sp,Su) ®

**PEP 4300. Clinical Experience II.** Public school clinical experience in physical education. Prerequisite: Admission into Teacher Education program. (1 cr) (F,Sp)

**PEP 4350. Administration of Physical Education.** Designed to help students understand objectives of physical education and sport, and incorporate them into a philosophy to assist in developing quality programs at the secondary level. Covers all aspects of physical education and sport administration including, but not limited to, budget, personnel, facilities management, programs, and activities. (2 cr) (F,Sp)

**PEP 4400 (QI). Evaluation in Physical Education.** Focuses on the nature and use of a variety of tests in physical education. Practical application, interpretation, and use of test results are stressed. (3 cr) (F,Sp)

**PEP 4500. Methods of Coaching.** Addresses issues associated with secondary coaching, including budgets, fund raising, discipline policy, parents, booster clubs, equipment, liability, team selection, etc. (1 cr) (F,Sp)

**PEP 4600. Methods of Coaching Football and Soccer.** Outlines the methods, strategies, and techniques for coaching scholastic football and soccer. Emphasizes young player skill development and high school coaches' administration of these sports. Prerequisite: PEP 4500 (may be taken concurrently). (1 cr) (Sp)

**PEP 4700. Methods of Coaching Volleyball, Track and Field.** Outlines the methods, strategies, and techniques for coaching scholastic volleyball, as well as track and field. Emphasizes young player skill development and high school coaches' administration of these sports. Prerequisite: PEP 4500 (may be taken concurrently). (1 cr) (Sp)

**PEP 4800. Methods of Coaching Basketball, Baseball, and Softball.** Outlines methods, strategies, and techniques of coaching scholastic basketball, baseball, and softball. Emphasizes young player skill development and high school coaches' administration of these sports. Prerequisite: PEP 4500 (may be taken concurrently). (1 cr) (F,Su)

**PEP 4850. Methods of Teaching and Coaching Women's Gymnastics.** Instructs students in required coaching methods for women's gymnastics from the beginning to advanced levels. Also includes section on judging. (3 cr) (F,Sp)

**PEP 4900 (CI). Methods of Physical Education.** Designed to prepare physical education majors and minors to teach physical education in the schools. Emphasizes planning, teaching, strategies, and methods. Admission to the Teacher Education

program is required. Must be taken concurrently with either PEP 3300 or 4300. Prerequisites: Two courses selected from PEP 3350, 3400, and 3500. (3 cr) (F,Sp)

**PEP 4950H. Honors Senior Thesis.** Culminating experience within the department for honors students. Student works closely with faculty mentor in an extensive project in the student's area of interest. (1-6 cr) (F,Sp)

**PEP 5050 (d6050).<sup>1</sup> Psychological Aspects of Sports Performance.** Psychological theory and principles applied to sports. Includes motivational techniques, psychological evaluation, stress and anxiety in sports, and personality and sports performance. Also taught as Psy 5050/6050. (3 cr) (Sp)

**PEP 5070. Sport Sociology.** Develops understanding of the social significance of sport. Applies the sociological perspective to a variety of contemporary issues, enabling students to better understand how sport affects and reflects American culture. (3 cr) (Sp)

**PEP 5430 (CI). The History and Philosophy of Physical Education.** Designed to familiarize physical education majors (or nonmajors) with history of physical education and sport, as well as philosophical influences which have contributed to development of contemporary physical education and sport. Considers historical development of yesterday's pastimes into today's complex, institutionalized forms of sport and physical education. (3 cr) (F)

**PEP 5500. Student Teaching Seminar.** Capstone seminar focused upon student teaching issues, professional development, and principles of effective instruction. Prerequisites: PEP 4900, completion of Level I and II field experiences. (2 cr) (F,Sp)

**PEP 5560. Practicum in Improving School System Programs.** In-service seminar for experienced teachers, emphasizing improvement in instruction. (1-4 cr) (F,Sp,Su) ®

**PEP 5600. Student Teaching in Secondary Schools.** A 10-week culminating experience in which students assume full-time teaching responsibilities under the direction of cooperating teachers in physical education. Prerequisites: PEP 4900, completion of Level I and Level II field experiences. (8 cr) (F,Sp)

**PEP 5700 (d6700). Special Topics in Physical Education.** In-depth review and discussion of special topics in physical education. (1-6 cr) (F,Sp,Su) ®

**PEP 5900. Independent Study.** Provides opportunity for undergraduate or graduate students to participate in independent inquiry under guidance of a professor. (1-3 cr) (F,Sp,Su) ®

**PEP 5910. Independent Research.** Allows undergraduate students to pursue personal research interest by formalizing an independent project under the guidance of a professor. (1-3 cr) (F,Sp,Su)

**PEP 6000. Administration of Athletics.** Prepares students to organize and administer interscholastic and intercollegiate sports at the public school or university level. Consideration is given to both the challenges and standards associated with such programs. (3 cr) (Sp)

**PEP 6010. Leadership in Health, Physical Education, and Recreation.** Group approach to improvement and innovation in leadership and supervisory skills. (3 cr) (Sp)

**PEP 6050 (d5050). Psychological Aspects of Sports Performance.** Psychological theory and principles applied to sports. Includes motivational techniques, psychological evaluation, stress and anxiety in sports, and personality and sports performance. Also taught as Psy 6050/5050. (3 cr) (Sp)

**PEP 6070. Sport in Society.** Introduces students to complex role and social significance of sport in contemporary society. Familiarizes students with aims, scope, and potential contributions of sport in society. (3 cr) (Sp)

**PEP 6250. Graduate Cooperative Work Experience.** Professional level of educational work experience in a cooperative education position for graduate students. (1-10 cr) (F,Sp,Su) ®

**PEP 6290. Corporate Wellness Marketing.** Reviews history of corporate fitness in America, as well as common organizational and management practices. Emphasizes marketing practices promoting individual and business involvement. (3 cr) (Sp)

**PEP 6400. Exercise in Health, Fitness, and Sport.** Emphasizes physiological and health benefits of exercise. Discusses role of exercise in disease prevention, along with medications given to treat illness and disease. (4 cr) (F)

**PEP 6420. Curriculum in Physical Education.** Curriculum development studied in terms of student needs in relation to present-day society. Includes current practices and trends in the area of curriculum. (3 cr) (F)

**PEP 6430. History and Philosophy of Physical Education and Sport.** History of physical education; philosophical influences which have contributed to contemporary physical education; and methods of educational instruction using the primary philosophical positions. (3 cr) (F)

**PEP 6450. Fitness Assessment and Exercise Testing.** Exposure to fitness assessment in clinical cardiac settings, as well as in corporate wellness settings. Exercise testing and interpretations, using different testing protocols in emphasized variant electrocardiograms, studied as part of the disease process. Prerequisite: PEP 6400. (3 cr) (Sp)

**PEP 6500. Practicum in Corporate Wellness.** Experiences designed for the practical implementation of coursework. Involves random populous rehabilitation, as well as executive and industry, senior citizen centers, and rest homes. (1-10 cr) (F,Sp,Su) ®

**PEP 6540. Wellness Programming.** Emphasizes exercise prescription writing and exercise prescription implementation. Students test prescriptions in laboratory setting. Prerequisites: PEP 6400, 6450. (3 cr) (Sp)

**PEP 6690. Analysis of Teaching Physical Education.** Designed to provide graduate students with practicum experiences in the analysis of physical education, via micro teaching and observation of physical education classes. (3 cr) (Sp)

**PEP 6700 (d5700). Special Topics in Physical Education.** In-depth review and discussion of special topics in physical education. (1-6 cr) (F,Sp,Su) ®

**PEP 6730. Worksite Guidance and Counseling.** Provides cardiac rehabilitation/corporate wellness graduate students with basic understanding of exercise and health psychology. (3 cr) (F)

**PEP 6800. Biomechanics and Ergonomics of Health, Industry, and Sport.** Understanding and application of biomechanical and ergonomic principles fundamental to efficient human movement in health, industry, and sport. Prerequisite: PEP 4200. (3 cr) (Sp)

**PEP 6810. Research Methods in Health Sciences.** Explores basic to advanced concepts contained in research and statistical design, as applicable to health sciences. (3 cr) (F)

**PEP 6820. Wellness Certification and Technology.** Provides instruction and experience in wellness technology and wellness certification. Students learn use of current technology in the fitness industry and obtain certain wellness certifications. (2 cr) (Sp)

**PEP 6830. Motor Learning.** Comprehensive review and analysis of research in the area of motor skills which bears upon the teaching of physical education activities. (3 cr) (Sp)

**PEP 6900. Independent Study.** Student conducts independent projects under direction of one or more professors. Provides student with opportunity for individualized study. (1-3 cr) (F,Sp,Su) ®

**PEP 6910. Independent Research.** Allows graduate students to pursue personal research interests by formalizing an independent project under the guidance of a graduate professor. (1-3 cr) (F,Sp,Su)

**PEP 6960. Master's Project.** Allows students opportunity to develop creative and applicable educational project. (3 cr) (F,Sp,Su)

**PEP 6970. Thesis.** (1-9 cr) (F,Sp,Su) ®

**PEP 6990. Continuing Graduate Advisement.** Provides graduate students with continued support and advisement. Usually taken following completion of all coursework required for the degree. (1-9 cr) (F,Sp,Su) ®

**PEP 7550. Practicum in the Evaluation of Instruction.** Field-based experience involving supervision of student teachers in Department of Health, Physical Education and Recreation. (1-6 cr) (F,Sp,Su) ®

## *Parks and Recreation Professional Courses (PRP)*

**PRP 1000. Introduction to Parks and Recreation.** Introduces the role of leisure recreation and parks in society. Discusses history, trends, issues, and values in society. Describes public and private agencies providing recreation. (2 cr) (F,Sp)

**PRP 1500. Social Recreation Leadership.** Information and practical experience in the organization and management of social recreation activities. Planning, programming, and evaluation techniques given for a variety of age groups. (3 cr) (F)

**PRP 2250. Introductory Cooperative Work Experience.** An introductory-level educational work experience in a cooperative education or business position as approved by the department. Repeatable for up to 6 credits. (1-6 cr) (F,Sp,Su) ®

**PRP 2500. Outdoor Recreation Management.** Explores philosophy, meaning, and value of outdoor recreation in society. Gives management agency overview. Emphasizes organizing and leading outdoor recreation pursuits. (3 cr) (Sp)

**PRP 3000. Recreation Programming.** Studies recreation programming, including methods, models, and classification. Also includes analysis of activities, organizational structures, and evaluation techniques. (3 cr) (Sp)

**PRP 3100. Leisure and Aging.** Examines relevance of leisure as a means of enhancing the quality of life for the aging person. Topics include retirement; physical, social, psychological, and emotional changes; and leisure programming considerations. (2 cr)

**PRP 3500 (CI). Community Recreation Administration.** Examines community recreation organization with emphasis on administrative skills and functions, including budgeting, personnel management, and grantsmanship. Prerequisites: PRP 1000 and 3000. (3 cr) (F)

**PRP 3750. Commercial Recreation and Tourism.** Examines history, organization, and management of commercial recreation and tourism enterprises. Studies entrepreneurship, feasibility, marketing, and management of projects. (3 cr) (F)

**PRP 3900. Introduction of Therapeutic Recreation for Diverse Populations.** Explores characteristics, behaviors, and programming techniques used to meet recreational needs of varied population groups and all degrees of disabilities. (4 cr) (F)

**PRP 4000. Therapeutic Recreation.** Examines special population groups served by recreation, including institutional procedures, clinical application, and activity programming. Prerequisite: PRP 3900. (3 cr) (Sp)

**PRP 4200. Advanced Therapeutic Recreation.** Examines current trends and issues in therapeutic recreation and how they affect the therapeutic recreation profession. Instruction in licensing requirements for eligibility for TRT and TRS licensure and certification. Prerequisite: PRP 4000. (3 cr) (F)

**PRP 4250. Advanced Cooperative Work Experience.** Cooperative education work experience with increased levels of complexity, wherein students gain a more professional level of experience as they advance toward completion of the program. (1-12 cr) (F,Sp,Su) ®

**PRP 4280. Challenge Initiative Training.** Introduction to standard techniques of conducting low and high ropes course programs. Areas of training include program development, risk management, and technical training on USU's High Ropes Course. Students receive a Certificate of Training. (3 cr) (F,Sp)

**PRP 4300. Legal Aspects of Recreation and Leisure.** Focuses on legal aspects of recreation and park programs, management, and administration. Provides basic knowledge and understanding of risk management process, legal terms, and their application. Prerequisites: PRP 1000, 2250, 3000. (3 cr) (F)

**PRP 4400. Recreation Park and Facility Management.** Studies recreation park and facility management, including examination of supply, demand, population, maintenance, and safety in developing appropriate areas and facilities for parks. (3 cr) (F)

**PRP 4700. Internship Seminar.** In preparation for PRP 4750, students identify internships and prepare written materials and objectives for internship assignment. (1 cr) (F,Sp)

**PRP 4750. Recreation Internship.** Practical, off-campus management experience with cooperating parks and recreation agency. Prerequisites: PRP 1000, 2250, 3000, 4700. (9 cr) (F,Sp,Su)

**PRP 4970H. Honors Senior Thesis.** Culminating experience within the department for honors students. Student works closely with faculty mentor in an extensive project in the student's area of interest. (1-6 cr) (F,Sp,Su)

**PRP 5000 (CI). Seminar in Recreation.** Student analysis, papers, and presentations of current issues and problems in recreation. Includes discussions with professionals and development of resume. Prerequisites: PRP 1500, 2250, 2500, 3500, 3750, 3900, 4000, 4400. (3 cr) (F,Sp)

**PRP 5900. Independent Study.** Students work on special projects and research out of the classroom, with approval and guidance of instructor. (1-3 cr) (F,Sp,Su) ®

**PRP 5910. Independent Research.** (1-3 cr) (F,Sp,Su) ®

## Physical Education Activity Courses (PE)

**PE 1000. Skiing.** Alpine ski instruction for all students. Offered for beginning, intermediate, and advanced levels. Focuses on knowledge, techniques, equipment, and safety necessary for participating in and enjoying alpine skiing. (1 cr) (Sp) ®

**PE 1020. Cross Country Skiing.** Focuses on knowledge, techniques, equipment, and safety necessary to participate in and enjoy winter recreational activities, including cross country ski touring and snowshoeing. (1 cr) (Sp) ®

**PE 1100. Basketball.** Designed to help the recreational player become more familiar with the basic skills involved in the game of basketball. During the course, games and/or a "mini" tournament will be played. (1 cr) (Sp) ®

**PE 1110. Flag Football.** Designed to help students develop and understand the skills and strategies of recreational flag football through active participation. (1 cr) (F) ®

**PE 1120. Soccer.** Designed to help students develop and understand the skills and strategies of soccer through active participation in drills and games. (1 cr) (F,Sp) ®

**PE 1130. Softball.** Designed to help students develop and understand the skills and strategies of recreational softball through active participation. (1 cr) (Sp) ®

**PE 1140. Ultimate Frisbee.** Designed to enhance each student's skills and abilities in ultimate frisbee. Emphasizes cardiovascular and muscular fitness. Course is progressive, with increase in intensity as the individual improves abilities. (1 cr) (F,Sp) ®

**PE 1150. Volleyball.** Designed to help students enhance their basic volleyball skills and enjoyment of the game through active participation. (1 cr) (F,Sp) ®

**PE 1200. Badminton.** Through active participation, students learn basic skills, rules, and strategies of singles and doubles badminton. (1 cr) (F,Sp) ®

**PE 1210. Cycling.** Conditioning class emphasizing training. Introduction to road safety principles, various riding techniques, and cycle maintenance. Sections of road and mountain cycling offered. (1 cr) (F,Sp,Su) ®

**PE 1220. Golf.** Designed for the beginning and novice golfer. Basics of individual grip, set-up, posture, and swing. Includes putting, chipping, weight transfer, and balance. (1 cr) (F,Sp,Su) ®

**PE 1230. Gymnastics.** Designed to enhance current abilities and teach skills according to the individual student's abilities. Skills taught through drill work and lecture. (1 cr) (F,Sp,Su) ®

**PE 1240. Racquetball.** Designed to help students understand the general rules and strategies of racquetball, improve competitive skills, and play safely and effectively. (1 cr) (F,Sp) ®

**PE 1250. Tennis.** Designed for students desiring a basic understanding of tennis. Improvement of skills and strategies through active participation in drills and games. Both beginning and intermediate level sections offered. (1 cr) (F,Sp,Su) ®

**PE 1260. Billiards.** Designed to develop basic knowledge and concepts for playing a variety of games. Focuses on stroke mechanics, shot selection, and strategy. (1 cr) (F,Sp,Su) ®

**PE 1270. Bowling.** Provides students with the knowledge, skills, and strategies for successful participation and enjoyment. (1 cr) (F,Sp,Su) ®

**PE 1280. Fly Fishing.** Provides students with the opportunity to develop the skills, knowledge, and strategies for successful participation and enjoyment. (1 cr) (F,Sp,Su) ®

**PE 1300. Jog/Walk.** Provides students with opportunity to achieve and maintain personal fitness through jogging and/or walking. (1 cr) (F,Sp,Su) ®

**PE 1310. Conditioning.** Designed to improve overall flexibility, strength, and endurance capacity of the body. (1 cr) (F,Sp) ®

**PE 1320. Weight Training.** Demonstration of proper weight training techniques. Helps students understand basic concepts related to weight training, in order to gain strength, improve muscle tone, and start or continue a healthy lifestyle. (1 cr) (F,Sp,Su) ®

**PE 1330. Aerobics.** Fitness program, primarily designed to improve cardiovascular fitness, muscular endurance, and flexibility. (1 cr) (F,Sp) ®

**PE 1340. Spinning.** Intense cardiovascular conditioning class performed on stationary bikes. (1 cr) (F,Sp) ®

**PE 1350. Water Aerobics.** Provides students with opportunity to maintain personal fitness, with an emphasis on non-weight-bearing cardiovascular activity in water. (1 cr) (F,Sp) ®

**PE 1400. Swimming.** Designed for swimmers and nonswimmers desiring to improve swimming skills and enhance cardiovascular and muscular fitness. Emphasizes swimming safety and enjoyment in a variety of water activities. Beginning, intermediate, and lap swim sections offered. (1 cr) (F,Sp,Su) ®

**PE 1500. Self-Defense.** Covers skill development in terms of defensive capability, environment assessment, situation management, and the legal ramifications of the use of force. Available to the general University student body. (1 cr) (F,Sp,Su) ®

**PE 1510. Fencing.** Introduction to basic techniques of fencing. (1 cr) (F,Sp,Su) ®

**PE 1620. Hiking.** Provides skills and knowledge in hiking, with an emphasis on leave no trace techniques and safe operations in an outdoor environment. (1 cr) (F,Sp,Su) ®

**PE 1630. Orienteering.** Provides skills and knowledge in the fundamentals of orienteering with an emphasis on wilderness travel techniques and safety in the outdoors. (1 cr) (F,Sp,Su) ®

**PE 1640. Rock Climbing: Basic.** Provides skills and knowledge in basic rock climbing, teaching safe judgment and proper techniques in a climbing gym. (1 cr) (F,Sp,Su) ®

**PE 1650. Outdoor Survival.** Provides skills and knowledge in the fundamentals of outdoor survival and developing a wilderness ethic to allow for safe participation in wilderness activities. (1 cr) (F,Sp,Su) ®

**PE 1670. Wilderness First Aid.** Provides outdoor leaders with an introduction to wilderness first aid. Upon completion of course, students may receive a two-year wilderness first aid certification. (1 cr) (F,Sp,Su) ®

**PE 1690. National Outdoor Leadership School Course.** Provides students with the opportunity to earn USU credit for attending National Outdoor Leadership (NOLS) courses. (3-18 cr) (F,Sp,Su) ®

**PE 1740. Sailing.** Provides skills and knowledge in the fundamentals of sailing and water safety. (1 cr) (F,Sp,Su) ®

**PE 1810. Winter Exploration.** Provides skills and knowledge for safe winter camping using backpacking equipment. Assists in the development of high outdoor ethics. (1 cr) (F,Sp) ®

**PE 1820. Snowshoeing.** Provides skills and knowledge of snowshoeing, with an emphasis on leave no trace techniques and development of safe winter activity skills. (1 cr) (F,Sp) ®

**PE 1830. Yurt Camping.** Provides skills and knowledge for safe winter camping using a yurt for shelter. Assists in the development of high outdoor ethics. (1 cr) (F,Sp) ®

**PE 1840. Ice Skating.** Teaches basic, intermediate, conditioning, and competitive skill development. (1 cr) (F,Sp,Su) ®

**PE 1850. Skating.** Teaches basic and intermediate skating skills, as well as conditioning and competitive skill development. Develops artistic, hockey, speed, in-line, boarding, and social skills. (1 cr) (F,Sp,Su) ®

**PE 1900. Dance.** Designed to help students enhance their basic skills and enjoyment of dance through the following forms: jazz, modern, ballet, ballroom, social, Latin, western swing, etc. (1 cr) (F,Sp) ®

**PE 2000. Personal Instruction and Conditioning.** Designed for students and prospective members of varsity teams, as well as for the student/athlete requiring a personalized program. (1 cr) (F,Sp,Su) ®

**PE 2010. Varsity Cross Country.** Designed to meet the needs of varsity student/athletes in cross country. (1 cr) (F) ®

**PE 2020. Varsity Football.** Designed to meet the needs of varsity student/athletes in football. (1 cr) (F) ®

**PE 2030. Varsity Soccer.** Designed to meet the needs of varsity student/athletes in soccer. (1 cr) (F) ®

**PE 2040. Varsity Volleyball.** Designed to meet the needs of varsity student/athletes in volleyball. (1 cr) (F) ®

**PE 2050. Varsity Indoor Track and Field.** Designed to meet the needs of varsity student/athletes in indoor track and field. (1 cr) (Sp) ®

**PE 2060. Varsity Basketball.** Designed to meet the needs of varsity student/athletes in basketball. (1 cr) (Sp) ®

**PE 2070. Varsity Gymnastics.** Designed to meet the needs of varsity student/athletes in gymnastics. (1 cr) (Sp) ®

**PE 2080. Varsity Track and Field.** Designed to meet the needs of varsity student/athletes in track and field. (1 cr) (Sp) ®

**PE 2090. Varsity Softball.** Designed to meet the needs of varsity student/athletes in softball. (1 cr) (Sp) ®

**PE 2100. Varsity Golf.** Designed to meet the needs of varsity student/athletes in golf. (1 cr) (F,Sp) ®

**PE 2110. Varsity Tennis.** Designed to meet the needs of varsity student/athletes in tennis. (1 cr) (F,Sp) ®

**PE 2120. Varsity Weight Training.** Designed for varsity athletes. Emphasizes strength development. (1 cr) (F,Sp,Su) ®

**PE 3000. Dynamic Fitness.** Designed to develop positive health practices in the areas of physical activity, diet, rest, and relaxation of living through classroom, laboratory, and activity experiences. (3 cr) (F,Sp,Su) ®

**PE 4000. Lifeguard Training.** Designed to prepare students as pool or nonsurf open water lifeguards. Presents knowledge and skills necessary for lifeguard functions. American Red Cross certification available. (2 cr) (F,Sp) ®

**PE 4050. Water Safety Instructor.** Attention given to methods of teaching swimming and lifesaving. Presents knowledge and skills necessary for lifeguard functions. American Red Cross certification available. Offered through Evening School. (2 cr) (F,Sp) ®

**PE 4100. Scuba Diving.** Designed to prepare students for underwater diving. Students will be introduced to all of the equipment and safety techniques set out by the Professional Association of Diving Instructors (PADI), which is the world's largest and most popular diver training organization. PADI Certification is available through this course. (1 cr) (F,Sp,Su) ®

**PE 4200. Athletic Transition.** Life skills course designed to meet the needs of fourth and fifth year student athletes. Provides personal and career assistance. (2 cr) (F,Sp)

## ***Dance West Summer Classes (DE)***

**DE 1700W. Jazz.** Provides training and experience in the styles of jazz, one of the popular forms of American dance. (1 cr) (Su) ®

**DE 1800W. Dance West Performance.** Students will learn dances to be performed in "The West: America's Odyssey." Prerequisite: Audition. (1-3 cr) (Su) ®

**DE 1840W. Beginning Classical Ballet.** A discipline in recognized classic form. Includes barre exercises, port de bras, and center practice in balance, jumping, and turns. (2 cr) (Su) ®

**DE 1870W. Beginning Classical Modern Dance.** Designed to develop coordination, ease, and poise in handling the body. Focuses on dance as an art using the body as a medium of expression. (2 cr) (Su) ®

**DE 2850W. Intermediate Classical Ballet.** Barre exercises, port de bras, and center practice in balance, jumps, beats, and turns with more emphasis on exactness and

precision of line. Prerequisite: One year of ballet or permission of instructor. (2 cr) (Su) ®

**DE 2880W. Intermediate Classical Modern Dance.** Stresses alignment of the skeletal structure, freedom and movement of the torso, and technical work enabling the dancer to secure the natural axis of balance. Prerequisite: One year modern dance or permission of instructor. (2 cr) (Su) ®

**DE 3800W. Advanced Ballet.** Pointe and Pas de Deux. Intensified center floor work concentrating on longer adagio and allegro combinations. Prerequisite: Five years of ballet or permission of instructor. (3 cr) (Su) ®

**DE 4500W. American Character Ballet.** History through movement from seventeenth century European dance through contemporary styles. (3 cr) (Su) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

<sup>2</sup>This class is not taught on a regular basis. See department for further information.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

## Department of *History*

### *College of Humanities, Arts and Social Sciences*

**Head: Professor** *Norman L. Jones*, medieval, early modern Europe, Britain, Christianity  
Office in Main 323, (435) 797-1290

**Associate Head: Associate Professor** *Frances B. Titchener*, ancient Greece and Rome, Latin, Greek

**Graduate Program Coordinator: Associate Professor** *Michael L. Nicholls*, early American history

**FAX** (435) 797-3899

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**TTY** (435) 797-1297

**Trustee Professor** *Anne M. Butler*, U.S. West, U.S. women, editor of *Western Historical Quarterly*; **Professors** *Jay Anderson*, folklore, folklife, film studies; *C. Robert Cole*, England, modern European history; *Kermit L. Hall*, American legal history; *Clyde A. Milner II*, U.S. West, American Indian, American Studies, executive editor of *Western Historical Quarterly*; *Carol A. O'Connor*, Twentieth Century U.S.; *Leonard N. Rosenband*, France, European economic and labor history; *Barre Toelken*, folklore and folklife, director of Folklore Program; **Adjunct Professors** *Doran J. Baker*, Electrical and Computer Engineering Department, history of science; *Christopher B. R. Pelling*, University College, Oxford: Classics; **Professors Emeritus** *Stanford Cazier*, American intellectual history; *William F. Lye*, Africa, India, Canada; *Charles S. Peterson*, U.S. Western history; *F. Ross Peterson*, U.S. modern political history, Black history; **Associate Professors** *Christopher A. Conte*, Africa, world, and environmental history; *Mark L. Damen*, ancient world, theatre history, Latin, Greek; *R. Edward Glatfelter*, Russia and East Asia, associate dean of College of Humanities, Arts and Social Sciences; *David R. Lewis*, American Indian, environmental, Utah, co-editor of *Western Historical Quarterly*; *Daniel J. McInerney*, American intellectual history, Nineteenth Century; *Stephen C. Siporin*, folklore, oral narrative folklore, folk art; **Assistant Professors** *Peter Mentzel*, Eastern Europe, Ottoman empire, Islamic civilization; *Jennifer Ritterhouse*, U.S. history, African-American history, U.S. South, women's history; *Susan O. Shapiro*, Greek intellectual history, ancient Greek and Latin language; **Adjunct Assistant Professors** *Daniel M. Davis*, photograph curator, U.S. West; *Stephen C. Sturgeon*, manuscript curator, Twentieth Century U.S. West, political, environmental history; **Lecturer** *Denise O. Conover*, American diplomatic history, U.S. military, American civilization

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), Master of Arts (MA) in History; participates in Master of Social Sciences (MSS)

## *Undergraduate Programs*

### *Objectives*

The Department of History offers a flexible program to accomplish the following objectives:

1. To train undergraduates to research, analyze, synthesize, and communicate reasonable conclusions about the past by using the historical method.
2. To inculcate cultural literacy and provide the knowledge necessary for informed decision-making by citizens of Utah, the United States, and the world.
3. To provide students with crucial work skills in research, analysis, communication, and collaboration, as well as enriching their lives.
4. To contribute to the liberal arts curriculum of the University through general education, general interest courses, the history

major, the history teaching major, minors in history and classics, and the interdisciplinary programs of folklore, American studies, British and commonwealth studies, and the Liberal Arts and Sciences Program.

History is a reading- and writing-intensive program.

### *Requirements*

**Departmental Requirements.** New freshmen accepted in good standing by the University may apply for admission to the History Department. Students transferring from another institution or another major will be admitted if they have a minimum 2.5 GPA in history courses and an overall minimum GPA of 2.5. A minimum 2.75 GPA is required for entry into the teacher education program.

Candidates for a degree must earn a grade of *C* or better in all history courses used to meet the requirements for a history major or minor, a history teaching major or teaching minor, or a classics minor.

### Bachelor of Arts (BA) Degree in History

The BA degree requires a minimum proficiency in a foreign language. This proficiency may be established in one of the following ways:

1. 16 credits in a single language.
2. Documentation of a proficiency level of “intermediate low” or better through an examination administered by the USU Department of Languages and Philosophy.
3. Completion of any upper-division foreign language course constituting a third-year course of study with a grade of *C* or higher.

### Bachelor of Science (BS) Degree in History

The BS degree in history requires 16 credits of math and science beyond the University Studies requirements. Of the 16 credits, 3 must be earned in a statistics course, preferably in social science statistics. The remaining 13 credits must include a course series from the following list: Biol 1210, 1220; Chem 1210, 1220; Geol 1150, 3200; Phyx 2110, 2120, 2210, 2220.

**History Major.** Thirty-six credits of history coursework are required. A grade of *C* or better must be earned in all history courses used for the major. Each major must complete *one* of the following three courses in the area of premodern civilization: Hist 1020, 1040, or 1060. Each major must complete *one* of the following two courses in the area of modern civilization: Hist 1030 or 1050. Each major must complete *one* of the following two courses in the area of American history: Hist 2700 or 2710. (If a student has taken Hist 1700 on another campus or at USU before entering the History Major, this course may be counted toward meeting the American history survey requirement.) No student, including transfer students, may count more than 12 credits of lower-division coursework toward the history major. Every senior must take Hist 4990, the capstone course for the major. Students should complete their remaining 21-24 credits by taking 3000- and 4000-level history courses. Since new courses may be approved from time to time, any upper-division course listed in the current *Schedule of Classes* under *History* is acceptable.

No more than 3 credits of Hist 4930 may be applied toward the major.

Since the study of history requires an understanding of many fields of human endeavor, students majoring in history must select a minor. Historians are encouraged to take electives in fields that will broaden their knowledge of the world and are closely allied to history, such as literature, economics, geography, anthropology, political science, sociology, classics, philosophy, or foreign language.

Students wishing to undertake graduate work should pursue the BA degree. During their senior year, they should take the graduate record exam (GRE).

**History Teaching Major.** Thirty-nine credits, earned in history courses, are required. A grade of *C* or better must be earned for all history courses used for the major. Each major must complete *one* of the following three courses in the area of premodern civilization: Hist 1020, 1040, or 1060. Each major must complete *one* of the following two courses in the area of modern civilization: Hist 1030 or 1050. Each major must complete *one* of the following two courses in the area of American history: Hist 2700 or 2710. (If a student has taken Hist 1700 on another campus or at

USU before entering the history teaching major, this course may be counted toward meeting the American history survey requirement.) No student, including transfer students, may count more than 12 credits of lower-division coursework toward the history teaching major. Every history teaching major must take *one* of the following three courses as a senior capstone course: Hist 4850, 4860 or 4870. Students should complete their remaining 24-27 credits by taking 3000- and 4000-level history courses. A minimum of two courses must be taken from each of the following areas: U.S. history, European history, and world history. Since new courses may be approved from time to time, any upper-division course listed in the current *Schedule of Classes* under *History* is acceptable. To become licensed to teach history, students must be admitted to the Secondary Teacher Education Program (STEP). A 2.75 GPA is required for admission, as well as a writing test, a speech and hearing test, and a background check. Application should be made as soon as practical after the history teaching major has begun. Applications for admission are available in the History Department office. The STEP requires 35 credits of coursework, in addition to the 39 credits of history courses. For additional information about the STEP, contact Harold Heap, secondary education undergraduate advisor, (435) 797-2222.

All teaching majors must also have a teaching minor in an area for which teaching licensure can be granted.

No more than 3 credits of Hist 4930 may be applied toward the major.

**Minor in History.** Twenty-one credits are required. A grade of *C* must be earned in all history courses used for the minor. Every student must complete *one* of the following three courses in the area of premodern civilizations: Hist 1020, 1040, or 1060. Every student must complete *one* of the following two courses in modern civilization: Hist 1030 or 1050. Every student must complete one of the following courses in the area of American history: Hist 2700 or 2710. (If a student has taken Hist 1700 on another campus or at USU before entering the history minor, this course may be counted toward meeting the American history survey requirement.) No student, including transfer students, may count more than 12 credits of lower-division coursework toward the history minor. Students should complete their remaining 9-12 credits by taking 3000- and 4000-level history courses.

No more than 3 credits of Hist 4930 may be applied toward the minor.

**History Teaching Minor.** Twenty-four credits are required. A grade of *C* or better must be earned in all history courses used for the minor. Every student must complete *one* of the following three courses in premodern civilization: Hist 1020, 1040, or 1060. Every student must complete *one* of the following two courses in modern civilization: Hist 1030 or 1050. Every student must complete one of the following courses in the area of American history: Hist 2700 or 2710. (If a student has taken Hist 1700 on another campus or at USU before entering the history teaching minor, this course may be counted toward meeting the American history survey requirement.) No student, including transfer students, may count more than 12 credits of lower-division coursework toward the history minor. All teaching minors in history must take one of the following: Hist 4850, 4860 or 4870. Students should complete their remaining 9-12 credits by taking 3000- and 4000-level history courses.

No more than 3 credits of Hist 4930 can be applied toward the minor.

**Classics Minor with Emphasis in Civilization.** Twenty-one credits of coursework are required. All students must take Hist 3130 and 3150. They must take *one* of the following three courses in ancient archaeology: Hist 3110, Anth 1030, or Anth 3170. They must take *one* of the following three ancient literature courses: Clas 1100, 3210, or Thea 5290. They must take *one* of the following three ancient art courses: Hist 3110, 4210, or Art 4710. They must take *one* of the following two ancient thought courses: PolS 4310 or Phil 3100. The remaining 3 credits are elective and may include any of the courses listed above.

**Classics Minor with Emphasis in Latin Language.** Thirteen credits are required. All students must complete Hist 3150 and 7 credits of upper-division (3000- and 4000-level) courses in Latin language. They must also complete *one* of the following courses: Art 4710, Clas 1100, 3210, Hist 4210, or Thea 5290.

**Classics Minor with Emphasis in Greek Language.** Thirteen credits are required. All students must complete Hist 3130 and 7 credits of upper-division (3000- and 4000-level) courses in classical Greek language. They must also complete *one* of the following courses: Art 4710, Clas 1100, 3210, Phil 3100, or Thea 5290.

### ***Academic Opportunities***

**Departmental Honors in History.** Students in the department with a minimum GPA of 3.5 may apply to pursue an honors degree in history. Those interested should consult the department honors coordinator.

**Phi Alpha Theta.** History students with a minimum GPA of 3.1 in history classes and an overall minimum GPA of 3.0 are eligible for membership in the national history honor society, Phi Alpha Theta. Those interested should consult the faculty advisor for Phi Alpha Theta.

**Undergraduate Teaching Fellows.** The UTF program is designed to provide students, particularly potential teachers, with the opportunity to assist professors and, thereby, learn first-hand about the nature of the profession. UTFs must maintain a minimum GPA of 3.0 and be sponsored by a professor. Application forms are available in the History Department office.

### ***Additional Information***

For updated information concerning programs and courses offered by the Department of History, visit the departmental web page at <http://www.usu.edu/history>.

### ***Financial Support***

Scholarships, grants-in-aid, and work-study programs are available through the University. The History Department offers tuition waivers and scholarships to outstanding students. In addition, undergraduates may be employed as research assistants and clerical assistants within the department. For current information on scholarships and employment opportunities, consult the department head.

## ***Graduate Programs***

### ***Admission Requirements***

Graduate applicants may be admitted to the program for either the master of arts or master of science in history if they meet the following qualifications: (1) hold a baccalaureate degree; (2) have at least a 3.0 cumulative GPA over the last 60 credits of undergraduate work, with a 3.5 GPA in history courses recommended; (3) submit Graduate Record Examination (GRE) general test scores, with a **required** minimum score at the 40th percentile on the verbal section, and a **recommended** minimum score at the 40th percentile on *both* the quantitative and analytical portions of the exam; (4) submit three letters of recommendation from persons acquainted with the applicant's academic performance and potential; and (5) submit a brief statement of proposed fields of interest and career goals.

The Department of History also strongly recommends that applicants have either an undergraduate major or minor in history or a closely related field (i.e., American studies, classics). Familiarity with one or more foreign languages is highly desirable and is required for the master of arts degree and for master's level research in many fields of history. Applications will be strengthened by the submission of an example of the student's historical writing, such as a paper (about 15 pages in length) written for a seminar or upper-division course.

The final recommendation for admission will be made upon consideration of all the above factors by the department and the School of Graduate Studies.

### ***Degree Programs and Additional Requirements***

**Master's Degree, Plan A (Thesis).** The thesis option should be taken by anyone intending to do research or enter another program for the doctoral degree. A master of arts, master of science, or master of social sciences degree can be completed with this option.

The program consists of 30 semester credits beyond the bachelor's degree, 6 credits of which must be in thesis research. Students must take Hist 6000, as well as either Hist 6010 or 6020, or another theory-intensive course approved by the director of graduate studies. Students may apply a maximum of 4 internship credits earned while working in an archives, for a museum, on the staff of a scholarly journal, or as a teaching intern in an upper-division undergraduate course.

The remainder of the 30 credits may be taken as electives in history or related courses relevant to the student's program.

Upon arrival at USU, students are urged to meet with the departmental graduate advisor, who will direct them to one or more faculty members with similar interests. Through consultations with the graduate and faculty advisor, the first-year student will form a thesis committee and formulate a course of study. By the end of the first year, most students will have submitted to their committees a proposal for the thesis, which they will write under the close supervision of the committee members. The oral defense usually takes place in the spring semester of the second year.

**Master's Degree, Plan B (Nonthesis).** A nonthesis master's program can help a student attain employment in many areas, but is not recommended for students planning to secure a doctorate. A master of arts, master of science, or master of social sciences degree can be completed with this option.

The Plan B program consists of 30 credits beyond the bachelor's degree. The course requirements are identical to those of the Plan A program, except that only 3 thesis credits are permitted.

Students completing the Plan B program do not write a full-length thesis. Instead, Plan B students write a research paper of approximately 30 pages in length and submit a portfolio of their graduate writing, which includes two additional and distinct pieces of writing. Students defend their Plan B research papers and writing portfolios before their major professor and the members of the supervisory committee. Final approval of the Plan B rests with the department, rather than with the School of Graduate Studies.

**Master of Arts.** To receive a master of arts (MA) degree, students must successfully complete two years of foreign language at the undergraduate level. If two years of undergraduate language study already appear on the student's transcript, he or she must demonstrate current competence through successful completion of a language exam or by taking a 3000- or 4000-level language course for which a grade of *B* or higher proves competency. In all cases, an individual assessment must be made of a student's language status. For further information, see page 77.

Students planning to continue on for a doctorate should be aware that many doctoral programs in history require that students pass written proficiency exams in two languages.

**Master of Science.** To receive a master of science (MS) degree in history, students must demonstrate, to the satisfaction of their supervisory committee, the ability to incorporate computer science, statistics, or environmental science in their research.

**Master of Social Sciences (MSS).** Like the MA and MS in history, the MSS degree requires a minimum of 30 credits, including 15 credits in the major discipline of history, plus a minimum of 15 credits from one of the following two tracks. *Track A:* a minimum of 15 credits from two approved minor areas, with at least two courses in each minor area. *Track B:* a minimum of 15 credits from an approved minor and a liberal arts and sciences cluster, with at least two courses in the minor and two courses in the cluster. Accepted minor disciplines include instructional technology, economics, geography, political science, psychology, and sociology/anthropology. This degree is designed for secondary school teachers who need more training to obtain licensure in additional teaching fields or who simply wish to deepen their understanding of a related field.

Students in the MSS program are required to take Hist 6000 and 3 credits of Hist 6970 for their Plan B. A supervisory committee consists of a major professor in history and two committee members, each representing one of the student's minor fields. MSS students, like other Plan B students in history, must write a research paper of approximately 30 pages and submit a portfolio of their graduate writing that consists of two separate and distinct pieces of work, one from each of their two minor fields. An oral defense of the student's Plan B paper and portfolio is held before the student's supervisory committee.

Additionally, the master of social sciences (MSS) in history requires students to demonstrate an understanding of statistical applications in the social sciences.

### **Financial Assistance**

The primary financial assistance offered by the Department of History is through teaching assistantships. Each year, the History Department offers to qualified students, on a competitive basis, a total of seven teaching assistantships. These assistantships entail approximately 20 hours of work per week, assisting faculty members with departmental introductory survey courses. The award carries a stipend and an out-of-state tuition waiver. To keep their assistantships, teaching assistants must maintain a GPA of 3.0 (or a *B* average) and be a full-time student (see page 71). While enrolled in the MA or MS program, teaching assistants may hold teaching assistantships for a maximum of two years. Applications for teaching assistantships should be postmarked *no later than February 1*, for the upcoming academic year.

Graduate students may be eligible for Carr Scholarships to supplement their teaching assistantships. Competitive grants to support travel and research are also available to history graduate students.

In addition, financial assistance is available through the *Western Historical Quarterly*, a journal published at USU. The editors of the journal offer, during alternate years, the S. George Ellsworth Editorial Fellowship and the Robert M. Utley Editorial Fellowship. These fellowships are awarded to highly qualified students working as editorial assistants in that office. These fellowships are nationally competitive and allow graduate students to learn all aspects of journal production. They carry a stipend (with additional funding possible during the summer) and a waiver of the out-of-state portion of the tuition. Materials should be postmarked no later than February 1, for the upcoming academic year. Applicants will be notified in early April.

Funding for the S. George Ellsworth Fellowship is provided by the *Western Historical Quarterly*, the School of Graduate Studies, the College of Humanities, Arts and Social Sciences, and the S. George Ellsworth Endowment of the Mountain West Center for Regional Studies. The S. George Ellsworth Fellowship is being offered for the 2003-2004 academic year.

Funding for the Robert M. Utley Fellowship is provided by the *Western Historical Quarterly* and the School of Graduate Studies. The Robert M. Utley Fellowship is being offered for the 2002-2003 and 2004-2005 academic years. For further information about *Western Historical Quarterly* fellowships, write to: *Western Historical Quarterly*, Utah State University, 0740 Old Main Hill, Logan UT 84322-0740; or send e-mail to: [cdoyle@hass.usu.edu](mailto:cdoyle@hass.usu.edu).

The application deadline for both fellowships is February 1, for the upcoming academic year.

**Additional Funding.** In addition to teaching assistantships and the *Western Historical Quarterly* editorial assistantships, the School of Graduate Studies awards a limited number of scholarships. To be eligible for these awards, all students should complete the application for admission and send it, along with GRE scores and letters of recommendation, to the School of Graduate Studies by February 1. A financial aid application form (which may be obtained from the History Department) should be returned to the History Department by February 1.

Students interested in establishing eligibility for federal loans and work-study will need to complete the Free Application for Federal Student Aid (FAFSA) and submit it to: Financial Aid Office, Utah State University, 1800 Old Main Hill, Logan UT 84322-1800. Questions about eligibility should be directed to the Financial Aid Office, tel. (435) 797-0173.

### ***Career Opportunities***

Some graduates of USU's master's program continue their formal education in PhD programs or law schools. Others find employment in the two-year college or secondary school systems, as teachers or administrators. Still others work for historical societies, museums, publishing firms, and a variety of enterprises in the private sector.

### ***Additional Information***

Current announcements and other information are posted to the History Department web site, <http://www.usu.edu/history>.

## ***History Courses (Hist)***

**Hist 1020 (BHU). Cultural and Economic Exchange in the Pre-Nineteenth Century World.** Surveys pre-Nineteenth Century cultural and economic interactions in important zones of exchange. Regional focus determined by instructor. Themes may include: trade, religious conversion, migration, slavery, warfare, and other types of cross-cultural exchange. (3 cr) (F,Sp) ©

**Hist 1030 (BHU). The Modern World.** Survey of world history from the beginning of the nineteenth century to the present. (3 cr) (F,Sp,Su) ©

**Hist 1040 (BHU). Foundations of Western Civilization: Ancient and Medieval.** Survey of institutions and developments of early and medieval Western civilization from its Mediterranean origins to the beginning of the early modern period. (3 cr) (F,Sp,Su)

**Hist 1050 (BHU). Foundations of Western Civilization: Modern.** Survey of the institutions and developments in Western civilization from 1500 to the present. (3 cr) (F,Sp,Su)

**Hist 1060 (BHU). Introduction to Islamic Civilization.** Survey of Islamic civilization from the Prophet Muhammed to the present. (3 cr)

**Hist 1600. American Cultures in Film.** Introduction to major ethnic groups in America and their treatment in recent feature films. Also taught as Engl 1600. (3 cr) (F,Sp)

**Hist 1700 (BAI). American Civilization.** Fundamentals of American civilization. Covers history, political system, and economic institutions of the United States. Fulfills American Institutions requirement. (3 cr) ©

**Hist 1710 (BHU). Introduction to Folklore.** Introduction to major genres of folklore (folk narrative, custom, folk music and song, vernacular architecture and arts), folk groups (regional, ethnic, occupational, familial), and basic folklore research method (collecting and archiving). (3 cr) (F,Sp)

**Hist 2010. Special Topics Seminar.** Study of special cross-cultural topics, including Imperial Paris, British India, Slavery in America, and Ute History. (3 cr)

**Hist 2040 (BHU). British and Commonwealth Cultures.** Introduction to the diverse cultures of the British Isles and the Commonwealth of the present day. Particular emphasis on regional identity in relation to multiculturalism and internationalization. Also taught as Engl 2040. (3 cr) (F)

**Hist 2700 (BAI). United States to 1877.** Survey of the development of American society, economy, culture, and politics to 1877. (3 cr) (F,Sp,Su)

**Hist 2710 (BAI). United States 1877-Present.** Survey of the development of American society, economy, culture, and politics since 1877. (3 cr) (F,Sp,Su)

**Hist 2720. Survey of American Folklore.** Principal ethnic, regional, and occupational folk groups in America. Relations between folklore and American history, literature, and society. Key genres in American folklore (narrative, art, song, etc.) and their role in American culture. Also taught as Engl 2720 and Anth 2720. (3 cr) (Sp)

**Hist 3070 (DHA). Perspectives in Folklore.** In-depth study of folklore for nonmajors. Topics vary according to faculty expertise. Also taught as Engl 3070. (3 cr) (F,Sp)

**Hist 3110 (DHA, CI). Ancient Near East.** Survey of history and civilization of ancient Mesopotamia, Egypt, and Israel, from prehistory to 500 B.C. Writing intensive. Prerequisite: Engl 2010 or equivalent. Also taught as Art 3110. (3 cr)

**Hist 3130 (DHA, CI). Greek History.** History of Greece from Neolithic period to modern times. Special emphasis on politics, art, literature, and civilization. Writing intensive. Prerequisite: Engl 2010 or equivalent. (3 cr)

**Hist 3150 (DHA, CI). Roman History.** History of Rome from Neolithic era to "fall" of the Western Empire. Special emphasis on politics, art, literature, and civilization. Writing intensive. Prerequisite: Engl 2010. (3 cr)

**Hist 3220 (DHA, CI). Medieval European Civilization, 500-1500.** Provides students with overview of major themes in medieval European history from 500 to 1500 A.D. Also introduces major historiographical problems related to this period. Writing intensive and document based. Prerequisite: Engl 2010 or equivalent. (3 cr)

**Hist 3230. Early Modern Europe.** Explores major themes of early modern European history, such as secularization, the rise of the nation state, the Reformation, and the birth of capitalism. Introduces major historiographical issues of the period. Reading and writing intensive. Prerequisite: Engl 2010 or equivalent. (3 cr)

**Hist 3240. Modern Europe from 1789 to the Present.** Historical survey of Europe from the French Revolution to the present, with special emphasis on political and cultural implications of imperialism. Prerequisite: Hist 1050. (3 cr)

**Hist 3250. Renaissance Europe 1300 to 1520.** Emphasizing writing and primary sources, covers significant changes in Europe in government, society, and intellectual life caused by the Black Death, the humanist revolution in arts and literature, and the centralizing efforts of popes and monarchs. (3 cr)

**Hist 3260. History of Spain and Portugal.** History of Iberian peninsula from fifteenth century to the present. Age of Exploration, conquest and colonization in the Americas and Africa, eighteenth century reforms, constitutional monarchies, civil wars, and twentieth century dictatorships. Writing intensive. Prerequisite: Engl 2010 or equivalent. (3 cr)

**Hist 3280. East Central Europe Since 1520.** Examines history of East Central Europe, with special emphasis on growth of nationalism and establishment of the states of Czechoslovakia, Hungary, and Poland. Emphasizes research and writing. (3 cr)

**Hist 3310. Balkans Since 1389.** Examines history of Balkan peninsula, with special emphasis on growth of nationalism and establishment of Bulgaria, Albania, Greece, Romania, and Yugoslavia. Emphasizes research and writing. (3 cr)

**Hist 3320. Tsarist Russia.** Political, economic, and cultural development of Russian people to 1917. Writing and computer intensive. (3 cr)

**Hist 3330. The Soviet Union and its Heirs.** Beginning with the Russian Revolution, surveys political, cultural, and economic history of the Soviet Union and the regional states emerging in its wake. Writing and computer intensive. (3 cr)

**Hist 3410. The Modern Middle East.** Examines history of the Middle East (Arabian peninsula, Fertile Crescent, Egypt, Iran, and Turkey), with special emphasis on social and political currents which have shaped the area's history. (3 cr)

**Hist 3460. Comparative Asian History.** Surveys history of Asian continent, analyzing common patterns in the cultures of West, South, Southeast, and East Asia. (3 cr)

**Hist 3480. History of China.** Development of traditional Chinese culture and effect on that culture of the growth of western influence. Writing and computer intensive. (3 cr)

**Hist 3510. Africa and the World.** Explores foundation of Africa's contemporary problems. Surveys Africa's history of interactions with Asia and Europe. In addition to writing several short essays covering readings and films, students investigate an aspect of cultural, political, or economic interaction and prepare a short research paper. (3 cr)

**Hist 3530. African Environmental History.** Surveys changing historical relationship between Africans and their physical environment. Readings cover ecological change in arid, savanna, rain forest, and montane environments. Students also survey and evaluate the methods and sources used by environmental historians to explain environmental stress, degradation, and rehabilitation. (3 cr)

**Hist 3620. History of Colonial Latin America.** Surveys art, culture, religion, and social organization of the Aztecs, Incas, and Mayas, and of the European dominated post-conquest. Introduces students to major historiographical problems in the field. Prerequisite: Engl 2010 or equivalent. (3 cr)

**Hist 3630. History of Modern Latin America.** Introduces history and historiography of Latin America from the wars of independence to the contemporary era. Writing intensive. (3 cr)

**\*Hist 3700 (CI). Regional Folklore.** Study of folklore and folklife as a regionalizing process, rather than memorization of cultural contexts of a particular region. Regions examined through their folk culture include Brittany in Northwest France, the pine Barrens of New Jersey, and the Mormon cultural region of the Intermountain West. Also taught as Engl 3700. (3 cr) (F,Sp)

**Hist 3710 (CI). Folklore Colloquium.** Issues, problems, and methodologies in folklore study. Focus and instructor variable. Also taught as Engl 3710. (3 cr) (Sp) ®

**Hist 3720. Colonial America.** Advanced survey of North American Colonies, emphasizing British experience, from their founding to 1763. Addresses major issues of interpreting America's beginnings. (3 cr) (F)

**Hist 3730. The New American Nation.** Advanced survey of American history from 1763 to 1800, with special emphasis on historiography of the Revolution, creation of a Republic, and efforts to define the New Nation. (3 cr) (Sp)

**Hist 3740. United States in the Age of Jefferson and Jackson.** Examines history of United States from 1800 to 1846, from election of Jefferson to outbreak of war with Mexico. Prerequisite: Engl 2010. (3 cr) (F)

**Hist 3750. Civil War and Reconstruction.** Analysis of most trying period in U.S. history, with special emphasis on the course and results of the war. Prerequisite: Engl 2010. (3 cr) (Sp) ©

**Hist 3760 (DHA, CI). The United States, 1900-1945.** Analyzes scholars' approaches to U.S. history in the early twentieth century, with attention to socio-economic change, political reform, and transforming impact of American involvement in two world wars. Writing intensive. Prerequisite: Engl 2010 or equivalent. (3 cr) (Sp)

**Hist 3770. Contemporary America, 1945-Present.** Domestic and foreign policy since World War II. Emphasizes Cold War, Civil Rights, and the political and social developments of contemporary United States. Contains intensive writing component. (3 cr) (F) ©

**Hist 3840. Twentieth Century American West.** Considers emerging scholarly literature about the American West in the twentieth century, with attention to economic, environmental, and demographic questions. (3 cr) (Sp)

**Hist 3850 (DHA, CI). History of Utah.** Prehistory to the present. Examines environment and peoples of Utah, emphasizing use of primary documents to view and interpret Utah's past. Reading and writing intensive. Requires use of USU Special Collections and Archives. Prerequisite: Engl 2010. (3 cr) (Sp) ©

**Hist 3950 (DHA, CI). Environmental History.** Surveys writings from a relatively new genre of historical scholarship that attempts to explain the relationship between human society and the natural world. Readings focus on North America, but students also have opportunity to survey materials from the non-Western world. Course is reading and writing intensive, and requires students to conduct a research project in which they construct the history of a particular landscape. (3 cr)

**Hist 4210. Celtic Europe.** History of Celtic peoples in British Isles, Scandinavia, and continental Europe, from Neolithic times to the Norman Conquest in 1066. Computer intensive. (3 cr) (F,Sp)

**Hist 4230 (DHA, CI). The History of Christianity in the West.** Introduces students to history of Christian spirituality, asking how Christianity has been lived and how it has shaped lives over two thousand years. Uses original sources to introduce both the history and the historiographical problems surrounding the Christian religion. Writing intensive. (3 cr)

**Hist 4250. The Reformation in Britain: 1450-1688.** Focuses on major research questions in the field of early modern studies. Explores causes and consequences of English Reformation and British Civil War. Writing and research intensive. (3 cr)

**Hist 4290. Europe and the French Revolution, 1700-1815.** Examines causes and consequences of the French Revolution, introducing students to major themes in its interpretation. (3 cr)

**Hist 4310. History of Nationalism.** Examines development of nationalism. Addresses different theories of nationalism, and then tests these theories with various case studies. Emphasizes research and writing. (3 cr)

**Hist 4320 (DHA). History of Scientific Thought.** Examination of key episodes in the history of science and associated ideas about the nature of scientific knowledge and how it may be acquired. Also taught as Phil 4320. (3 cr) (Sp)

**Hist 4330. Modern Germany with Special Emphasis on the Twentieth Century.** Historical survey of Germany beginning with Frederick the Great of Prussia, and considering the parallel history of the Habsburg empire and the Germany of the Kleinstaaterei. Considers wars and economic and political developments beginning in 1871, which produced the Nazi period. Prerequisite: Hist 1050. (3 cr)

**Hist 4390. British Imperialism from 1688 to the Present.** Topical survey of British Imperialism from 1688 to the present. Topics include the interaction of British imperialism with foreign policy; social, economic, and political institutions; the life of the mind and senses; and non-European cultures. Prerequisite: Hist 1050. (3 cr)

**Hist 4550 (DHA, CI). The History of Women and Family in America.** Writing intensive course drawing on film, primary documents, and readings to trace the history of women, emphasizing race, class, and gender influences of each era. (3 cr)

**Hist 4600 (DHA, CI). The History of the American West.** Traces major themes in nineteenth century history of the land between the Mississippi River and the Pacific Coast. In a writing intensive course, students use primary documents and secondary materials to discover the race, class, and gender issues that shaped the American West. (3 cr)

**Hist 4610 (QI). Themes and Methods in Economic History.** Themes and methods in economic history, drawing on various societies and time periods. Designed to prepare future historians to work in their field. Prerequisite: Math 1030 or Stat 1040. (3 cr)

**Hist 4620 (CI). Advanced Seminar in American Studies.** Builds upon foundation courses in American Studies and introduces students to theory and methods. Prepares students for the senior project. Required for American Studies majors and minors. Should be taken after completion of 12 credits in the major, but prior to completion of 21 credits. Also taught as Engl 4620. (3 cr) (Sp)

**Hist 4640 (CI). Studies in the American West.** Interdisciplinary course in American Studies, exploring the region of the West through the analysis of literary texts, historical sources, and socio-cultural materials. Also taught as Engl 4640. (3 cr) (F)

**Hist 4690 (CI). American Studies Capstone Seminar.** Required for students majoring in American Studies. Supports design and writing of senior thesis. Each student selects a topic integrating insights from classes taken by the individual student for the American Studies major. Also taught as Engl 4690. (3 cr)

**Hist 4700. Folk Material Culture.** Introduction to folklife studies, emphasizing patterns of expressive culture (material, verbal, and customary) in selected folk groups. In-depth examination of vernacular primary sources, including documentary and feature films. Also taught as Engl 4700. (3 cr) (F,Sp)

**Hist 4710. American Indian History.** Prehistory to the present. Emphasizes ethnohistory and the Western U.S., focusing on intercultural contacts, subsistence and environmental change, and contemporary political and economic issues, while analyzing primary documents and secondary readings. (3 cr) (F)

**Hist 4730 (CI). History of Black America.** Study of African-American experience from slavery to freedom, as well as the difficult quest for democracy and equality in contemporary America. Includes both creative and research writing components. (3 cr) (Sp)

**Hist 4740. American Immigration History.** Examines history of immigration to the United States from Europe, Africa, Latin America, and Asia. Requires library research, especially in government documents, and use of oral history techniques. (3 cr) (F)

**Hist 4750. Advanced Folklore Workshop: Fife Conference.** Focuses on one theme or topic in folklore, and offers lectures from nationally prominent scholars in the area. Taught during one week, every day and all day. To receive grade, student must write critical paper. Also taught as Engl 4750. (3 cr) (Su) ®

**\*\*Hist 4790. American Religious History.** Varieties of American religious experience from settlement to the present. (3 cr)

**Hist 4810. American Military History.** Covers evolution of the military in American history and society from 1775 to the present. (3 cr)

**Hist 4850. Interpreting the Past for Teachers.** Focuses on nonformal educational experiences open to secondary school students outside of the classroom. Interpretive modes examined include historical film, documentaries, living history programs, history fairs and festivals, and historical novels and magazines. (3 cr) (F,Sp)

**Hist 4860. Teaching History.** Designed to introduce history teaching majors to ethical and methodological issues arising in history classroom. (3 cr) (F)

**Hist 4870. Teaching World History: Themes, Approaches, and Materials.** For history teaching majors and minors only. Introduces students to a number of approaches to the study and teaching of world history. Students survey theoretical and pedagogical literature, then assemble a course package, which is presented to their peers. (3 cr) (Sp)

**Hist 4880. History Workshop: Special Topics.** Focuses on a theme or topic in history. (1-3 cr) (F,Sp,Su) ®

**Hist 4910. Special Studies in History.** Examination of special areas and themes in history. (3 cr) (F,Sp,Su) ®

**Hist 4930. Directed Readings.** Directed readings in any special historical field. For each credit granted, minimum of three books must be read. Prerequisite: Instructor's approval. (1-3 cr) ®

**Hist 4940. Historical Internship.** Directed internship involving participation in a historical research or cultural management project. (1-3 cr) (F,Sp,Su) ®

**Hist 4990 (CI). Special Topics in History.** Senior history seminar emphasizing historiographical literacy, research, and writing skills in relation to a specific historical topic. Prerequisites: Lower- and upper-division courses in areas relating to topic in question. (3 cr) (F,Sp,Su) ®

**Hist 5700. Folk Narrative.** Forms and functions of folk narrative genres: myth, legend, folktales, memorate, and ballad. Also taught as Engl 5700. (3 cr)

**Hist 6000. Historical Methods and Research.** Introduction to the historical profession, emphasizing research and writing skills, as well as the critical assessment of scholarly works. Should be taken at beginning of student's graduate program. Required for history master's students. (4 cr) (F)

**Hist 6010. History and Theory.** Examination of major works that have influenced the theory and practice of historical writing. History master's students are required to complete Hist 6010, 6020, or another theory-enriched course. (4 cr) ®

**Hist 6020. Approaches to History.** Uses readings in particular instructor's field to underscore theories and methods different historians bring to their subject. History master's students are required to complete Hist 6010, 6020, or another theory-enriched course. (4 cr) ®

**Hist 6030. Research Seminar.** Research in primary sources for graduate students. (4 cr) ®

**Hist 6100. Special Topics: Ancient History.** Intensive readings and group discussions of selected topics in ancient history. (4 cr) ®

**Hist 6130. Special Topics: Early Modern European History.** Intensive readings and group discussions of selected topics in early modern European history. (4 cr) ®

**Hist 6160. Special Topics: Modern European History.** Intensive readings and group discussions of selected topics in modern European history. (4 cr) ®

**Hist 6200. Special Topics: Comparative World History.** Intensive readings and group discussions of selected topics in comparative world history. (4 cr) ®

**Hist 6230. Special Topics: Middle Eastern History.** Intensive readings and group discussions of selected topics in middle eastern history. (4 cr) ®

**Hist 6260. Special Topics: Asian History.** Intensive readings and group discussions of selected topics in Asian history. (4 cr) ®

**Hist 6300. Special Topics: African History.** Intensive readings and group discussions of selected topics in African history. (4 cr) ®

**Hist 6330. Special Topics: Latin American History.** Intensive readings and group discussions of selected topics in Latin American history. (4 cr) ®

**Hist 6400. Special Topics: American History.** Intensive readings and group discussions of selected topics in American history. (4 cr) ®

**Hist 6430. Special Topics: Western American History.** Intensive readings and group discussions of selected topics in Western American history. (4 cr) ®

**Hist 6460. Seminar in Environmental History.** Focuses on historical writings seeking to explain relationship between human society and nature. Many of assigned readings are set in the non-Western world. (4 cr)

**Hist 6500. Archiving Internship.** Directed internship at a regional archive. Internship should reflect eight to sixteen hours of work per week during the semester. (2-4 cr) (F,Sp,Su) ®

**Hist 6520. Editing Internship.** Training in requirements of editorial work in scholarly journals and books. Emphasis placed on editing techniques and mechanics of editorial work. Can be repeated once for credit. (2 cr) (F,Sp,Su) ®

**Hist 6540. Museum Internship.** Directed internship at a regional museum. Internship should reflect eight to sixteen hours of work per week during the semester. (2-4 cr) (F,Sp,Su) ®

**Hist 6560. Professional Internship.** Directed internship involving participation in a historical research project for a government agency, corporation, municipality, or some other entity. (2-4 cr) (F,Sp,Su) ®

**Hist 6580. Teaching Internship.** Involves working with the teacher of an upper-division undergraduate course. Intern prepares, explains, and grades one of the written assignments in the course, as well as completing work required of the undergraduates. Can be repeated once for credit. (2 cr) (F,Sp,Su) ®

**Hist 6600. American Studies Theory and Method.** Provides students with theory and method of graduate-level research in American Studies. Also taught as Engl 6600. (3 cr) (F)

**Hist 6610. Seminar on the American West.** Readings and research on topics in the American West. Interdisciplinary focus suitable for graduate students in History and American Studies. Also taught as Engl 6610. (3-4 cr) (F)

**Hist 6620. Seminar in Native American Studies.** Readings and research on topics in Native American history and culture. Interdisciplinary focus suitable for graduate students in History and American Studies. Also taught as Engl 6620. (3-4 cr) (F)

**Hist 6630. Studies in Film and Popular Culture.** Offered annually on a rotating basis by professors in folklore and English (Cultural Studies, Literature, British and Commonwealth). Topics and theoretical approaches vary, but the primary focus is on feature films. Also taught as Engl 6630. (3 cr) (F) ®

**Hist 6700. Folklore Theory and Method.** Serves as orientation for new graduate students in folklore. Introduces students to comparative annotation, folklore indices, oral-formulaic theory, performance theory, contextual analysis, and other approaches. Also taught as Engl 6700. (3 cr) (F)

**Hist 6710. Regional Folklore.** Study of folklore and folklife as a regionalizing process. Regions examined through their folk culture range. Also taught as Engl 6710. (3 cr) (Sp)

**Hist 6720. Folklore Fieldwork.** Basic methodology class for folklorists and oral historians. Students learn interviewing techniques and other methods for observing and recording the performance of tradition and traditional history. Also taught as Engl 6720. (3 cr) (F,Sp)

**Hist 6730. Public Folklore.** Provides history and analysis of governmental involvement in protecting, promoting, and otherwise manipulating and utilizing cultural heritage. Also taught as Engl 6730. (3 cr) (F,Sp)

**Hist 6740. Folk Narrative.** Covers principal narrative genres in folk tradition (myth, tale, legend, ballad) and the basic theories for their analysis and discussion. Also taught as Engl 6740. (3 cr) (Sp)

**Hist 6750. Advanced Folklore Workshop (the Fife Conference).** Intensive workshop focusing on a topic in folklore. Brings in nationally known experts as lecturers and discussants. Students attend all sessions, then write a critical paper during the summer semester. Also taught as Engl 6750. (3 cr) (Su)

**Hist 6760. Cultural and Historical Museums.** Examines outdoor cultural and historical museums, examining their function in modern multi-cultural societies. Also taught as Engl 6760. (3 cr) (Sp)

**Hist 6770. Seminar in Folklore and Folklife.** Conducts close, professional-level study of major areas of folklore and folklife research. Also taught as Engl 6770. (3 cr) (F,Sp,Su) ®

**Hist 6800. Paleography.** Skills course covering subjects such as technology of writing, interpretation of hands, and mastery of abbreviations. Useful to any student working with old manuscripts, it is essential for those writing theses in medieval or early modern European history. (3 cr)

**Hist 6820. Writing Scholarly Reviews.** Prepares students for writing, editing, and publishing reviews in their chosen discipline. Taught by book review editors at *Western American Literature* and *Western Historical Quarterly*. (3 cr)

**Hist 6840. Archives Management.** Study of management of archival collections. Emphasis on processing and conservation of manuscript and photographic materials. Case studies in identification, processing, and preservation. (3 cr)

**Hist 6860. Historical Criticism: Practicum.** Preparation of critiques for student-presented projects entered into Utah History Fair state-wide competition. Operation of one-day workshop for History Fair finalists. (1-3 cr)

**Hist 6880. Special Topics: Advanced History Workshop.** From teaching values of democracy in public school setting to writing publishable biographies, Department of History sponsors advanced credit workshops on a range of subjects. (1-3 cr) ®

**Hist 6900. Directed Studies.** Directed readings in any special historical field. For each credit granted, a minimum of four books must be read. Instructor signature required. (1-3 cr) (F,Sp,Su) ®

**Hist 6970. Thesis Research.** (1-6 cr) (F,Sp,Su) ®

**Hist 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

## *Latin Courses (Latn)*

**Latn 1010. Beginning Latin I.** Basics of Latin grammar and vocabulary. Beginning readings. (5 cr) (F)

**Latn 1020. Beginning Latin II.** Intermediate concepts of grammar and vocabulary. Intermediate readings. Prerequisite: Latn 1010. (5 cr) (Sp)

**Latn 3100. Intermediate Latin Prose.** Readings in Latin prose. Prerequisite: Minimum grade of C or higher in Latn 1020. (3 cr)

**Latn 3130. Intermediate Latin Poetry.** Readings in Latin poetry. Prerequisite: Minimum grade of *C* or higher in Latn 1020. (3 cr)

**Latn 4100. Advanced Latin Readings.** Readings in Latin poetry and/or prose. Prerequisite: Minimum grade of *C* or higher in Latn 3100 and 3130. (3 cr) (F,Sp) ®

**Latn 4930. Directed Readings in Latin Poetry and Prose Authors.** Directed readings in advanced Latin poetry and prose authors. Prerequisite: Successful completion of at least three semesters of Latin. (1-3 cr) (F,Sp,Su)

## *Greek Courses (Grk)*

**Grk 1010. Beginning Ancient Greek I.** Basics of Greek grammar and vocabulary. Beginning readings. Prerequisite: At least one year of Latin. (5 cr) (F)

**Grk 1020. Beginning Ancient Greek II.** Intermediate concepts of Greek grammar and vocabulary. Intermediate readings. Prerequisite: Grk 1010. (5 cr) (Sp)

**Grk 3300. Intermediate Greek Prose.** Readings in ancient Greek prose. Prerequisite: Minimum grade of *C+* or higher in Grk 1020. (3 cr) (F)

**Grk 3330. Intermediate Greek Poetry.** Readings in Greek poetry. Prerequisite: Minimum grade of *C+* or higher in Grk 1020. (3 cr) (Sp)

**Grk 4300. Advanced Greek Readings.** Readings in Ancient Greek poetry and/or prose. Prerequisite: Minimum grades of *C* or higher in Grk 3300 and 3330. (3 cr) (F,Sp) ®

**Grk 4930. Directed Readings in Greek Poetry and Prose Authors.** Directed readings in advanced Greek poetry and prose authors. Prerequisite: Successful completion of at least three semesters of Greek. (1-3 cr) (F,Sp,Su)

## *Classics Courses (Clas)*

**\*Clas 1100. The Latin and Greek Element in English.** Survey of classical word roots in English, with a view to enhancing students' comprehension of English vocabulary and its Indo-European heritage. (3 cr) (F)

**\*Clas 3210. Classical Mythology.** Introduces major myths of the Classical world. Explores how these myths serve as keys to understanding the documents and arts of Classical civilization. (3 cr) (Sp)

\*Taught 2002-2003.

\*\*Taught 2003-2004.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

# Honors Program

**Director:** David F. Lancy

**Assistant to the Director:** Robyn E. Daines

**Secretary:** Kay B. Gamble

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## Undergraduate Program

### Overview

Utah State University's Honors Program, established in 1966, provides an enhanced academic environment for highly motivated undergraduates. The Honors Program includes a community of scholars whose curiosity, creativity, and enthusiasm for learning foster educational achievement and personal growth.

Honors offers students intensive seminars, experimental classes, interdisciplinary courses, writing projects, leadership opportunities, and special activities. Members may define independent study programs and design special research projects. Honors students work in close contact with professors in smaller classes; they pursue studies in greater depth than regular classes would allow. Members also enjoy the company of other committed students who encourage and support one another's intellectual growth and productivity. Honors students participate actively in their own education.

Honors serves students who work hard, raise questions, and seek answers. It is designed for students who want to go beyond minimum requirements and narrow specialties. The program benefits those who want to make the most of their university experience.

The Honors program maintains strict standards for both entering and completing its program. However, there are no extra fees to pay, and there are honors options suitable for both entering freshmen and transfer students. The most important criterion for success is a student's motivation and dedication to learning.

### Entrance to the Honors Program

A limited number of entering freshmen are invited to join the Honors Program each year. These are students who have been awarded University Club Scholarships, Quinney Scholarships, and Presidential Academic Scholarships.

Other students who are interested in the Honors Program should contact the Honors Office for information about gaining admission.

Students admitted to the program will be eligible to register for Honors classes. Those who plan to complete Honors degrees should plan to take at least one honors course every semester in order to fulfill the degree requirements.

### Participation in Honors

To be eligible for entrance into Honors, a student must have a GPA of 3.5. To remain eligible, the student must not allow his/her

GPA to drop below 3.5. The Honors Office places students with a GPA of less than 3.5 on probation. If the GPA is not raised to 3.5 after one semester on probation, the student is dropped from the program. Reinstatement can be requested if the GPA is raised to 3.5. Honors students must also register for one honors class per semester in order to remain in the program.

### Honors Degrees

Utah State University offers Honors Degrees designed to fill a variety of student needs. Members may work toward one of three degree options:

**1. University Honors.** Requires 30 semester credits including at least 12 credits from the *Honors Course List* and as many as 15 credits, including Honors senior thesis/project credits, in an upper-division plan of study that has been approved by the Honors Director. University Honors requires a USU cumulative GPA of at least 3.50.

**2. University Honors with Department Honors.** Requires 30 semester credits including as many as 15 credits from the *Honors Course List* and at least 15 credits, including Honors senior thesis/project credits, in an approved Department Honors Plan. University Honors requires a USU cumulative GPA of at least 3.50.

**3. Department Honors.** Requires 15 semester credits as specified in a Department Honors plan, including a senior thesis/project.

### Listing of Honors Courses

Class offerings change frequently. For the most complete list, see the *Honors Course List* available in the Honors Program office, Merrill Library 374.

## Honors Courses (Honr)

**Honr 1300H (BAI). U.S. Institutions.** Provides basic understanding of history, principles, form of government, and economic system of the United States. Open only to students enrolled in USU Honors Program. (3 cr) (F,Sp)

**Honr 1320H (BHU). Civilization: Humanities.** Provides basic understanding of broad range of themes cutting across human history and continuing to be important in contemporary society. Covers both Western and non-Western civilization. Open only to students enrolled in USU Honors Program. (3 cr) (F,Sp)

**Honr 1330H (BCA). Civilization: Creative Arts.** Explores questions such as: "What is art, and how do you judge it?" and "How does artistic expression vary across cultures?" Covers several forms of art. Students attend concerts, visit galleries, and attend theatrical performances. Open only to students enrolled in USU Honors Program. (3 cr) (F,Sp)

**Honr 1340H (BSS). Social Systems and Issues.** Considers how a society of self-interested individuals can live together in peace and harmony. Topic explored from perspectives of different disciplines. Open only to students enrolled in USU Honors Program. (3 cr) (F,Sp)

**Honr 1350H (BLS). Integrated Life Science.** Interdisciplinary course focusing on basic concepts of life science. Demonstrates role of modeling, prediction, and observation in the process of scientific discovery, which occurs within an historical and social context. (3 cr) (F,Sp,Su)

**Honr 1360H (BPS). Integrated Physical Science.** Interdisciplinary course focusing on basic concepts of physical science, including structure of matter and magnitude and character of the forces of nature. Demonstrates role of modeling, prediction, and observation in the process of scientific discovery, which occurs within an historical and social context. (3 cr)

**Honr 2000H. Honors Seminar.** Includes orientation to the Honors Program and topics of interest to faculty and students. (1 cr) (F,Sp) ®

**Honr 3010H (DSC). Special Topics: Life and Physical Sciences.** Focuses on basic scientific concepts and methods of inquiry used by scientists. Considers science from a broad perspective, showing how various disciplines are related. Open only to students enrolled in USU Honors Program. (3 cr) (F,Sp) ®

**Honr 3020H (DHA). Special Topics: Humanities/Creative Arts.** Humanities section provides basic understanding of a broad range of themes cutting across human history and continuing to be important in contemporary society. Covers both Western and non-Western civilization. In the Creative Arts section, students explore questions such as: "What is art, and how do you judge it?" and "How does artistic expression vary across cultures?" Covers several forms of art. Students attend concerts, visit galleries, and attend theatrical performances. Open only to students enrolled in USU Honors Program. (3 cr) (F,Sp) ®

**Honr 3030H (DSS). Special Topics: Social Sciences.** Considers how a society of self-interested individuals can live together in peace and harmony. Topic explored from perspectives of different disciplines. Open only to students enrolled in USU Honors Program. (3 cr) (F,Sp) ®

**Honr 3900H. Independent Study.** Independent research, library and/or laboratory work, or creative effort working in a one-to-one relationship with a faculty member. Limited to students actively pursuing an Honors degree. (1-5 cr) (F,Sp,Su) ®

**Honr 4000H. Reading Seminar.** Opportunity to read, discuss, and write about classic books. (1 cr) (F,Sp) ®

**Honr 4700H. Honors Fellows.** Junior or senior Honors students assist in leading Honors seminars and tutorials. (1-3 cr) (F,Sp) ®

**Honr 4800H. Thesis/Project Seminar.** Oral presentation and discussion of senior theses/projects. Guest presentations focus on essential contrasts and similarities in "ways of knowing" among various academic specialties. (1 cr) (Sp)

**Honr 4900H. Senior Thesis/Project.** All Honors students are required to submit a senior thesis/project for graduation with an Honors degree. Thesis/project may be in any area of student's choice, prepared in cooperation with an advisor drawn from the faculty at large. (1-5 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

*Department of*

# ***Human Environments: Apparel and Textiles, Consumer Sciences, Family and Consumer Sciences Education, and Interior Design***

***College of Family Life***

**Head: Professor Gong-Soog Hong**, consumer and family economics  
Office in Family Life 320A, (435) 797-1558

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**WWW** <http://henv.usu.edu>

**Professors** *Leona K. Hawks*, housing and energy and indoor environments, extension; *Jean M. Lown*, consumer and family economics; *Tom C. Peterson*, interior design; *Barbara R. Rowe*, family resource management, extension; **Professors Emeritus** *Joan R. McFadden*, housing, residential technology, education; *Janet E. Preston*, family and consumer sciences education; *Alison C. Thorne*, family resource management; **Associate Professor** *Elizabeth Rogers*, interior design; **Associate Professors Emeritus** *Jeanette J. Arbuthnot*, merchandising; *LaRae B. Chatelain*, housing and equipment; *Jane L. McCullough*, family resource management; **Assistant Professors** *Karen Biers*, clothing and textiles, home-based entrepreneurship, extension; *Lucy Delgadillo*, family and consumer sciences, housing; *M. Michelle Hartzell-Lawson*, textiles and clothing; *Nancy Thompson*, family and consumer sciences education; **Assistant Professor Emeritus** *Ruth V. Clayton*, clothing and merchandising; **Temporary Assistant Professor** *Yoon G. Lee*, family and consumer sciences, family finance; **Lecturers** *Steven J. Kearl*, interior design; *Julie P. Wheeler*, family and consumer sciences education

**Degrees offered:** Bachelor of Science (BS) and Bachelor of Arts (BA) in Apparel and Textiles; BS and BA in Family and Consumer Sciences; BS and BA in Family and Consumer Sciences Education; BS and BA in Interior Design; Master of Science (MS) in Human Environments; and Human Environments specialization in the Family Life Doctor of Philosophy (PhD)

**Undergraduate emphasis:** *BS and BA in Family and Consumer Sciences—Family Finance*

**Graduate specializations:** *MS—Clothing and Merchandising, Consumer Science, Family and Consumer Sciences Education and Extension, Interior Design*

## ***Undergraduate Programs***

### ***Objectives***

The Department of Human Environments offers programs that address human and environmental issues. These programs are accessed through courses that serve departmental majors as well as majors in many other departments on the campus. The four majors in the department lead to careers in merchandising and business, family finance, teaching and extension, and interior design. Departmental objectives are aimed to educate students so that upon graduation they will be prepared for a career, prepared to be a contributing citizen, and prepared with knowledge and skills useful throughout their lives. The department also prides itself in the service it provides to students in other departments throughout the University, and strives to design selected courses specifically for nonmajors.

Four majors are offered: Apparel and Textiles, Family and Consumer Sciences, Family and Consumer Sciences Education, and Interior Design. The Family and Consumer Sciences (FCS) major has two options: (1) an FCS major with a minor and a minimum of 6 credits in each of four subject areas, and (2) an FCS major with a family finance emphasis.

### ***Departmental Admission Requirements***

Admission requirements for the Department of Human Environments are the same as those described for the University on pages 48-51. Students in good standing may apply for admission to the department.

A 2.5 grade point average is required in the major area. A grade of *C* or better must be earned in all major required courses. Courses required for the major may be repeated only once. *P/D/F* may not be used in major area courses or in supporting courses.

Courses required for the professional component of a program will be accepted if they have been completed within the past ten years. The current instructor of any course for which students need an update will work with students to meet this requirement. To provide a common base of understanding, all majors in the college need to complete FL 1100, Critical Issues in Family Life, listed in the College of Family Life section of this catalog (see page 95).

### ***Apparel and Textiles Major***

This major provides students with a solid foundation in fashion theory, apparel manufacturing and merchandising, product development and design, apparel marketing, and textile fundamentals.

A minor in one of the following areas is recommended, but not required: Marketing, Apparel Design, or Clothing and Textiles. The Marketing minor expands a student's knowledge in marketing, promotion, retailing, and entrepreneurship. Students interested in creating apparel designs with the traditional and new technology should minor in Apparel Design. The Clothing and Textiles minor emphasizes the study of clothing construction, quality, and textile products.

The suggested sequence for completing required coursework for the Apparel and Textiles major, with a Marketing minor, is as follows:

**Freshman Year:** Engl 1010; FL 1100; HEnv 1010, 1120, 1750; Psy 1010 or Soc 1010; Math 1050; Phil 2400; Econ 1500; Spch 1050. (30 total credits)

**Sophomore Year:** Engl 2010; Acct 2010; HEnv 1010, 2150, 2250; Econ 2010; USU 1320, 1330; USU 1350 or 1360; Breadth Life Sciences (BLS) or Breadth Physical Sciences (BPS); 3 elective credits. (31 total credits)

**Junior Year:** HEnv 1010, 3030, 3060, 4150, 4910; MHR 3110; BA 3500. (45-47 total credits) Depth Humanities and Creative Arts (DHA); 3 elective credits. (29 total credits)

**Senior Year:** HEnv 1010, 4070, 4150, 4250 (4-8 credits); BA 4510, 4530 or 4540, 4550; 4 elective credits (29 total credits)

As recommended for all students, students interested in the Apparel Design or Clothing and Textiles minor should meet with their advisor.

### ***Family and Consumer Sciences Major***

The Family and Consumer Sciences (FCS) major is an integrative major that links the various foci within the family and consumer sciences profession and, as such, prepares the student for positions requiring interdisciplinary problem-solving skills related to clothing and textiles, consumer sciences, family studies, housing and design, and foods and nutrition. The Family and Consumer Sciences major prepares graduates for positions in business, local/state/federal agencies, hospitals, child care centers, various financial fields, and other related agencies.

All students in the FCS major must complete the **Core Courses** and then select either the FCS major with a minor and a minimum of 6 credits in each of the four subjects areas *or* the FCS major with the family finance emphasis. A grade of *C* or better must be earned in the major course requirements. These courses

may not be taken with a *P/D*, *D+*, *F* option. The family finance emphasis requires a cumulative GPA of 2.5 and a minimum grade of *B-* in HEnv 2450 and 3450.

**College of Family Life Required Course.** FL 1100 is required for *all* students in the FCS major.

**Core courses.** The following courses are required for *all* FCS majors: FHD 1500; HEnv 1750, 2450, 2510, 3310, 3350, 4250; and NFS 1020.

### ***Family Finance Emphasis***

The focus in this emphasis is on Family Finance. Students completing this program will be prepared for careers in family financial counseling or other aspects of family financial management.

The suggested sequence for completing required coursework for the Family and Consumer Sciences Major, Family Finance Emphasis is as follows:

**Freshman Year:** Engl 1010; FHD 1500; FL 1100; HEnv 1750; NFS 1020; Stat 1040; USU 1360.

**Sophomore Year:** BIS 2450; Econ 1500; HEnv 2450, 2510, 3310, 3350, 3450; USU 1320; and electives.

**Junior Year:** HEnv 3280, 3340, 4460; Soc 3110; DSC course; DHA course; and electives.

**Senior Year:** HEnv 4250, 4330, 5250, 5340, 5350; and electives. Also, choose one of the following courses: BIS 1550, 2550; Spch 1050.

### ***Family Finance Minor***

A Family Finance minor requires 15 credits of HEnv coursework, including HEnv 2450, 3350. Choose the remaining credits from the following: HEnv 2340, 3280, 3340, 3450, 4330, 4460, 5340, 5350.

All students should contact their academic advisor for assistance with course selection, program planning, and meeting graduation requirements.

### ***Family and Consumer Sciences Education Major***

This major provides professional preparation for teaching Family and Consumer Sciences Education and Occupational Family and Consumer Sciences Education in public schools, or for employment as a family and consumer scientist in business or government agencies, and extension. Many states, including Utah, require a master's degree to work for extension.

This composite major includes study in nutrition and food sciences, family and human development, interior design, housing, apparel and textiles, and consumer sciences, plus professional education courses.

Student teaching in secondary public schools is required. Internships in extension or business are available.

The suggested sequence for completing required coursework for the Family and Consumer Sciences Education Major is as follows:

**Freshman Year:** Engl 1010; HEnv 1040, 1750, 1790, 2510; FHD 1500; FL 1100; Math 1050; NFS 1020. Computer and Information Literacy (CIL) requirements must be met or waived. Students should also register for the child development lab.

**Sophomore Year:** Chem 1110, 1120; Engl 2010; FHD 2400; HEnv 2040, 3030; NFS 1240, 2020; USU 1300. Students should apply to the Secondary Teacher Education Program (STEP) during the spring of their sophomore year.

**Junior Year:** HEnv 3300, 3340, 3400, 4300, 4400; FHD 4960; ScEd 3100, 3210, 4200, 4210; SpEd 4000; DHA course.

**Senior Year:** HEnv 2450, 3040, 3350, 5500, 5600; InsT 5200; NFS 4070; ScEd 5300; USU 1320.

### ***Interior Design Major***

The major in interior design has been developed to prepare students for entry into the profession of interior design. Each student must identify, research, and creatively solve problems pertaining to the function and quality of the interior environment.

An interior designer performs services relative to interior spaces, both commercial and residential. These services include programming, design analysis, space planning, and aesthetics, using specialized knowledge of interior construction, building codes, equipment, materials, and furnishings. Another component of each student's training in interior design is the preparation of drawings and documents relative to the design of interior spaces, in order to enhance and protect the health, safety, and welfare of the public.

The suggested sequence for completing required coursework for the Interior Design major is as follows:

**Freshman Year:** HEnv 1700 (1 credit), 1750, 1790, 3740, 3750; FL 1100; Art 1110, 1120; 9 credits of University Studies Breadth courses; Engl 1010; Quantitative Literacy course, 3 credits.

**Sophomore Year:** HEnv 1700 (1 credit); HEnv 2710, 2720, 2730, 2750, 2760; Engl 2010; 3 credits of Art 2710 or 2720; 6 credits of University Studies Breadth courses; and one Art elective.

**Junior Year:** HEnv 1700 (1 credit); HEnv 3730, 3760, 3770, 3790, 4730; one Art elective; HEnv 4250 (4 credits) should be taken the summer semester after the junior year.

**Senior Year:** HEnv 1700 (1 credit); HEnv 3030, 3340, 4740, 4750, 4760, 4770; MHR 2990; 6 credits of University Studies Depth courses.

**Laptop Computer Requirement.** Students entering sophomore-level interior design courses must bring their own laptop computer. Specifications for the laptop will be provided by the department. The computer should be purchased just prior to beginning the sophomore year.

**Sophomore Review.** In addition to basic undergraduate and graduate requirements set forth in this catalog, students in Interior Design must participate in a Sophomore Review in order to matriculate to junior class standing. The review takes place during spring semester. Students wishing to enroll in junior-level courses must first submit projects from as many of the following courses as possible: HEnv 1790, 2710, 2720, 2730, 2750, 2760; Art 1110, 1120; and one elective Art skills class. Students will be provided a space for the display of their projects. The manner in which the work is exhibited is at the discretion of the student and will be considered in the overall evaluation.

An additional component of the Sophomore Review will be an analysis of the student's academic performance. Courses considered for junior status are: HEnv 1750, 1790, 2710, 2720, 2730, 2750, 2760, 3740, 3750; Art 1110, 1120; three credits from Art 2710 or 2720; and one Art skills course. The student's overall GPA will also be used as part of the review process.

Students with a cumulative GPA of 3.0 or above will be automatically advanced to upper-division status following the successful completion of the first portion of this review. Students with a GPA of less than 3.0, who have successfully completed the first part of this review, will be accepted into upper-division courses as space permits, with higher GPAs being considered first.

If a student who has been approved to take upper-division classes stops out of the program, he or she will be readmitted if space is available. Due to space limitations, first preference will be given to students with continuous registration in the program.

**Tours.** Each year the Interior Design program sponsors a tour to a major design center. Students should plan to take advantage of this opportunity while enrolled in the program.

### ***Additional Information***

For more information about Bachelor of Science requirements, the sequence in which courses should be taken, University graduation requirements, and basic professional teaching certification in family and consumer sciences education see the major requirement sheets, available from the Human Environments Department. A listing of course requirements for majors and minors is also available from the department.

For information about changes in requirements or scheduling, students should confer with a departmental advisor. Most of the programs can be tailored to individual student needs with the help of a faculty advisor.

For updated information concerning programs and courses offered by the Department of Human Environments, as well as information on career opportunities, check the departmental web page at <http://henv.usu.edu>.

### ***Financial Support***

Scholarships, assistantships, grants-in-aid, and work-study programs are available through the University. In addition, the department employs students to assist in research and development.

Each year, the college offers a host of scholarships to undergraduate students who have demonstrated their ability in departmental majors. Applications are available in January from the College of Family Life Dean's Office.

## ***Graduate Programs***

### ***Admission Requirements***

See general admission requirements (pages 72-73). With permission, MS students may use the Miller Analogies Test in lieu of the GRE. In addition, a student without an undergraduate degree in the area to which he or she is applying may be required to complete selected undergraduate courses prior to admission as a fully matriculated graduate student.

## **Degree Programs**

The MS in the Department of Human Environments encompasses a specialization in each of four major areas: Clothing and Merchandising, Consumer Science, Family and Consumer Sciences Education and Extension, and Interior Design. A specialization in Human Environments, with emphases in Clothing and Merchandising, Consumer Science, and Family and Consumer Sciences Education, is offered within the PhD in Family Life.

## **Specializations**

The MS program offers the four specializations indicated above. The Plan A (thesis) or Plan B option may be pursued in each MS specialization, and Plan C is available in the Family and Consumer Sciences Education and Extension distance learning specialization. The Plan A, Plan B, and Plan C options are described on page 77 of this catalog. All students in the MS program must complete HEnv 6290 (Current Issues in Research).

**Clothing and Merchandising.** The clothing and merchandising specialization offers two options: (1) apparel merchandising, and (2) socio/psychological-historical. Both options can prepare students for university or college teaching, extension, or doctoral programs. Apparel merchandising students may also wish to focus on a business career. Socio/psychological-historical students may also be interested in careers in the museum field. Department courses are offered in fashion theory, behavioral aspects of dress, international apparel and textile trade, research trends, and clothing and merchandising problems, including archaeological/historical textile analysis. Electives allow concentrations in such areas as business, anthropology, sociology, design, and history.

**Consumer Science.** This specialization includes a foundation in theory and decision-making processes related to allocation of individual consumer and household resources. Students study economic interactions of families and consumers, with an emphasis on the analysis of household consumption, household financial management, human capital investment, and allocation of time. Theories in economics, finance, sociology, psychology, and quantitative methods are applied to investigate policy questions and decisions made by consumers and households. Graduates in this specialization pursue careers in university or college teaching, Cooperative Extension, government, and social agencies serving families and private industry. Background in family and/or consumer economics, introductory statistics, and research methods is preferred. Students not having a background in these areas may need to take supplementary courses to build entry competencies.

**Family and Consumer Sciences Education and Extension.** This specialization is designed to prepare teacher educators to work in family and consumer sciences education. Options for concentration are curriculum/program development or extension. Each option includes coursework in education, family and consumer sciences education, and an area of individual student interest.

The requirements for the options of curriculum/program development and extension may be filled by a 30-credit program with thesis, a Plan B option, or a 33-credit plan including a practicum and a report. These requirements *do not* include Utah licensure for teaching in public education.

**Interior Design.** This specialization has two options. One option constitutes a first professional degree, consisting of a three-year program available to candidates with a previous baccalaureate degree in a discipline other than interior design. The option begins with a year-and-a-half of undergraduate coursework and studios designed to form the underpinnings for advanced study. The undergraduate coursework is not applied toward the master's degree program. The second option is an advanced professional degree, consisting of a two-year course of study for students who hold an undergraduate degree in interior design. This option allows outstanding students to pursue additional knowledge in areas of special interest.

## **Research**

Faculty in the department have active, ongoing research projects. Graduate students have the opportunity to participate in many of these projects.

## **Financial Assistance and Assistantships**

Teaching and research assistantships are available from the department and from faculty with funded research projects. The nature of each assignment varies depending on student qualifications and departmental or faculty needs. Applications for assistantships and several scholarships are available through the department. Application deadline for fall semester assistantships is April 1, but applications may be accepted throughout the year.

# **Human Environments Courses (HEnv)**

**HEnv 1010. Apparel and Textiles Professional Development Seminar.** Weekly seminars provide orientation to apparel and textiles profession. Exploration of related careers. Invited participation by outside speakers. (1 cr) (F,Sp) ®

**HEnv 1040. Beginning Clothing Construction.** Introductory-level sewing techniques and the use and care of sewing machines and sergers. Waiver exam available. No previous sewing experience needed. (3 cr) (F,Sp)

**HEnv 1120. Introduction to Apparel and Textiles.** Investigation and analysis of the Apparel and Textiles industry, including a look at the career opportunities. Lecturers may include guest speakers from the industry. (3 cr) (F)

**HEnv 1700. Interior Design Professional Seminar.** Weekly seminars to provide an orientation to the professional aspects of interior design. Exploration of related careers and professional societies. Invited participation by outside speakers. Repeatable for up to four credits. (0.5 cr) (F,Sp) ®

**HEnv 1750 (BCA). Design in Everyday Living.** Investigation of the basic elements and principles of design related to everyday living experiences and the practical application of relevant theory. (3 cr) (F,Sp,Su)

**HEnv 1790 (BCA). Interior Design Theory.** Explores basic philosophy of interior design. Analyzes design elements and principles when applied to interior spaces. Evaluation of contemporary design theories as factors influencing design trends. (3 cr) (Sp)

**HEnv 2040. Intermediate Clothing Construction and Alterations.** Intermediate-level clothing construction techniques, pattern alteration and fitting, and use of

sewing machine and serger. Previous sewing experience required. Prerequisite: HEnv 1040. (3 cr) (F,Sp)

**HEnv 2150. Textile Analysis and Evaluation.** Analysis of textile products as they relate to product performance, production, and value. (3 cr) (Sp)

**HEnv 2250. Study Practicum in Human Environments.** Introductory-level experience in study practicum or internship position approved by the department. One credit for every 75 hours of experience. Sophomore standing required. Student may receive a *maximum* of 4 credits. (1-4 cr) (F,Sp,Su) ®

**HEnv 2340. How to Buy a House.** Easy-to-access Internet course explaining the steps required to buy a house. Student comprehension assured by assignments accompanying interesting study materials. For students needing information or assistance with special assignments, contact provided with extension housing specialist in Human Environments Department. (1 cr) (F,Sp,Su)

**HEnv 2450 (BSS). The Consumer and the Market.** Explores how the marketplace operates, including factors influencing consumer purchases, current consumer problems, and assistance provided to consumers by federal and state agencies, businesses, and other organizations. (3 cr) (F,Sp,Su)

**HEnv 2510. Contexts in Family and Consumer Sciences.** Overview of the multidisciplinary nature of Family and Consumer Sciences. Students learn problem-solving strategies, basic ethics, professionalism, and personal productivity. Teaches the uniqueness and commonalities of the components of Family and Consumer Sciences. (3 cr) (F,Sp)

**HEnv 2710. Architectural Graphics I.** Competency development in use of drafting tools, symbols, and techniques used in interior design presentation. Includes communication skills related to techniques and approaches to graphic presentations of interior design solutions: floor plans, elevations, sections, axonometrics, details, and dimensioning. (4 cr) (F)

**HEnv 2720. Architectural Graphics II.** Introduction to three-dimensional drawing: isometric and perspective. Development of methods of rapid graphic communication techniques and approaches to complete professional presentations. Exploration of various types of media and presentation methods. Prerequisite: HEnv 2710. (4 cr) (Sp)

**HEnv 2730. Interior Space Planning and Human Dimensions.** Focuses on physical, psychological, and human factors influencing design of interior space. Includes research, programming, analysis, and design of residential and nonresidential spaces. Prerequisite: HEnv 2710. (4 cr) (Sp)

**HEnv 2750. Computer Aided Drafting and Design I.** Introduction to computer aided drafting and design for design students. Prerequisite: BIS 1400 or passing grade on Computer and Information Literacy exam. (3 cr) (F)

**HEnv 2760. Computer Aided Drafting and Design II.** Advanced exploration and study of computer aided design, creative applications, and proficiencies. Prerequisite: HEnv 2750. (3 cr) (Sp)

**HEnv 3030 (DSC). Textile Science.** Study of fibers, yarns, fabric constructions, and finishes as related to appreciation, selection, use, and care of current textiles. Evaluation of physical, economic, and aesthetic properties of textile products to determine suitability for desired end use. (4 cr) (F,Sp)

**HEnv 3040. Advanced Clothing Construction and Design.** Develops skills in flat pattern design and tailoring techniques. Prerequisite: HEnv 2040. (3 cr) (Sp)

**HEnv 3060 (DSS, CI). Human Behavior Related to Dress.** Analyzes economic, historic, psychological, social, and cultural contexts shaping individual and group dress and appearance. Contrasts Western with non-Western societies with respect to cultural change and ambivalence, ideologies, appearance-modifying commodities, interpretation of symbolic ambiguity, and negotiations of meanings of appearance. Prerequisite: Soc 1010 or Psy 1010. (3 cr) (F)

**HEnv 3280 (DSS). Economic Issues for Individuals and Families.** Focuses on issues related to economic well-being of individuals and families, with special emphasis on income and wealth, poverty, consumption and saving, work and leisure, human capital investment, and aging. (3 cr) (Sp)

**HEnv 3300. Family and Consumer Sciences Education Clinical Experience I.** Provides on-site experience for students to model a secondary family and consumer sciences education teacher. Students expected to learn teaching and classroom management principles. Must be taken concurrently with HEnv 3400. Prerequisite: Admission to Secondary Education Professional Education Component. (1 cr) (F)

**HEnv 3310. Consumer Policy Analysis.** Examines different tools for policy analysis. Provides conceptual and analytical framework for understanding the role of consumer sciences professionals as political actors and the potential to influence the shaping of public policy, particularly consumer and government policies. Prerequisite: HEnv 2450. (3 cr) (Sp)

**HEnv 3340 (DSS). Housing: Societal and Environmental Issues.** Studies housing in the contemporary U.S., including affordability, access, expectations, aesthetic considerations, and effects of public and private policies on housing choices. (3 cr) (F)

**HEnv 3350 (DSS, QI). Family Finance.** Achieving personal and family financial goals, including financial planning and record keeping, different types of insurance, taxes, use of credit, investments, retirement, and estate planning. Prerequisite: Choose one of Math 1030, 1050, or Stat 1040. (3 cr) (F,Sp,Su)

**HEnv 3400. Family and Consumer Sciences Education Methods I.** Methods of successfully planning and maintaining family and consumer sciences work education programs in secondary schools. History and philosophy of applied technology education. Prerequisite: Admission to Secondary Education. HEnv 3400 and 3300 must be taken concurrently. (3 cr) (F)

**HEnv 3450. Consumer Credit Problems.** Consumer credit problems, debt reduction strategies, credit collection policies and practices, bankruptcy, and government assistance programs. Prerequisite: HEnv 3350. (3 cr) (F)

**HEnv 3730. Interior Materials and Construction.** Identification of current interior materials; their characteristics, use, and care. Experience in specification estimation, workroom procedures, and development of a working resource file. Prerequisite: HEnv 2730. (3 cr) (F)

**HEnv 3740 (DHA). History of Interior Furnishings and Architecture I.** Identification of historical architectural styles and elements in interior furnishings and materials, dating from ancients, middle ages, Italian renaissance, the Hispanic periods, and the French periods. (3 cr) (F)

**HEnv 3750 (DHA, CI). History of Interior Furnishings and Architecture II.** Identification of historical architectural styles and elements in interior furnishings and materials, including the English period and the American period, Victorian through the present. (3 cr) (Sp)

**HEnv 3760. Residential Design Studio.** Studio projects of various complexity and type, having residential focus. Analysis of various approaches to problem solving. Graphic and verbal presentation, emphasizing high-end design evaluation. Prerequisite: HEnv 2730. (4 cr) (Sp)

**HEnv 3770. Commercial Design Studio.** Studio projects of various complexity and type, having commercial focus. May include hospitality, retail, medical, office, and other commercial and institutional design opportunities. Prerequisite: HEnv 3760. (4 cr) (F)

**HEnv 3790. Architectural Systems.** Study of architectural systems in contemporary buildings. Investigation of construction drawings and their interpretation. Includes related codes and professional terminology. (3 cr) (F)

**HEnv 4070 (CI) (d6070).<sup>1</sup> Merchandising Management Strategies and Entrepreneurship.** Application of effective textile and apparel merchandising strategies for businesses, both entrepreneurial and large retail organizations. Prerequisite: HEnv 1120 or consent of instructor. (3 cr) (Sp)

**\*HEnv 4150 (DHA) (d6150). History of Apparel and Textiles I.** Tracks political, economic, technological, artistic, cultural, and social factors associated with origin, adoption, and abandonment of dress and appearance styles of men and women in western civilization from prehistoric times through the sixteenth century. Emphasizes ideas and critical thinking. (3 cr) (Sp)

**\*\*HEnv 4160 (DHA) (d6160). History of Apparel and Textiles II.** Tracks fashion changes in textiles and apparel for men and women in Western Europe and North America from the seventeenth century to the present. Analyzes past influence on present fashions. Includes designs of famous apparel designers. Evaluates authenticity of costumes in films. (3 cr) (Sp)

**HEnv 4240. Topics in Human Environments.** Current topics associated with human environments. Prerequisites: Approval of instructor and junior standing. (3 cr) (F,Sp,Su) ®

**HEnv 4250. Human Environments Advanced Internship I.** Placement experience in applying skills and knowledge in businesses and community agencies. One credit for each 50 hours of experience. Prerequisites: Completion of 12 semester credits in the major and approval of written internship goals by instructor. (1-12 cr) (F,Sp,Su) ®

**HEnv 4260. Human Environments Advanced Internship II.** Placement experience in applying skills and knowledge in businesses and community agencies. One credit for each 50 hours of experience. Prerequisite: HEnv 4250. (1-12 cr) (F,Sp,Su) ®

**HEnv 4300. Family and Consumer Sciences Education Clinical Experience II.** Provides on-site experience for students to model a secondary family and consumer sciences education teacher. Students expected to learn teaching and classroom management principles. Prerequisites: HEnv 3300, 3400. (1 cr) (Sp)

**HEnv 4330. Family Financial Management Services Career Seminar.** Exploration of career options through readings, guest lecturers, interviews of practitioners, and development of an internship and career plan. Prerequisites: HEnv 3350. (1 cr) (F)

**HEnv 4400. Family and Consumer Sciences Education Methods II.** Development of competency in curriculum planning, and skill and sensitivity in the use of various teaching-learning strategies and resources. Includes assessment for vocational education. Prerequisites: HEnv 3300, 3400. (3 cr) (Sp)

**HEnv 4460. Financial Counseling.** Development and application of financial counseling and presentation skills. Analysis of various financial problems and development of appropriate solutions and resources. Prerequisites: HEnv 3350 and 3450. (3 cr) (F)

**HEnv 4730. Design Detailing.** Detailing of interior components. Preparation of detail drawings for use by the trades for interior components. Student develops construction documents and prepares scale model for senior exhibit. (3 cr) (Sp)

**HEnv 4740 (CI). Business and Professional Practices in Interior Design.** Overview of business practices and principles for interior design, including: salesmanship, marketing, client and trade relationships, establishing an interior design practice, and fee structure. (2 cr) (Sp)

**HEnv 4750. Senior Project Design Studio I.** A commercial interior design project, focusing on research, programming, schematics, development of construction documents, and a project presentation. Prerequisites: Senior ranking in Interior Design and HEnv 4730. (3 cr) (Sp)

**HEnv 4760. Senior Project Design Studio II.** Continuation of HEnv 4750 project, including development of commercial finish selections, project specifications, and other related documents. Prerequisite: HEnv 4750. (3 cr) (Sp)

**HEnv 4770. Senior Exhibit.** Analysis and review of student work in preparation for formal exhibition. (1 cr) (Sp)

**HEnv 4900. Independent Study in Human Environments.** Before registering, students must identify a project or topic of interest and discuss with instructor. Prerequisite: Junior standing and approval of faculty. (1-5 cr) (F,Sp,Su) ®

**HEnv 4910. Creative Projects.** Research project or practicum conducted under direction of faculty member. Topic may be initiated by student or faculty. Prerequisites: Junior standing and approval of faculty. (1-4 cr) (F,Sp,Su) ®

**HEnv 5210. Introduction to Software Usage.** Basic operating system usage, and word and graphic processing for VAX, IBM compatibles, and MacIntosh systems. (1 cr) (F)

**HEnv 5250. Financial Counseling Practicum.** Students apply their knowledge by conducting one-on-one counseling sessions, observing other counselors, and teaching workshops. Students develop valuable management, communication, and counseling skills. Prerequisites: HEnv 2450, 3350, 3450, 4460, and senior or graduate standing. (3 cr) (F,Sp,Su) ®

**HEnv 5340. Housing Finance and Regulations.** Exploration of mortgage loan industry, with in-depth examination of various lending products and procedures. Study of regulations affecting housing, including Fair Housing, predatory lending, and mortgage default. Prerequisite: HEnv 3350. (3 cr) (Sp)

**HEnv 5350. Advanced Family Finance.** Managing personal and family financial resources to achieve goals relating to investments, retirement, and estate planning. Prerequisite: HEnv 3350. (3 cr) (Sp)

**HEnv 5500. Student Teaching Seminar.** Taken during student teaching in secondary schools to complement school experience. Focuses upon problems arising during student teaching. Includes teaching plans, procedures, adaptive classroom practices, and evaluation. Prerequisites: HEnv 4300, 4400. Must be taken concurrently with HEnv 5600. (2 cr) (F)

**HEnv 5550. Workshop Topics in Human Environments.** Concentrated offerings to increase knowledge, skills, or creative expression in current topics or curriculum. (0.5-3 cr) (Su) ®

**HEnv 5600. Student Teaching in Secondary Schools.** After assignment to a cooperating family and consumer sciences educator, students are given professional responsibilities associated with teaching. Prerequisites: HEnv 4300, 4400. Must be taken concurrently with HEnv 5500. (8 cr) (F)

**\*HEnv 6020. Introduction to Research in Apparel and Textiles.** Analyzes research related to historical, sociological, psychological, marketing, and economic concepts and theories related to fashions. Applies current theories and methodologies to study of selected topics within the field of fashion, such as apparel, interiors, and theater. (3 cr) (F)

**HEnv 6030. Textile Science.** Evaluation of the physical, economic, and aesthetic properties of textile products. Students develop individual textiles research project. Repeatable for up to 4 credits. (1-4 cr) ®

**HEnv 6050. Advanced Topics in Apparel and Textiles.** Investigative approach to selected themes related to current or historical topics in clothing, merchandising, and/or apparel design. (1-3 cr) (F,Sp,Su) ®

**HEnv 6060. Human Behavior Related to Dress.** Students critique and summarize current research on individual topics and present their summaries to the class. (3 cr) (F)

**HEnv 6070 (d4070). Merchandising Management Strategies and Entrepreneurship.** Application of effective textile and apparel merchandising strategies for businesses, both entrepreneurial and large retail organizations. Prerequisite: HEnv 1120 or consent of instructor. (3 cr) (Sp)

**\*\*HEnv 6120. International Textile and Apparel Trade.** Discussion of trade theory, including globalization system, and exploration of significant factors contributing to exchange of apparel and textile goods in the world market. (3 cr) (Sp)

**\*HEnv 6150 (d4150). History of Apparel and Textiles I.** Tracks political, economic, technological, artistic, cultural, and social factors associated with origin, adoption, and abandonment of dress and appearance styles of men and women in western civilization from prehistoric times through the sixteenth century. Emphasizes ideas and critical thinking. To receive credit for 6150, graduate students study structure and design of historic garments and textiles and use the historical method of research to investigate individual topics. (3 cr) (Sp)

**\*\*HEnv 6160 (d4160). History of Apparel and Textiles II.** Tracks fashion changes in textiles and apparel for men and women in Western Europe and North America from the seventeenth century to the present. Analyzes past influence on present fashions. Includes designs of famous apparel designers. Evaluates authenticity of costumes in films. To receive credit for 6160, graduate students study purposes and function of historic textiles and apparel collections, and techniques for maintenance, storage, and date identification of historic textile products. (3 cr) (Sp)

**HEnv 6190. Current Issues in Apparel and Textiles.** Investigation of current issues confronting retailers, manufacturers, and designers of textile and apparel products. Focuses on domestic and international operations. Includes fashion trend analysis. Students research a foreign country and write a formal paper comparing the U.S. business environment with that of the selected country. Oral presentation of findings also required. (3 cr) (Sp)

**HEnv 6200. Master's Seminar in Human Environments.** Course objectives will be unique each time course is offered. Repeatable for up to 3 credits. (1-3 cr) (F,Sp) ®

**HEnv 6210. Using and Interpreting SPSS to Analyze Social Research Data.** Explores use of SPSS for descriptive statistics, contingency tables, ANOVA models, and multiple regression. Discussion of syntax, procedure options, and interpretation of output. (2 cr) (Sp)

**HEnv 6240. Graduate Topics in Human Environments.** Survey of selected topics in human environments. Topic will be unique each time course is offered. (1-3 cr) (F,Sp,Su) ®

**HEnv 6250. Graduate Internship in Human Environments.** For graduate students who wish to acquire or upgrade their experience in an occupational field related to their area of study. One credit per 60 hours of experience. Repeatable for up to 6 credits. Prerequisite: Instructor approval prior to enrollment. (1-6 cr) (F,Sp,Su) ®

**HEnv 6280. Research Methods in Human Environments.** Techniques and tactics in designing and analyzing social science human behavior research. Emphasizes designs and instrumentation. Prospectus required. (2 cr) (F)

**HEnv 6290. Current Issues in Research.** Investigation and reporting of current issues related to human environments research. (3 cr) (F)

**\*HEnv 6330. Consumer Problems.** Covers history of U.S. consumer movement; national and international consumer issues; sources of consumer research and information; roles of consumers, business, and government in development and implementation of consumer regulations; and emerging consumer issues. (3 cr) (F)

**HEnv 6340. Housing: Societal and Environmental Issues.** Problems related to housing in the contemporary U.S., including affordability, access, expectations, aesthetic considerations, and the effects of public and private policies on housing choices. (3 cr) (F)

**\*\*HEnv 6360. Family Resource Management.** Use of resources by families to achieve their economic and social goals. Topics include management theories, changes in resources available to families, current problems in resource allocations within the household, and evaluation of information related to these topics. (3 cr) (F)

**\*HEnv 6420. Family Economics.** Identifies alternative measures of family economic well-being, theories of family economic behavior, and income and wealth distribution related to demographic characteristics. Explores government policies, both national and international, that affect economic well-being. (3 cr) (Sp)

**\*\*HEnv 6430. Family Financial Problems.** Reviews research on family financial problems, including unemployment, credit, bankruptcy, relationship of financial problems to emotional distress, and sources of assistance for financial problems. (3 cr) (Sp)

**HEnv 6500. Family and Consumer Sciences Education Colloquium.** Survey of current research and problems. (1-3 cr) (F,Sp) ®

**HEnv 6520. Administration and Supervision in Family and Consumer Sciences Education.** Application of research and theory of administration and supervision to define and clarify the role of leadership in Family and Consumer Sciences Education. (3 cr) (F)

**HEnv 6530. Classroom Management, Student Motivation, and Guidance.** Multi-strategy approach for increasing teachers' effectiveness and satisfaction in family and consumer sciences classroom management and discipline. (3 cr) (Sp)

**HEnv 6540. Curriculum Development, Testing, and Evaluation.** Examines current trends in curriculum development and special programs related to specific educational programs. Includes field testing of curriculum. (3 cr) (F)

**\*\*HEnv 6550. Family and Consumer Sciences Education Topics.** Explores advanced application of teaching strategies and theory, as well as the creation of innovative classroom materials. (3 cr) (Sp) ®

**HEnv 6570. Adult Education and Volunteer Programs.** Explores current program formats and instructional materials developed for adult education. Emphasizes program and course development and teaching strategies suitable for adults. (3 cr) (F)

**\*\*HEnv 6710. Computer Applications of Modeling in Interior Design.** Application of software to produce a model of interior spaces, using contemporary modeling software. Prerequisite: HEnv 2760. (3 cr) (F)

**HEnv 6750. Readings in Interior Design.** Readings about the creative process, post-occupancy evaluation, culture and environment, and design forecasting. Repeatable for up to 3 credits. (1-3 cr) (F,Sp) ®

**\*HEnv 6770. Facilities Planning and Management.** Facilities management process in large-scale organizations. Formation of facilities policies, procedures, and standards. The facilities data base, space allocations, and management process. (3 cr) (Sp)

**\*\*HEnv 6780. Design Methodologies in Interior Design.** Identifies and defines various design methodologies, with regard to design solutions for interior environments. (3 cr) (F)

**HEnv 6900. Independent Study in Human Environments.** Independent study in the areas of human environments, including clothing and merchandising, consumer sciences, family and consumer sciences education, and interior design. Check with committee for approval of project and allowable credit hours. (1-4 cr) (F,Sp,Su) ®

**HEnv 6970. Master's Thesis Research in Human Environments.** Repeatable for up to 6 credits. (1-6 cr) (F,Sp,Su) ®

**HEnv 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

**HEnv 7200. Research Seminar.** Provides opportunity for investigation and reporting of student-selected problems. Repeatable for up to 3 credits. Prerequisite: HEnv 6290. (1-3 cr) ®

**HEnv 7220. Theory in Human Environments.** Identification, status, and application of theories and theory development in human environments. Prerequisite: HEnv 6290. (3 cr)

**HEnv 7240. Advanced Topics in Human Environments.** Major topics and issues in the study of human environments. Prerequisite: HEnv 6290. (3 cr) ®

**HEnv 7250. Advanced Graduate Internship.** Professional supervision of doctoral students applying and interpreting general principles from the study of and research in human environments. One credit for every 60 hours experience. Repeatable for up to 4 credits. Prerequisite: HEnv 6290. (2-4 cr) (F,Sp,Su) ®

**HEnv 7260. Research Topics in Human Environments.** Critical review and evaluation of research in the study of human environments. Prerequisite: HEnv 6290. (3 cr) ®

**HEnv 7270. Theoretical Frontiers.** Identification, status, and application of theories and theory development in area of specialization. Prerequisite: HEnv 7220. (3 cr)

**HEnv 7500. Leadership in Vocational Education.** Supervision and leadership theory with practical application to roles of vocational educators as leaders, as supervisors, and as administrators in educational programs, cooperative extension, and similar settings. (3 cr)

**HEnv 7560. Supervision Practicum.** Directed activities in curriculum development and supervision in the public schools. (1-6 cr)

**HEnv 7900. Independent Study.** Independent study in the areas of human environments, including clothing and merchandising, consumer sciences, and family and consumer sciences education. Repeatable for up to 6 credits. Prerequisite: Instructor's permission. (1-6 cr) (F,Sp,Su) ®

**HEnv 7970. Dissertation Research.** Repeatable for up to 20 credits. (1-12 cr) (F,Sp,Su) ®

**HEnv 7990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

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\*Taught 2002-2003.

\*\*Taught 2003-2004.

<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

Department of

# Industrial Technology and Education

College of Engineering

**Head: Professor Maurice G. Thomas**, Technology Education  
Office in Industrial Science 112E, (435) 797-1795

**Graduate Program Coordinator: Professor Edward M. Reeve**, technology education, communication technology

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WWW <http://www.engineering.usu.edu/ite/>

**Professor Emeritus Jay C. Hicken**, technology education, wood technology, power/energy/transportation; **Associate Professors Kurt Becker**, technology education, construction technology, computer aided drafting; **Ward P. Belliston**, computer electronics technology; **Steve C. Hsiung**, computer electronics technology; **Gary A. Stewardson**, technology education, manufacturing technology; **David P. Widauf**, aviation technology; **Assistant Professor Kevin S. Garrity**, aviation technology, professional pilot; **Senior Lecturer Charles B. Larsen**, aviation maintenance; **Lecturers Mark R. Baugh**, welding engineering technology; **Randy Chesley**, aviation maintenance; **Doran L. Gillie**, computer aided drafting and design; **Gary R. Green**, aviation technology, professional pilot; **Advisor Janet Karren**; **Chief Flight Instructor John C. "Jack" Hunter**; **Assistant Chief Flight Instructor Sean E. Heiner**

**Degrees offered:** Bachelor of Science (BS) in Technology and Industrial Education, BS in Aviation Technology—Maintenance Management, BS in Aviation Technology—Professional Pilot, BS in Computer Electronics Technology, BS in Welding Engineering Technology, Associate of Applied Science (AAS) in Aircraft Maintenance Technician—Airframe, AAS in Aircraft Maintenance Technician—Powerplant, AAS in Computer Aided Drafting and Design, Master of Science (MS) in Industrial Technology

**Undergraduate emphases:** *BS in Technology and Industrial Education*—Technology Education and Trade and Technical Education

## Undergraduate Programs

### Objectives

The Department of Industrial Technology and Education offers professional programs to prepare students to function as technologists in a variety of technical specialties. The department values the integration of academic knowledge with hands-on technical skills. This is achieved by emphasizing the application of scientific and technological principles in extensive laboratory activities. The department strives to ensure that all graduates will obtain employment to match their interests and preparation.

The **Technology and Industrial Education** programs prepare graduates to teach in public schools, applied technology colleges, and community colleges. **Aviation Technology—Maintenance Management** graduates fill aviation maintenance management positions in government and industry. The **Aviation Technology—Professional Pilot** curriculum prepares graduates to be professional pilots. **Computer Electronics Technology** graduates fill technical positions in the electronic and computer industries. **Welding Engineering Technology** graduates fill technical/management positions in the construction and fabrication industries. The **Aviation Maintenance Technician—Airframe** and **Aviation Maintenance Technician—Powerplant** programs provide training and FAA licensing for graduates to perform maintenance and repairs on aircraft. The **Computer Aided Drafting and Design** program teaches design and computer skills for graduates to work successfully in a variety of drafting fields.

### Admission Requirements

Admission requirements are commensurate with those outlined for the University. See pages 48-51 in this catalog.

### Professional Technology Program (PTP)

The Professional Technology Program (PTP) applies to Aviation Technology—Maintenance Management, Aviation Technology—Professional Pilot, Computer Electronics Technology, and Welding Engineering Technology students. The purpose of the program is to provide a quality education for students by requiring that they be fully prepared for upper-division coursework by having satisfactorily completed all required pre-professional courses.

Enrollment in upper-division ITE courses (3000-level and above) is available only to students who have been accepted into the PTP or into an appropriate graduate program or to students with a non-ITE major requiring a specific class. (Non-ITE majors may take a *maximum of two* upper-division ITE classes.)

To be eligible to apply for admission to a professional program, a student must be in good academic standing in the University and college, must achieve a grade of C- or better in every required preprofessional course, and must have an overall grade point average of 2.0 in required preprofessional coursework completed at USU.

A student can repeat no more than three of the required preprofessional courses in order to satisfy the PTP application and eligibility requirements. Multiple repeats of the same course are included in the total of three repeats. Audits count as a time taking a class unless prior written approval is obtained from the college academic advisor.

Although transfer credit accepted by the department and the college may be applied toward PTP admission requirements, the grades received will not be used in the USU GPA calculation. A final decision on admission of a transfer student into the PTP will

not be made until after the applicant has completed at least 15 credits of acceptable coursework at USU.

Eligible students must apply for admission to the PTP during the semester in which they are completing the required preprofessional courses.

For all technology majors in the Professional Program, the following academic regulations apply in addition to University regulations:

1. A minimum GPA of 2.0 must be maintained in technology/math/science/business courses required for, or used as technical electives in, the chosen major. Courses which were part of the preprofessional program requirements and University Studies courses are not included in this GPA calculation.

2. No more than 6 hours of *D* or *D+* credit may be applied toward meeting graduation requirements in technology/math/science/business classes.

3. College of Engineering courses may be repeated only once. Audits count as a time taking a class unless prior written approval is obtained from the department head. A maximum of three required or elective courses completed as part of a Professional Program can be repeated in order to meet graduation requirements. (Courses completed as part of a preprofessional program are not included in this total of three repeats.)

4. The *P-D-F* grading option may not be used in required or elective courses completed as part of a Professional Program. (The *P-D-F* grading option is approved for University Studies courses.)

5. The academic regulations listed above (1-4) apply to required coursework and any technology/math/science/business course which could be used to satisfy graduation requirements for the chosen degree. That is, once a student completes a particular technical elective, it becomes a required course for that student.

6. Students in violation of departmental or college academic regulations, no longer eligible for graduation, or not making satisfactory progress toward a degree, will be placed on probation.

a. Students will be placed on probation if they (i) earn an *F* in a technology/math/science/business course which could be used to satisfy graduation requirements for the chosen degree (see item 5 above); (ii) have more than 6 hours of *D* credit (see item 2 above); or (iii) have a GPA of less than 2.0 (see item 1 above).

b. Students remain on probation until they improve their standing by repeating and passing all failed classes, repeating classes to reduce the number of *D* credits to 6 or less, and/or by raising their GPA above 2.0.

c. While on probation, a student must earn a semester GPA of 2.0 or higher in technology/math/science/business classes and must not earn any grades of *D* or *F*.

While on probation, a student may not preregister. The student's major code will be changed to a preprofessional code. The student must meet at least once per semester with the college academic advisor to work out a schedule having the primary goal of correcting the existing academic problems.

## Requirements

### Bachelor of Science in Technology and Industrial Education

**Technology Education.** This emphasis prepares the student to teach in junior and senior high schools. The curriculum requirements include the following: ITE 1000, 1010, 1020, 1030, 1040,

1200, 2030, 2300, 3030, 3050, 3200, 3220, 3300, 3440, 4300, 4400, 5220, 5500, 5600; Math 1050, 1060; BIS 1400; Phyx 1800; InsT 5200; ScEd 3100, 3210, 4200, 4210, 5300; SpEd 4000; Engl 1010, 2010. Students are also required to complete a technical option (either ITE 1640 or ITE 4200). Students in this emphasis also take University Studies courses and electives. See major requirement sheet, available from the department, for further information.

**Trade and Technical Education.** This emphasis prepares the student to teach applied technology education courses at the high school or post-high school level. The curriculum requirements include the following: technical courses/work experience, 51 credits; professional courses, 27 credits, including InsT 5200, ITE 3200, 3300, 3900, 3930, 4300, 4400, 4700, 5220, 5910, SpEd 4000; University Studies, 24 credits; general electives, 9 credits; Engl 1010, 2010; BIS 1400; and Math 1050.

State licensure requires a minimum of two years of approved vocational experience. Successful completion of a trade competency examination is accepted in lieu of vocational experience.

### Bachelor of Science in Aviation Technology— Maintenance Management

Aviation Technology—Maintenance Management graduates are qualified to enter the work force in many rewarding career fields in aviation. Employment opportunities exist in target industries such as major airline carrier maintenance management, commuter airline maintenance management, fixed-base operator (FBO) maintenance, and Federal Aviation Administration (FAA) aircraft inspection after some field experience. This major has a great deal of depth in general maintenance, which applies to most industrial maintenance operations. Although the major's focus is aviation, the knowledge and skills gained can be used in other fields.

The courses for **Aviation Technology—Maintenance Management** are as follows: ITE 1030, 1100, 1130, 1140, 1170, 1200, 1240, 2100, 2110, 2140, 2150, 2170, 2180, 2190, 2200, 2300, 2420, 2430, 2440, 3010, 3120, 3280, 3610, 4200, 4490, 4610, 4620; Math 1050, 1060, 1100; Phyx 1800; Stat 2300; Engl 1010, 2010; MHR 3110, 3710; and BIS 1400.

Students in Maintenance Management must also complete 11 credits of technical electives. At least 10 credits must be in upper-division courses. Technical electives include: ITE 2310, 2360, 2370, 2400, 3030, 3230, 3400, 3410, 3820, 4250, 4310; BA 3700, 4720. Completion of the optional FCC Avionics license will require more than the 126 credits for graduation. Students in this degree also take University Studies courses and electives. See major requirement sheet, available from the department, for further information.

### Bachelor of Science in Aviation Technology— Professional Pilot

Aviation Technology—Professional Pilot graduates are trained to be commercial pilots. The degree requirements include completion of the following FAA licenses: private, instrument, commercial, CFI, CFII, and Multi-Engine. The courses for this specialization are as follows: ITE 1100, 1130, 2170, 2180, 2300, 2330, 2350, 2430, 2510, 2520, 2540, 2620, 2660, 2720, 2740,

2860, 2880, 3010, 3120, 3140, 4280, 4490, 4660, 5300, 5400; Math 1050, 1060, 1100; Bmet 2000, 3250; Engl 1010, 2010; BIS 1400, 1550; Phyx 1800; and MHR 3110. Nine credits of upper-division electives are required, chosen from the following list: MHR 3710, 3720; InsT 5230, 5400; Soc 3320, 3500; Psy 4240; BIS 4350, 4550; Phil 3520; and ITE 4250. Also 21 credits of University Studies classes and 8 credits of other electives (including upper-division courses) need to be taken to fulfill requirements for graduation. Prior to taking some of the courses required for this major, students must attain a 2.5 cumulative GPA.

### **Bachelor of Science in Computer Electronics Technology**

Students choosing Computer Electronics Technology are trained for positions in industry as liaison technologists between the design engineer and production personnel. These positions are available in field engineering, test engineering, quality control engineering, and design engineering, to mention a few. Networks and LAN management are also emphasized.

The courses for **Computer Electronics Technology** are as follows: ITE 2240, 2300, 2310, 2320, 2360, 2370, 2400, 3380, 3390, 3400, 3510, 3710, 4710; ASTE 3050; BIS 1400, 2450, 3330, 3500, 5400; CS 1700, 1710, 1720; Chem 1110; Math 1050, 1060, 1100; Phyx 1800; Stat 2300; and Engl 1010, 2010. Students must choose 12 credits of technical electives specified in one of the following areas of emphasis: Computer Science, Electrical Engineering, Internet/E-Commerce, or Business Information Systems. For details, contact advisor. Students in this program also take University Studies courses and electives. See major requirement sheet, available from the department, for further information.

### **Bachelor of Science in Welding Engineering Technology**

Utah State University offers one of the few BS degree programs in the nation in welding engineering technology. Students choosing this major are trained for entry-level positions in the industrial setting as welding engineers, welding engineering technologists, welding technologists, quality assurance technologists, or manufacturing technologists. They are prepared to work in field construction, light and heavy shop fabrication, and in manufacturing/production. They are trained in new process development, code and noncode high-quality applications, problem solving, technical sales, inspection, and estimating.

The courses for **Welding Engineering Technology** are as follows: ITE 1030, 1200, 1640, 2300, 2310, 2670, 2850, 3030, 3060, 3090, 3230, 3630, 3670, 3810, 3820, 4200, 4310, 4810, 4820, 5750, 5760, 5890; BIS 1400; Math 1050, 1060, 1100; Chem 1110, 1130; Engl 1010, 2010; BA 3700; MHR 3110, 3710; Stat 2300; and Phyx 1800. In addition, students in this major must also take University Studies courses and electives. See major requirement sheet, available from the department, for further information.

### **Associate of Applied Science Vocational-technical Programs**

The two-year curricula develop strong technical skills in one of two areas of specialization—aircraft maintenance technician or computer aided drafting and design. Most of the credits earned in these programs may be applied toward a related BS degree should the student decide to continue his or her education.

### **Aircraft Maintenance Technician (Airframe or Powerplant) Two-year Associate of Applied Science Degree.**

This two-year technical program, leading to an Associate of Applied Science (AAS) degree, emphasizes aircraft repair and maintenance. Required courses are: ITE 1030, 1130, 1140, 1170, 1200, 1240, 2100, 2110, 2140, 2150, 2170, 2180, 2190, 2200, 2300, 2420, 2430, 2440, 3280, 4200; Math 1050, 1060; Phyx 1800; and Engl 1010. FAA regulations require students to earn a 70 percent or higher score to pass each course.

In addition, students must complete University Studies requirements for the AAS degree, as described in the general University requirements. Federal Aviation Administration airframe and powerplant certification is available without University Studies requirements. See requirement sheet, available from the department, for further details.

### **Computer Aided Drafting and Design Two-year Associate of Applied Science Degree Program.**

A two-year technical drafting and design program leading to an AAS degree is available to those desiring to directly enter the drafting and design occupation. Curriculum requirements include the following: ITE 1010, 1030, 1040, 1200, 2300, 2320, 3220, 3230, 3240, 3270, 4930; BIS 1400; Math 1050; and Engl 1010. Students in this program also fulfill University Studies requirements and complete technical electives and other electives. See requirement sheet, available from the department, for further details.

## ***Graduate Programs***

The Master of Science (MS) degree in Industrial Technology is available to individuals interested in graduate study. Candidates may choose either the Plan A thesis option or the Plan B nonthesis program.

### ***Admission Requirements***

See the general admission requirements for graduate study in this catalog (pages 72-73). Students applying for admission to the MS program must complete the GRE with a minimum quantitative and verbal score of 1,000 and a 40th percentile minimum score on the verbal and quantitative tests or must complete the MAT with a minimum score of 43. Admission committees also consider experience, undergraduate record, and formal recommendations.

### ***MS Degree***

The MS program offers a general technology degree. A Plan A or Plan B option is available. The Plan A and Plan B options are described on page 77 of this catalog. The degree is designed for industrial educators who want to strengthen their background in current educational theory and practice. Students are required to complete a professional core of courses relating to technology education or applied technology education and to select additional courses from a list of related courses. Plan A requires a minimum of 30 semester credits, including a thesis. Plan B is a nonthesis option that requires 33 semester credits, including a creative project. The core courses for this specialization are as follows: ITE 6090, 6100, 6150, 6450, and 6750.

### ***Financial Assistance***

The department offers a limited number of graduate research and teaching assistantships. For further information, contact the Industrial Technology and Education Department.

## ***Industrial Technology and Education Courses (ITE)***

**ITE 1000. Orientation to Technology Education.** Introduction to the technology education teaching profession, including programs, facilities, goals, and opportunities. (1 cr) (F)

**ITE 1010. Communications Technology.** Introduction to tools, materials, equipment, and processes used to transmit and receive messages. Major emphasis on hardware, software, communications, and the digital age. (3 cr) (F)

**ITE 1020. Energy/Power/Transportation.** Exploration of the concepts and processes relating to the source, conversion, transmission, and control of energy relating to use in industry, domestic, and transportation. (3 cr) (Sp)

**ITE 1030. Material Processing and Tooling Systems.** Introduction to properties of industrial materials (metallic, polymeric, ceramic, and composite), processes used to produce standard stock and finished products, design and construction of simple jigs and fixtures, and the use of precision measuring instruments in manufacturing. (3 cr) (F,Sp)

**ITE 1040. Construction and Estimating.** Overview of construction industry and its practices. Reviews four major parts of construction industry, including: (1) Inputs: materials; (2) Process: design and building of structures; (3) Outputs: sites, buildings, etc.; and (4) Feedback: effects of building systems. Provides prospective technology education teachers with opportunity to study and perform activities related to the field of construction and estimating. At completion of course, students should be able to demonstrate knowledge and skills required to implement a construction technology program. (3 cr) (Sp)

**ITE 1100. The Aviation Profession.** Covers attributes of aviation professional, career planning, and certification process. (1 cr) (F,Sp)

**ITE 1130. Flight Principles.** Basic flight theory and physics of flight. Aircraft control systems related to flight. Ground handling and servicing of aircraft. Special lab fee. (2 cr) (F)

**ITE 1140. Aircraft Components and Principles.** Materials and hardware, as well as nondestructive inspection applicable to aircraft. Plumbing methods, maintenance publications, and aircraft weight and balance control. (2 cr) (F)

**ITE 1170. Aircraft Structures.** Accepted methods and repair for metal structures. Organic finishes and application techniques with laboratory applications and practical experience. (3 cr) (F)

**ITE 1200. Computer-Aided Drafting and Design.** Provides students with ability to accurately produce basic engineering, 2-D, and pictorial drawings using traditional and computer-aided drafting techniques. Introduction to drafting fundamentals and equipment associated with the drafting industry, including drawings, reproductions, and computer-aided techniques. (3 cr) (F,Sp,Su)

**ITE 1240. Aircraft Maintenance.** Maintenance, repair, alteration, and inspection of aircraft. Assembly and rigging of control systems with laboratory application of maintenance assembly and rigging procedures. Prerequisites: ITE 1130, 1140. (3 cr) (Sp)

**ITE 1640. Introduction to Welding.** Theory of Oxy-Acetylene Welding, Shielded-Metal Arc Welding, and Gas Metal Arc Welding. (3 cr) (F)

**ITE 2030. Manufacturing Technology and Enterprise.** Focuses on management technology used to establish and finance a manufacturing firm, engineer a product and production system, and market a product. Emphasizes operation of basic ma-

chine woodworking equipment and a study of its uses. Prerequisite: ITE 1030. (3 cr) (F)

**ITE 2100. Aircraft Reciprocating Powerplants and Accessories.** Theory of operation, maintenance, and repair of reciprocating engines, propellers, exhaust systems, ignition systems, and fuel systems with laboratory applications of principles and components studied. Prerequisite: ITE 2110 (must be taken concurrently). (3 cr) (F)

**ITE 2110. Aircraft Reciprocating Powerplants and Accessories Lab.** Laboratory application of principles studied in ITE 2100. Prerequisite: ITE 2100 (must be taken concurrently). (3 cr) (F)

**ITE 2140. Aircraft Turbine Powerplants and Maintenance Operations.** Theory of turbine powerplants, including turbine engine and components operation, hot section inspection, and servicing. Aircraft engine 100-hour inspections and maintenance, with laboratory applications of principles and components studied. Prerequisite: ITE 2150 (must be taken concurrently). (3 cr) (Sp)

**ITE 2150. Aircraft Turbine Powerplant Maintenance Operations Lab.** Theory of turbine powerplants, including turbine engine and components operation, hot section inspection, and servicing. Aircraft engine 100-hour inspections and maintenance, with laboratory applications of principles and components studied. Prerequisite: ITE 2140 (must be taken concurrently). (3 cr) (Sp)

**ITE 2170. Aircraft Systems.** Theory and operation of aerospace environmental systems, communication, navigation and guidance systems, fuel and propellant systems, fire detection, and warning. (2 cr) (Sp)

**ITE 2180. Aircraft Hydraulic and Pneumatic Systems.** Theory and operation of aircraft hydraulic, landing gear, and brake systems. (2 cr) (F)

**ITE 2190. Aircraft Systems Lab.** Laboratory application of principles and components studied in ITE 2170. Prerequisite: ITE 2170 (must be taken concurrently). (1 cr) (Sp)

**ITE 2200. Aircraft Hydraulics and Pneumatics Systems Lab.** Laboratory application of principles and components studied in ITE 2180. Prerequisite: ITE 2180 (must be taken concurrently). (1 cr) (F)

**ITE 2240. Analog Devices and Circuits.** Study of differential amplifiers; operational amplifiers; regulators; and generator instrumentation amplifier, multiplier, and active filters. Prerequisites: ITE 2310; ITE 2400 (must be taken concurrently). (3 cr) (F)

**ITE 2250. Internship.** Planned supervised work experience in industry. Must have departmental approval. (1-4 cr) (F,Sp,Su) ®

**ITE 2270. Computer Engineering Drafting.** Provides students with ability to accurately produce computer-aided drafting software. Since there are no drafting prerequisites for this course, drafting fundamentals are also introduced. (2 cr) (F,Sp,Su)

**ITE 2300 (QD). Electronic Fundamentals.** Study and application of DC and AC concepts, semiconductors, digital electronics, and microcomputers. Prerequisite: Math 1050. (4 cr) (F,Su)

**ITE 2310. AC/DC Circuits.** Study of AC/DC principles beyond those taught in ITE 2300. Includes network theorems, capacitance, inductance, impedance, reactance, resonance, and transformers. Prerequisite: ITE 2300. (2 cr) (Sp)

**ITE 2320. Electronic Drafting.** Study of electronic drafting practices. Students exposed to various areas of electronic drafting and fabrication. Prerequisite: ITE 2300. (2 cr) (F)

**ITE 2330. Private Pilot Ground School.** Instructions in principles of flight, aircraft and engine operation, weather, navigation, radio aids to navigation, radio communi-

cations, and federal air regulations. Preparation for FAA Private Pilot written exam. (4 cr) (F,Sp)

**ITE 2350. Private Pilot Certification.** FAA approved flight training program meeting all requirements for, and in the issuance of, the Private Pilot Airplane License. Prerequisite: ITE 2330 (may be taken concurrently). (1 cr) (F,Sp,Su)

**ITE 2360. Digital Circuits.** Logic circuits, combinational and repeated circuits, counters, shifts registers, state tables, PLD's, and digital computer simulations. Prerequisite: ITE 2300 or equivalent. (3 cr) (Sp)

**ITE 2370. Computer and Microprocessor Programming.** Introduction to microprocessors and computers. Study of machine language programming, assemblies and cross assemblies, emulators, and input and output devices. Prerequisite: ITE 2300. (3 cr) (Sp)

**ITE 2400. Active Devices and Circuits.** Study of diodes; transistor principles, including semiconductor theory, bipolar, and field effect device characteristics; and modern thyristor devices. Prerequisite: ITE 2310. (3 cr) (F)

**ITE 2420. FAA Regulations, Records, and Certification.** Maintenance forms, records, and regulations releasing aircraft to airworthy status. Certification of maintenance technicians is also included. (2 cr) (Sp)

**ITE 2430. Aircraft Electrical Systems and Components.** Aircraft electrical power generating systems. Theory of generation, alternators, regulation, and control systems with laboratory application of principles and systems studied. Prerequisite: ITE 2300. (2 cr) (Sp)

**ITE 2440. Aircraft Electrical Systems Laboratory.** Laboratory application of principles and systems studied in ITE 2430. Prerequisites: ITE 2300; ITE 2430 (must be taken concurrently). (2 cr) (Sp)

**ITE 2510. Intermediate Flight.** FAA approved flight training program that fulfills the cross country requirements for commercial and instrument ratings. Prerequisite: ITE 2350. (1 cr) (F,Sp,Su)

**ITE 2520. Instrument Pilot Ground School.** Ground school approved by FAA under Part 141 of the Federal Aviation Regulations. Designed to prepare students to pass the FAA oral and written examinations required for becoming instrument rated pilots. Prerequisite: ITE 2350. (4 cr) (F,Sp)

**ITE 2540. Instrument Pilot Certification.** FAA approved flight training program meeting all the requirements for, and the issuance of, the Instrument Pilot Airplane Rating. Prerequisites: ITE 2350; ITE 2520 (may be taken concurrently). (1 cr) (F,Sp,Su)

**ITE 2620. Commercial Pilot Ground School.** Commercial flight operations including performance, cross country planning, advanced systems operations, complex airplanes, and flight maneuvers. Prerequisites: ITE 2350 and 2520. (2 cr) (F,Sp)

**ITE 2660. Commercial Pilot Certification.** Flight instruction to meet FAA requirements and completion of tests for certification. Prerequisites: ITE 2540; ITE 2620 (may be taken concurrently). (1 cr) (F,Sp,Su)

**ITE 2670. GMA, FCA, and GTA Welding.** Theory and skills course covering Gas Metal Arc Welding, Flux Core Arc Welding, and Gas Tungsten Arc Welding. Enrollment limited to Welding Engineering Technology majors or by permission. Prerequisite: ITE 1640. (3 cr) (Sp)

**ITE 2720. CFI and CFII Ground School.** Designed to prepare students to pass the FAA oral and written examinations required for becoming certified flight and instrument instructors. Combines Certified Flight Instructor and Certified Flight Instructor-Instrument into one course. Prerequisite: ITE 2660. (3 cr) (F,Sp)

**ITE 2740. CFI Certification.** FAA-approved flight training program meeting all requirements for the issuance of the Certified Flight Instructor Airplane Rating. Prerequisite: ITE 2720 (may be taken concurrently). (1 cr) (F,Sp,Su)

**ITE 2850. Statics and Strength of Materials.** Engineering technology course covering resultants and equilibrium of force systems; moments of inertia; method of work; stress, strain, and deflection due to tension, compression, and torsion; and Mohr's circle for stress and strain. Prerequisites: Math 1050, 1060. (3 cr) (F)

**ITE 2860. CFII Certification.** FAA approved flight training program meeting all the requirements for, and issuance of, the Certified Flight Instructor, Airplane Instrument Rating. Prerequisites: ITE 2720 and 2740 (may be taken concurrently). (1 cr) (F,Sp,Su)

**ITE 2880. Multi-Engine Certification.** FAA approved flight training program meeting all the requirements for, and the issuance of, the Multi-Engine Airplane Rating and the Certified Flight Instructor Multi-Engine Airplane Rating. Prerequisite: ITE 2660. (1 cr) (F,Sp,Su)

**ITE 3010. National Airspace, Air Traffic Control, and Airport Administration.** Study of air traffic control system, airspace usage, and facilities. Airport planning, development, and management and their importance to the achievement of a successful airport operation. Management of publicly owned and operated airports, ranging in size from general aviation to the large air carrier hubs. (3 cr) (F)

**ITE 3030. Computer-Integrated Manufacturing and Robotic Systems.** Introduction to principles, operations, and applications of computer-controlled manufacturing systems, including: CNC, CAD/CAM, robotics, programmable logic controllers, bar code readers, etc. Prerequisite: ITE 1030. (3 cr) (Sp)

**ITE 3050. Graphic and Electronic Communication Technology.** Introduction to modern graphic and electronic communication systems. Emphasizes design, development, production, and dissemination of both electronic and graphic messages. Covers major concepts, including desktop publishing, and audio and video production techniques. (3 cr) (Sp)

**ITE 3060. Codes, Weld Inspection, and Quality Assurance.** Study of ASME and AWS codes as relating to procedure qualification and welder qualification for fabrication of pressure vessels and structures, and how codes relate to quality assurance and ISO 9000. Prerequisite: ITE 2670. (3 cr) (F)

**ITE 3070. Technology Education for Elementary Schools.** Introduction to technology education and to science, technology, and society (STS) curricula for elementary schools, emphasizing teaching, developing, and managing technology-based activities. (3 cr)

**ITE 3090. Welding Power Sources.** Study of power sources used to generate and control voltage and amperage for welding. Prerequisites: ITE 2300, 2310, 2670. (2 cr) (Sp)

**ITE 3120. Aviation Law.** Law as it affects aviation industry. Rights and responsibilities of individual organizations and the aviation community. Regulation and liability pertaining to design, manufacturing, operation, and maintenance of aircraft. Prerequisite: ITE 1100. (3 cr) (F)

**ITE 3140. Advanced Avionics Systems and Flight Simulation.** In-depth study of state-of-the-art aircraft instrumentation systems and advanced flight training utilizing a flight simulator. Prerequisite: ITE 2540. (3 cr) (F,Sp,Su)

**ITE 3200. Methods in Industrial Education I.** Classroom laboratory practicum for design, practice, and performance of industrial education demonstrations and lab activities. Prerequisites: ITE 1000; ITE 3300 (must be taken concurrently). (3 cr) (F)

**ITE 3220. Architecture and Construction Systems.** Basics of architectural computer-aided drafting. Includes introduction to principles of construction. Explores residential and commercial systems, emphasizing construction codes. Prerequisites: ITE 1200, Math 1010. (3 cr) (F)

**ITE 3230. Machine and Production Drafting.** Teaches students to accurately produce both design drawings and working drawings. Explores techniques, symbols, and

conventions used to represent gears, cams, jigs, and fixtures. Also includes advanced techniques of production drawing, emphasizing Geometric Dimensioning and Tolerancing. Prerequisites: ITE 1200, Math 1050, or equivalent. (3 cr) (F)

**ITE 3240. Technical Illustration.** In-depth study of technical illustration. Includes preparation of pictorial drawings with rendering added. Explores industrial and architectural environments. Introduces rendering and animation software, emphasizing three-dimensional modeling. Prerequisite: ITE 1200. (3 cr) (Sp)

**ITE 3270. Advanced Computer-Aided Drafting.** Designed to enhance CADD productivity, encourage customization, and introduce students to advanced CADD techniques, including programming and introduction to parametric design. Prerequisite: ITE 1200. (3 cr) (Sp)

**ITE 3280. Advanced Turbine Engines.** Advanced study of turbo-jet propulsion. Comparative examination of jet, fan, turbo-prop, and turbo-shaft engines. Prerequisite: ITE 2150. (2 cr) (F)

**ITE 3300. Clinical Experience I.** Field-based experiences in secondary schools. Students complete 30 hours of tutoring students and assist teachers with managerial, clerical, and other professional tasks. Prerequisites: ITE 1000; ITE 3200 (must be taken concurrently). (1 cr) (F)

**ITE 3380. Microprocessor and Computer Interfacing.** Microcomputer interface applications, including digital system interface, serial and parallel interfacing, and D/A and A/D converters. Prerequisites: ITE 2240, 2370. (3 cr) (Sp)

**ITE 3390. Microcontrollers.** Study of microcontrollers and applications. Includes programming and building circuits. Prerequisite: ITE 3380. (3 cr) (F)

**ITE 3400. Communication Circuits.** Introduction to radio frequency communication circuits. Includes oscillators, modulation, transmitters, receivers, transmission lines, antennas, RF propagation, digital signal processing, GPS, and spread spectrum. Prerequisites: ITE 2300 and 2400. (3 cr) (Sp)

**ITE 3410. FCC License.** Prepares students to obtain the FCC General Radio Telephone Operator's License. Covers electronic fundamentals through microwave radar and FCC rules and regulations. Prerequisite: ITE 3400. (1 cr) (Sp)

**ITE 3440 (DSC). Science, Technology, and Modern Society.** Designed to challenge students from all academic majors to develop an understanding of the dynamic interaction between science, technology, and society. Explores responsibility of humans for directing the utilization of technology as a creative enterprise. (3 cr) (F,Sp)

**ITE 3510. Introduction to Networking.** Study of hardware and software required to build, install, maintain, and support a local area network. Emphasizes laboratory applications. Prerequisite: BIS 5400 (may be taken concurrently). (3 cr) (F)

**ITE 3610. AeroTechnology Design I.** Students select and plan a senior project. Requires written proposal, including technical description of the project and management plans. (1 cr) (Sp)

**ITE 3630. Fusion Joining and Brazing Processes.** Study of SAW, ESW, GMAW-EG, RW, PAW, PAC, Electron Beam, Laser, Friction, Brazing, and other welding processes. Prerequisites: Professional status and ITE 2670. (3 cr) (F)

**ITE 3670. Design for Welding.** Design of weldments and welded connections. Prerequisite: ITE 2850. (3 cr) (Sp)

**ITE 3710. Electronics/Computer Design I.** Students select and plan a senior project. Requires written proposal, including technical description of the project and management plans. Prerequisite: ITE 2320 (may be taken concurrently). (1 cr) (F)

**ITE 3740. Facility and Equipment Maintenance.** Systems approach to facility, equipment, and tool maintenance, including principles of woodworking, machine construction, adjustment, and sharpening. (3 cr)

**ITE 3810. Welding Design I.** Students select and plan a senior project. Requires written proposal, including technical description of the project and management plans. (1 cr) (Sp)

**ITE 3820. Nondestructive Testing.** Fundamental concepts relating to liquid penetrant, magnetic particle, ultrasonic, radiography, and other NDT processes. Prerequisites: Math 1100 and Phyx 1800. (3 cr) (Sp)

**ITE 3900. Principles and Objectives of Industrial Education.** Comprehensive study of philosophy and purposes of industrial education programs and their place in the total program of modern education. (3 cr)

**ITE 3930. Evaluation of Industrial Subjects.** Factors for evaluation of attitudes, skills, work habits, technical information, and instrument construction. (2 cr)

**ITE 4200 (d6200).<sup>1</sup> Composite Manufacturing Processes and Repair.** Composite manufacturing processes, composite materials survey, tooling design and fabrication, autoclave processes, vacuum bag techniques, filament winding processes, equipment requirements, materials cutting and storage, and composite materials testing. (3 cr) (Sp)

**ITE 4250. Internship.** Planned supervised work experience in industry. Prerequisite: Departmental approval. (1-6 cr) (F,Sp,Su) ®

**ITE 4280. Airline Operations.** Study of airline operations and their organizational structure. Examines functions of airline dispatcher, operations specialists, managers, and cockpit flight crew. Discussion of advanced flight planning, aircraft performance and loading considerations, and impact of weather on flight operations and routing priorities. Prerequisite: ITE 1100. (3 cr) (F)

**ITE 4300. Clinical Experience II.** Field-based experience, in which students complete 30 hours of teaching-related experiences in the classroom. Prerequisites: ITE 3200, 3300; ITE 4400 (must be taken concurrently). (1 cr) (Sp)

**ITE 4310 (d6310). Corrosion and Corrosion Control.** Analysis of corrosion mechanisms for ferrous metals, nonferrous metals, and nonmetallic materials, as well as the control of corrosion. Prerequisites: Chem 1110 and Math 1060. (2 cr) (Sp)

**ITE 4400. Methods in Industrial Education II.** Techniques of teaching as applied to individual and group instruction. Students apply various methods in presenting lessons. Prerequisites: ITE 3200, 3300; ITE 4300 (must be taken concurrently). (3 cr) (Sp)

**ITE 4480. Certified Flight Instructor Practicum.** Under supervision of ground school instructor, students gain practical experience teaching ground school subjects. Prerequisite: ITE 2740. (2 cr)

**ITE 4490. Human Factors in Aviation Safety.** Examines major causative agent in aircraft accidents: the human being. Emphasizes psychological and physiological factors enhancing accident probability. Includes detailed analysis of ergonomics (human engineering) and its influence on safety. Prerequisite: ITE 1100. (3 cr) (Sp)

**ITE 4580. Occupational Safety and Health Management.** Management practices and principles as applied to safety and health ethics, laws, organizations, programs, and varied functions of the safety and health professional. (2 cr)

**ITE 4610 (CI). AeroTechnology Design II.** Execution and completion of a team or individual project. Requires design reviews and written reports. Prerequisite: ITE 3610. (3 cr) (F)

**ITE 4620 (CI). AeroTechnology Design III.** Preparation and presentation of a team or individual project. Writing and speaking skills emphasized through technical reports and presentations. Prerequisite: ITE 4610. (3 cr) (Sp)

**ITE 4660 (CI). Flight Senior Project.** Students select, plan, and execute an approved senior project. Writing and speaking skills emphasized through technical reports and presentations. (3 cr) (F,Sp)

**ITE 4700. Student Teaching in Postsecondary Schools.** Planning, presenting, and evaluating instruction for students in postsecondary industrial and technical programs under the supervision of an experienced teacher. Enrollment by permission only. (4 cr)

**ITE 4710 (CI). Electronics/Computer Design II.** Execution and completion of a team or individual project. Requires design reviews and written reports. Prerequisite: ITE 3710. (3 cr) (Sp)

**ITE 4810 (CI). Welding Design II.** Execution and completion of a team or individual project. Requires design reviews and written reports. Prerequisite: ITE 3810. (3 cr) (F)

**ITE 4820 (CI). Welding Design III.** Preparation and presentation of a team or individual project. Writing and speaking skills emphasized through technical reports and presentations. Prerequisite: ITE 4810. (3 cr) (Sp)

**ITE 4930. Independent Study.** Upon application, students may propose and complete work above and beyond regular coursework to support or supplement their major. (1-4 cr) (F,Sp,Su) ®

**ITE 4940. Related Industrial Experience.** Provision for enrollment in industry schools conducted on university level. Approved by department upon application for trade competency examination and work experience in industry. (1-12 cr) (F,Sp,Su) ®

**ITE 5040. Manufacturing Enterprise.** Focuses on management technology used to establish a manufacturing enterprise, engineer a product and production system, finance the operation, and market the product. Prerequisite: ITE 1030. (3 cr)

**ITE 5220 (CI). Program and Course Development.** Review of basic principles and practices of curriculum and course development used in applied technology and technology education. Emphasizes components needed to develop a curriculum guide. Prerequisites: ITE 3200, 3300. (4 cr) (Sp)

**ITE 5230. Technical Training Innovative Program.** Prepares prospective and incumbent teachers to implement and conduct contemporary programs. Includes skill development and the philosophy needed for curriculum innovation. (1-4 cr) ®

**ITE 5240. Principles of Technology.** Introduction to applied technology principles forming the basis for today's society. (2-3 cr)

**ITE 5300. Turbo Prop Aircraft Ground School.** Introduction to Turbo Prop Commercial aircraft in use by Regional Airlines. Course includes the following: Systems Flight Management, Standard Operating Procedures, and Flight Planning. Prerequisite: ITE 2660. (3 cr) (F,Sp)

**ITE 5400. Regional Jet Ground School.** Introduction to typical commercial jet aircraft in use by Regional Airlines. Course includes the following: Aircraft Systems, Normal and Abnormal Operations, Performance, and Flight Planning. Prerequisite: ITE 2660. (3 cr) (F,Sp)

**ITE 5500. Student Teaching Seminar.** Focuses on observations and problems arising during student teaching. Includes review of teaching plans, procedures, adaptive classroom practices, and evaluation. Prerequisite: ITE 5600 (must be taken concurrently). (2 cr) (F)

**ITE 5600. Student Teaching in Secondary Schools.** Candidates assigned to cooperating teachers in public secondary schools within their major and minor subjects. Students have professional responsibilities with teaching. Prerequisite: ITE 5500 (must be taken concurrently). (8 cr) (F)

**ITE 5750. Welding Metallurgy I.** Metallurgical principles applied to welding and weldability of ferrous metals. Prerequisites: Chem 1110 and ITE 2670. (3 cr) (F)

**ITE 5760. Welding Metallurgy II.** Metallurgical principles applied to welding and weldability of nonferrous metals. Prerequisite: ITE 5750. (3 cr) (Sp)

**ITE 5800. Seminar—Technology Education.** Provides opportunity for students to participate in variety of enriching experiences, such as guest speakers, field trips, demonstrations, and conferences. (1-3 cr) ®

**ITE 5890. Seminar—Welding Engineering Technology.** Professional seminar specifically designed to introduce students to industry experts. Limited to welding students. (1 cr) (F,Sp) ®

**ITE 5900. Workshop in Industrial Technology and Education.** Special workshops for education or industry. May be repeated providing content varies. (1-4 cr) ®

**ITE 5910. Special Problems in Industrial Technology and Education.** (1-4 cr) ®

**ITE 5920. Related Technical Training.** (1-12 cr) ®

**ITE 6090. Program Design in Technology and Industrial Education.** Study of contemporary program design and development in technology and industrial education. Reviews complete curriculum developmental process. (3 cr) (F,Sp,Su)

**ITE 6100. Contemporary Issues in Technology and Industrial Education.** Study of present and future foundational professional developments in technology and industrial education. Students identify and investigate contemporary trends and issues affecting and facing technology and industrial education. (3 cr) (F,Sp,Su)

**ITE 6150. Evaluation and Assessment in Technology and Industrial Education.** Study of various methods used to measure and evaluate student achievement, including cognitive, affective, and psychomatic. Reviews principles of learning and teaching, and of evaluation of instruction. (3 cr) (F,Sp,Su)

**ITE 6200 (d4200). Composite Manufacturing Processes and Repair.** Composite manufacturing processes, composite materials survey, tooling design and fabrication, autoclave processes, vacuum bag techniques, filament winding processes, equipment requirements, materials cutting and storage, and composite materials testing. (3 cr) (Sp)

**ITE 6250. Internship.** Advanced instruction through supervised work experience in teaching, supervising, or administering educational or industrial program. (1-6 cr) (F,Sp,Su)

**ITE 6310 (d4310). Corrosion and Corrosion Control.** Analysis of corrosion mechanisms for ferrous metals, nonferrous metals, and nonmetallic materials, as well as the control of corrosion. Prerequisites: Chem 1110 and Math 1060. (2 cr) (Sp)

**ITE 6440. Technology and Society.** Study of dynamic interaction between technology and society. Examines human responsibility for directing changes in our future. (3 cr) (F,Sp,Su)

**ITE 6450. Administration and Organization of Technology and Industrial Education.** Administrative and supervisory techniques for successful operation of technology education and applied technology education programs. (3 cr) (F,Sp,Su)

**ITE 6520. Explorations of Industry.** Study of contemporary industry, business, and service through a series of site visits. Includes various management and finance methods and techniques. (3 cr) (F,Sp,Su)

**ITE 6610. Computer Delivery Systems in Technology and Industrial Education.** Introduces current computer technologies used in education. Explains how these technologies aid in development, preparation, and delivery of materials in a professional environment. Explores educational research and development of these technologies, with results being disseminated to others in the discipline. (3 cr) (F,Sp,Su)

**ITE 6750. Research in Technology and Industrial Education.** Introduction to practical research planning and design. Guides students from proposal selection to completed proposal to final research report. (3 cr) (F,Sp,Su)

**ITE 6800. Seminar.** (1-2 cr) (F,Sp,Su)

**ITE 6900. Readings and Conference.** Advanced individualized study on selected topics in technology and industrial education. Scheduled consultation with faculty member. (1-3 cr) (F,Sp,Su)

**ITE 6910. Experimental Laboratory in Technology and Industrial Education.** Introduction to elements of a research report through selection and development of experimental study utilizing tools, equipment, materials, and processes for improving programs and teaching techniques. (3 cr) (F,Sp,Su)

**ITE 6930. Independent Study.** Advanced educational experience through individual investigation. (1-6 cr) (F,Sp,Su)

**ITE 6960. Master's Project.** Development of creative project emphasizing a thoroughly developed plan of action. Includes proposal, project paper, and final presentation. (3-6 cr) (F,Sp,Su) ®

**ITE 6970. Thesis Research.** (1-9 cr) (F,Sp,Su)

**ITE 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

**ITE 7230. Foundations of Technology and Industrial Education.** Study of the objectives, legislative foundations, principles, philosophy, impact, and organization of technology and industrial education. (3 cr) (F,Sp,Su)

**\*ITE 7400. Occupational Analysis and Curriculum Development.** Students learn techniques for conducting an occupational analysis (both job and task analysis) and for developing performance-based or competency-based curriculum. Explores industrial and educational applications for this style of curriculum development. (3 cr)

**ITE 7460. Finance and Grant Writing in Technology and Industrial Education.** Procedures in financial administration of industrial education monies. Budget preparation, budget operation and control, and school accounting. In-depth review of steps and techniques needed for grant writing. (3 cr) (F,Sp,Su)

**ITE 7810. Research Seminar.** Identification of research problems, consideration of research strategies and methods, application of research and statistical concepts in departmental focus, and interaction with faculty. (1-6 cr) (F,Sp,Su)

**ITE 7970. Dissertation Research.** (1-15 cr) (F,Sp,Su) ®

**ITE 7990. Continuing Graduate Advisement.** (1-3 cr) ®

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\*This course is taught alternating years. Check with department for information about when course will be taught.

<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

Department of  
***Instructional Technology***

***College of Education***

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**Professors** *J. Nicholls Eastmond, Jr.*, theory and evaluation; *Andrew S. Gibbons*, instructional design, simulations; *Alan M. Hofmeister*, research; *M. David Merrill*, instructional design; *Barbara A. White*, distance education; **Professors Emeriti** *Don C. Smellie*, foundations; *Ron J. Thorkildsen*, research and interactive learning; *R. Kent Wood*, theory, foundations; **Associate Professors** *Mimi Recker*, cognitive modeling, interactive learning; *J. Steven Soulier*, message design, computer applications; *Linda L. Wolcott*, distance education, library media, and foundations; **Assistant Professors** *Joanne P. Bentley*, learning theory and evaluation; *David A. Wiley*, learning objects, instructional design theory; **Research Assistant Professor** *Charles G. Stoddard*, school library media, technology education; **Adjunct Instructors** *Val W. Dawson*, instructional development; *JaDene M. Demiston*, school library media; *Thomas M. Risk*, multimedia development; *Nathan M. Smith, Jr.*, computer applications; *Marilyn Taylor*, school library media; **Temporary Instructor** *Thomas B. Nickel*, distance education

**Degrees offered:** Master of Education (MEd), Master of Science (MS), Educational Specialist (EdS), Doctor of Philosophy (PhD) in Instructional Technology

**Graduate specializations:** *MEd*—Educational Technology, School Library Media Administration; *MS and EdS*—Instructional Technology; *PhD*—Instructional Technology

## ***Undergraduate Programs***

### ***Objectives and Requirements***

There is no major in instructional technology at the undergraduate level because of the need for those preparing in the field to have especially strong general education knowledge as well as depth in a specialized field of study. The minors include School Library Media or Multimedia Development. The objectives and requirements of these minors are as follows:

#### **School Library Media Minor Objectives**

1. Provides students with library media skills.
2. Prepares students to receive a Utah Library Media Certificate.
3. Prepares students for employment as a School Library Media Specialist.

#### **School Library Media Minor Requirements**

This minor is available only through distance education. Those persons wanting to certify for positions in the public schools must complete a teaching certificate and the prescribed School Library Media minor. A 2.7 grade point average is required for admission and certification as a school library media specialist at the bachelor's level. For detailed requirements, contact the department.

#### **Multimedia Development Minor Objectives**

1. Provides students with design skills.
2. Develops students' multimedia production skills.
3. Prepares students for employment in the multimedia field.

#### **Multimedia Development Minor Requirements**

Persons not seeking a public school position may elect the minor in Multimedia Development, in conjunction with a major in other fields. The Multimedia Development minor is especially appropriate for fields which require computer-based instruction, such as business, computer science, engineering, communications, and others. For detailed requirements, contact the department.

## ***Graduate Programs***

Instructional technology is a systematic way of designing, developing, implementing, and evaluating the processes of learning and teaching with specific objectives based on research in human learning and communication. It employs a combination of human and nonhuman resources to bring about more effective instruction. Instructional technology includes aspects of instructional design, product development, interactive learning technologies, multimedia, distance education, and library and information literacy. Each aspect of the field has unique contributions to make to the teaching-learning process.

The department offers specializations in Educational Technology, Information Technology and School Library Media Administration, Instructional Development for Training and Education, and Interactive Learning Technologies. A program emphasis in online learning communities in education and training is also offered.

Graduates are in demand in business and industrial settings, as well as in education, because of their preparation in training and instructional design. Admission to the graduate program is open to all students regardless of their undergraduate preparation.

### **Admission Requirements**

See general admission requirements, pages 72-73. The MS and MEd admission requirements include a 3.0 GPA for the last 60 semester credits (90 quarter credits) and an MAT score or GRE verbal and quantitative scores at or above the 40th percentile. In addition, the department requires that those applying for the EdS program have a master's degree, and a score at or above the 40th percentile on the verbal/quantitative tests of the GRE or 46 percent or above on the MAT. Those applying for the PhD program must have GRE verbal and quantitative test scores at or above the 40th percentile. Demonstrated writing and computer proficiency is required of all applicants. A minimum score of 550 on the TOEFL is required for all prospective international students.

Applications for all degree programs must be submitted to the School of Graduate Studies by January 31. Space permitting, additional qualified candidates will be considered until the beginning of summer semester. Students who wish to be considered for financial aid must submit applications by March 15 for the coming academic year. All graduate students are expected to begin their programs in the fall semester.

Applicants for the EdS and PhD programs who do not hold a master's degree in Instructional Technology must complete additional course requirements.

**No applications will be considered until all required information is received by the School of Graduate Studies.**

### **Degree Programs**

**Master of Science (MS).** This degree emphasizes instructional design and development, and prepares the graduate with skills to apply principles of instructional systems design to education and training. The program prepares instructional developers to take positions in corporate training programs in business and industry. It also leads to careers in public and higher education, development of interactive learning technologies, telecommunications, distance education, and adult education.

The MS degree is available to qualified students with bachelor's degrees from any field. Undergraduate students planning in advance for an MS in Instructional Technology should consider the department's Multimedia Development minor as part of their bachelor's program.

**Master of Education (MEd).** This master's program is only available through extension and distance education via EDNET (a two-way audio/video system). The MEd degree is a two-year cohort rotation (i.e., students proceed as a group through the two-year program). To be successful in this master's degree program, students should own or have access to a personal computer. They will also need an e-mail address and internet access in order to communicate with faculty members and other students in the program. Persons choosing the MEd have two specializations available: Educational Technology and School Library Media Administration.

The **Educational Technology** specialization is directed at public school educators and administrators who are interested in applying the principles of educational technology to the teaching/learning process. This specialization may lead to a position as a district-level or building-level educational technology specialist responsible for technology integration and in-service training related to computers and other technologies.

The **School Library Media Administration** specialization is directed at persons seeking employment in a school library media center. Students seeking this specialization must complete the

School Library Media minor (available only through extension and distance education) and apply for a Utah State Library Media Certificate. This specialization may lead to a position as a district-level or building-level school library media specialist (K-12). The library media specialist is prepared to apply principles of library and information technology to help students and teachers. The library media specialist also understands the effective use of learning resources in the teaching/learning process.

**Educational Specialist Degree (EdS).** The Educational Specialist degree is intended for students interested in acquiring advanced skills in instructional technology beyond those of the master's degree. This program involves coursework, independent study, practicum experiences, and a culminating experience. The degree requires a minimum of 30 credits beyond the master's degree, providing the master's degree was received in the instructional technology field. For students with a master's degree in a field other than instructional technology, a minimum of 40 credits is required.

**Doctoral Degree (PhD).** The doctor of philosophy degree emphasizes research and theory building in instructional design and development. The degree offers advanced preparation for graduates seeking a career in higher education, research centers, or corporate training and development.

**Course Requirements.** Course requirements for all degrees are dependent upon the area of emphasis and are individually planned by the student and the supervisory committee. For planning materials and program details, contact the department.

**Financial Assistance.** Fellowships, assistantships, and other financial support are available and awarded on a competitive basis. Apply through the department.

## **Instructional Technology Courses (InsT)**

**InsT 1000. Information Literacy.** Designed to develop ability to locate, evaluate, and use information. Develops competencies needed for lifelong pursuits of information through the use of libraries and electronic resources. Includes preparation for University Studies computer information literacy examination. (3 cr) (F,Sp)

**InsT 4010. Principles and Practices of Technology for Elementary Teachers.** Integrated experience for pre-service elementary teachers to apply instructional design principles in their instruction. Hands-on experience using a wide variety of technological tools in practical learning environments. Application of technology as both process and product. Prerequisite: Admittance to teacher education. (3 cr) (F,Sp,Su)

**InsT 4300. Clinical Experience in School Library Media.** School library media clinical observation experience. Students involved in observing management and assisting in middle and secondary library media centers, arranged by department. Minimum of 40 hours of observation experience required. (1 cr) (Sp)

**InsT 4910. Undergraduate Research and Creative Opportunity.** Cooperative process of discovery, investigation, research, or creativity between faculty and one or more students. (1-3 cr) (F,Sp,Su) ®

**InsT 5000 (d6060).<sup>1</sup> Foundations of Library Media Programs.** Introduction to historical and philosophical foundations of library media programs for teachers, administrators, and media specialists. Examines role of library media programs in schools and their contributions to the curriculum. Taught off campus through Utah Education Network. (3 cr) (F)

**InsT 5010 (d6110). Information Organization and Management.** Explores functions of information technology including circulation, cataloging, automation tools, and technical services within school library media program. Also considers policies and techniques for facilitating access to information in a school library media center. Taught off campus through Utah Education Network. (3 cr) (F)

**InsT 5020 (d6020). Collection Development.** Focuses on building and maintaining collections for library media programs. Discusses policy development for selection, protecting intellectual freedom, and reviewing, evaluating, and maintaining materials in all formats. Evaluation of school library collections also investigated. Taught off campus through Utah Education Network. (3 cr) (Sp)

**InsT 5030 (d6030). Information Access.** Introduction to finding information and resources using print and electronic sources. Emphasizes reference services, knowledge of basic reference/information sources, and resource sharing; and teaching information retrieval strategies within a school library media program. Taught off campus through Utah Education Network. (3 cr) (Sp)

**InsT 5040 (d6040). Library Media Center Administration.** Includes study of organization, personnel, budgets, programs, and management of a library media center. Students define their role within a school setting and in relation to that of the principal and teachers. Prerequisite: InsT 5000/6060 or approval of instructor. Taught off campus through Utah Education Network. (3 cr) (Su or Arr)

**InsT 5050 (d6050). Library Media Programs.** Presents a wide variety of activities which are integral to a school library media program, including reading guidance, instructional development, curriculum development, media skill instruction, and information literacy. Prerequisite: InsT 5040/6040 or approval of instructor. Taught off campus through Utah Education Network. (3 cr) (Su or Arr)

**InsT 5100 (d6100). Management and Maintenance of Information Technologies.** Introductory course in basic operation of technology tools used in school setting. Includes operation of video equipment, video cameras, Internet sites, CD-ROM, satellite receiving equipment, computer scanners, computer networks, and computer presentation systems. Taught off campus through Utah Education Network. (1 cr) (Arr)

**InsT 5190 (d6190). Library Media Practicum.** Observation and guided field experience in a library media center under professional library media specialists and instructional technology professionals. Bridge of theory into practice for students seeking certification. This course is required for those having limited or no school library media experience, as evaluated by their faculty advisor. Prerequisites: InsT 5040/6040, 5050/6050; or approval of instructor. (1-6 cr) (F,Sp,Su) ®

**InsT 5200. Principles and Practices of Technology for Secondary Teachers.** Integrated experience for pre-service secondary teachers to apply instructional design principles in their instruction. Hands-on experience using a wide variety of technological tools in practical learning environments. Application of technology as both process and product. Prerequisite: Admittance to teacher education. (2 cr) (F,Sp)

**\*InsT 5210. Digital Audio-Video Production.** Fundamental theories and practice in camera and computer-based audio and video production, including recording, editing, and digitizing audio and video segments for education and training applications. (3 cr) (F,Su)

**\*InsT 5220. Computer-Based Instruction Authoring Using Toolbook.** Fundamentals of programming computer-based instruction using the Toolbook authoring system. Prerequisite: Basic computer competencies. (3 cr) (F,Su)

**\*InsT 5230. Instructional Graphic Production.** Fundamental practices of using the computer to design and produce a wide variety of instructional graphics and animations. (3 cr) (F,Su)

**\*\*InsT 5240. Producing Distance Education Resources.** Focuses on production of Internet-based instructional resources for use in distance, flexible, and open learning. (3 cr) (Sp,Su)

**\*\*InsT 5250. Computer-Based Instruction Authoring Using Authorware.** Fundamentals of programming computer-based instruction utilizing the Authorware authoring system. Prerequisite: Basic computer competencies. (3 cr) (Sp,Su)

**InsT 5260. Learning and Applying HTML.** Asynchronous on-line course, teaching web publishing using HTML (Hyper-Text Markup Language). Explores current web technologies and includes design and evaluation. (3 cr) (F,Sp,Su)

**InsT 5270. Multimedia Special Topic Studio 1.** Selected special topics related to the development of multimedia products for instruction and training. (3 cr) (F,Sp,Su) ®

**InsT 5280. Multimedia Special Topic Studio 2.** Selected special topics related to the development of multimedia products for instruction and training. (3 cr) (F,Sp,Su) ®

**InsT 5300. Multimedia Production for Instruction and Training.** Students use knowledge acquired in prerequisite courses to design, produce, and master a multimedia instructional product. Prerequisites: InsT 5210, 5220, 5230, 5240. (3 cr) (Sp)

**InsT 5400. Computer Applications for Instruction and Training.** Introduction to use of computer applications, with special emphasis on software used in instruction and training. (3 cr) (F,Sp,Su)

**InsT 5520. Learning and Teaching at a Distance.** Focuses on issues and methods of teaching and learning in distance education. Students develop strategies for effectively integrating technologies and facilitating learning at a distance. (3 cr) (Sp)

**InsT 5550. Practicum in Distance Learning.** Students demonstrate effective practice by applying instructional development principles for designing, implementing, and evaluating instruction for distant learners. Prerequisite: InsT 5520. (3 cr) (Su)

**InsT 5600. Designing Instruction for Students At-Risk.** Participants use information technologies for ongoing problem solving during and after the course. Competencies emphasized include the design, implementation, and evaluation of specific effective instructional practices appropriate for all students, and particularly for students at risk of academic failure. (1-4 cr) (F,Sp,Su) ®

**InsT 5750. Instructional Technology Workshop.** Special training and experience in latest concepts and innovations in instructional technology. Content changes to reflect most recent topics and problems facing the profession. (1-4 cr) (Su) ®

**InsT 5900. Independent Study.** Individually directed study and projects. Prerequisite: Departmental permission. (1-4 cr) (F,Sp,Su) ®

**InsT 6000. Foundations of Instructional Technology.** Considers the present, past, and future of instructional technology, while helping individual student to develop personal understanding of and orientation to the field. Prerequisite: Matriculation into Instructional Technology master's program. (2 cr) (F)

**InsT 6010. Technology and its Role in the Transformation of Education.** Explores the critical role of educational technology as one tool in the transformation of education. Involves students in change-related projects in the local environment. Taught off-campus through EDNET. (1-3 cr) (F)

**InsT 6020 (d5020). Collection Development.** Focuses on building and maintaining collections for library media programs. Discusses policy development for selection, protecting intellectual freedom, and reviewing, evaluating, and maintaining materials in all formats. Evaluation of school library collections also investigated. Taught off campus through Utah Education Network. (3 cr) (Sp)

**InsT 6030 (d5030). Information Access.** Introduction to finding information and resources using print and electronic sources. Emphasizes reference services, knowledge of basic reference/information sources, and resource sharing; and teaching information retrieval strategies within a school library media program. Taught off campus through Utah Education Network. (3 cr) (Sp)

**InsT 6040 (d5040). Library Media Center Administration.** Includes study of organization, personnel, budgets, programs, and management of a library media center. Students define their role within a school setting and in relation to that of the principal and teachers. Prerequisite: InsT 6060/5000 or approval of instructor. Taught off campus through Utah Education Network. (3 cr) (Su or Arr)

**InsT 6050 (d5050). Library Media Programs.** Presents a wide variety of activities which are integral to a school library media program, including reading guidance, instructional development, curriculum development, media skill instruction, and information literacy. Prerequisite: InsT 6040/5040 or approval of instructor. Taught off campus through Utah Education Network. (3 cr) (Su or Arr)

**InsT 6060 (d5000). Foundations of Library Media Programs.** Introduction to historical and philosophical foundations of library media programs for teachers, administrators, and media specialists. Examines role of library media programs in schools and their contributions to the curriculum. Taught off campus through Utah Education Network. (3 cr) (F)

**InsT 6100 (d5100). Management and Maintenance of Information Technologies.** Introductory course in basic operation of technology tools used in school setting. Includes operation of video equipment, video cameras, Internet sites, CD-ROM, satellite receiving equipment, computer scanners, computer networks, and computer presentation systems. Taught off campus through Utah Education Network. (1 cr) (Arr)

**InsT 6110 (d5010). Information Organization and Management.** Explores functions of information technology including circulation, cataloging, automation tools, and technical services within school library media program. Also considers policies and techniques for facilitating access to information in a school library media center. Taught off campus through Utah Education Network. (3 cr) (F)

**InsT 6150. Communication, Instruction, and the Learning Process.** Examination of learning theory and communication theory, and their implications for instruction. Taught off-campus through EDNET. (3 cr) (Sp)

**InsT 6190 (d5190). Library Media Practicum.** Observation and guided field experience in a library media center under professional library media specialists and instructional technology professionals. Bridge of theory into practice for students seeking certification. This course is required for those having limited or no school library media experience, as evaluated by their faculty advisor. Prerequisites: InsT 6040/5040, 6050/5050; or approval of instructor. (1-6 cr) (F,Sp,Su) ®

**\*\*InsT 6210. Digital Video Disc Design and Production.** Fundamental theories and practice in the design and development of Digital Video Disc (DVD) based instructional resources (3 cr) (F,Su)

**InsT 6240. Instructional Analysis.** Introduces front-end analysis state of instructional design and development. Examines processes for conducting instructional needs assessment, audience analysis, learning environment analysis, and instructional task analysis. Prerequisite: Matriculation into Instructional Technology master's program. (2 cr) (F)

**InsT 6250. Instructional Design.** Examines theory and practice of designing instruction. Emphasizes practical applications of design principles and techniques for creating instructional materials. Prerequisite: Matriculation into Instructional Technology master's program. (2 cr) (F)

**InsT 6260. Learning Theory.** Detailed study of communication and learning theories as applied to the instructional design process. Examines principles and research upon which instructional design and instructional technology are based. Prerequisite: Matriculation into Instructional Technology master's program. (2 cr) (F)

**InsT 6270. Implementation and Management of Instruction.** Focuses on techniques and methods for putting well-designed instruction and training into use in both traditional and nontraditional settings. Prerequisite: Matriculation into Instructional Technology master's program. (2 cr) (Sp)

**InsT 6280. Instructional Evaluation.** Examines theories and implementation of both formative and summative evaluation of instruction. Includes expert and learner feedback, rapid prototyping, and cost analysis. Prerequisite: Matriculation into Instructional Technology master's program. (2 cr) (Sp)

**InsT 6300. Professional Development Seminar.** Geared toward assisting master's students in completing their degrees. Provides continuity from the first semester and encourages continued professional development in the discipline. (1 cr) (F,Sp,Su)

**InsT 6350. Instructional Design Process.** Examines key techniques in design of instruction. Applies principles to specific design problems. Introduces techniques for

developing instructional products according to completed designs. Taught off-campus through EDNET. (3 cr) (F)

**InsT 6360. Computers in Education for In-service Teachers.** Introduction to microcomputer applications in education for in-service teachers. Includes hands-on experiences with range of software tools for design, production, and administration. Taught off-campus through EDNET. (3 cr) (Sp)

**InsT 6370. Design and Development of Computer-Based Instruction.** Overview of computer-based design issues, including interface/screen design, instructional strategy and interaction, and computer program logic. Includes hands-on experience with authoring systems. Taught off-campus through EDNET. (3 cr) (F)

**InsT 6380. Distance Learning—K-12.** Designed for classroom teachers. Discusses technologies and applications of distance education to elementary and secondary school settings. Focuses on instructional strategies for effective teaching and learning at a distance. Taught off-campus through EDNET. (3 cr) (Sp)

**InsT 6390. Planning and Implementation for Technology.** Principles and practice of implementing innovations into real-world settings and evaluating their effectiveness. Taught off-campus through EDNET. (3 cr) (Sp)

**InsT 6400. Resources for Technology.** Acquisition and management of resources for technological innovation: proposal writing, financing of technological change, management of technology resources, and conduct of resource-related projects. Taught off-campus through EDNET. (3 cr) (Sp)

**InsT 6450. Instructional Development.** Application of theory, principles, and practice of instructional technology to the design of instructional products. Prerequisite: Matriculation into Instructional Technology master's program. (2 cr) (F)

**InsT 6460. Distance Education.** Application of theory, principles, and practice, providing instruction to learners separated from the instructor by distance and/or time. Addresses characteristics, technologies, and current issues of distance education. (3 cr) (Sp)

**InsT 6470. Performance Systems.** Application of theory, principles, and practice of organizational systems and human competence in designing performance support systems, job aids, and just-in-time instruction. (3 cr) (F)

**InsT 6480. Instructional Simulations.** Application of theory, principles, and practice of instructional technology in designing model-centered experiential instruction. (3 cr) (F)

**InsT 6490. Instructional Technology in Adult Education.** Application of theory, principles, and practice of instructional technology in providing instruction to adult learners. (3 cr) (Sp)

**InsT 6500. Instructional Development Tools.** Detailed study of processes, tools, and techniques for guiding and aiding the instructional design process. Emphasizes tools for project management, analysis, and design. (3 cr) (Sp)

**InsT 6510. Research and Evaluation in Instructional Technology.** Detailed study of methodologies for needs assessment, product evaluation, validation, and research. Includes methodological models, data collection, and data interpretation for both formative and summative evaluation. (3 cr) (F)

**InsT 6750. Instructional Technology Workshop.** Special training and experience in the latest concepts and innovations in instructional technology. Content changes reflecting the most recent topics and problems facing the profession. (1-4 cr) (Su) ®

**InsT 6770. Practicum in the Improvement of Instruction.** A field-based program focused upon characteristics of effective teaching methodologies, teaching performance, curriculum decision making, value guidelines, and the characteristics of the learner. Taught on demand. (1-4 cr) ®

**InsT 6780. Instructional Technology Programs.** Designed primarily as an in-service experience for teachers, trainers, administrators, and instructional technology personnel to improve local programs and services. Taught on demand. (1-3 cr) ®

**InsT 6790. Instructional Technology in Education and Training.** Offered on request to instructional designers, teachers, administrators, and media personnel who

have special needs related to instructional technology and seek assistance in improving their local programs. (1-3 cr) ®

**InsT 6800. Projects in Instructional Technology.** Guided experience in design and development of instructional products. Includes project management. Prerequisite: InsT 6250 and matriculation into Instructional Technology master's program. (2 cr) (Sp) ®

**InsT 6810. Research Seminar.** Provides opportunity for exchange of ideas by Instructional Technology master's students pursuing a Plan A option. Includes discussion of publications and products. (1 cr) (F,Sp,Su) ®

**InsT 6820. Instructional Technology Design and Development Studio 1.** Provides students with opportunity to work in teams with clients and leaders in the field on cutting-edge design and development projects. Students should plan to spend at least 20 hours per week working on the assigned project. Prerequisite: InsT 6800. (6 cr) (F,Su) ®

**InsT 6870. Current Issues Seminar.** Allows exploration of new cutting-edge topics in the field. Topics vary and are announced the semester prior to registration. Topics may be theory or practice based. (1-3 cr) (arranged) ®

**InsT 6900. Independent Study.** Individually directed study and projects. Prerequisite: Departmental permission. (1-6 cr) (F,Sp,Su) ®

**InsT 6910. Independent Research.** Individually directed research. Prerequisite: Departmental permission. (1-6 cr) (F,Sp,Su) ®

**InsT 6940. Internship.** An on-site experience in which the student applies knowledge and skills in a work environment. Used as culminating experience for the MS, Plan C. (1-6 cr) (F,Sp,Su) ®

**InsT 6960. Creative Project.** Individual experience in instructional product development. May be used as the culminating experience for the MEd and MS Plan C. (1-6 cr) (F,Sp,Su) ®

**InsT 6970. Thesis.** Individual work in MS thesis and Plan B report writing with guidance and criticism. (1-6 cr) (F,Sp,Su) ®

**InsT 6990. Continuing Graduate Advisement.** Allows students access to faculty and facilities to complete graduate thesis, project, and papers. (1-8 cr) (F,Sp,Su) ®

**InsT 7000. Pro-seminar I in Instructional Technology.** Lectures and discussions on advanced topics in instructional technology and related disciplines. Required for Instructional Technology EdS and PhD students. (3 cr) (F)

**InsT 7010. Pro-seminar II in Instructional Technology.** Continuation of InsT 7000. Lectures and discussions on advanced topics in instructional technology and related disciplines. Required for Instructional Technology EdS and PhD students. Prerequisite: InsT 7000. (3 cr) (Sp)

**InsT 7150. Advanced Seminar in Instructional Technology.** In-depth study of various topics including learning theory, instructional design, instructional theory, instructional development tools, production techniques, and instructional applications

in different cultures. Specific topics for each semester will be announced. (3 cr) (F,Sp,Su) ®

**\*InsT 7200. Quantitative and Design Research in Instructional Technology.** Examines current trends, applications, methods, and research questions that are appropriate to the use of quantitative and design research within the field of instructional technology. (3 cr) (F)

**InsT 7300. Qualitative and Interpretive Research in Instructional Technology.** Examines current trends, applications, methods, and research questions that are appropriate to the use of qualitative and interpretive research within the field of instructional technology. (3 cr) (Sp)

**InsT 7450. Internship in Program Evaluation.** Experience in practical aspects of program evaluation through planned, supervised evaluation project. Participation must be approved by student's supervisory committee. (1-4 cr) (F,Sp,Su) ®

**InsT 7460. Internship in Research.** Experience in conducting research through planned, supervised evaluation project. Participation must be approved by student's supervisory committee. (1-4 cr) (F,Sp,Su) ®

**InsT 7820. Practicum in Instructional Technology.** Preparation of project funding proposal for submission to a funding agency. Enrollment limited to Instructional Technology EdS and PhD students only. (2 cr) (F,Sp,Su) ®

**InsT 7870. Current Issues Seminar.** Allows exploration of new cutting edge topics in the field. Topics vary and are announced the semester prior to registration. Topics may be theory or practice based. (1-3 cr) (arranged) ®

**InsT 7900. Independent Study.** Individually directed study and projects. Prerequisite: Departmental permission. (1-6 cr) (F,Sp,Su) ®

**InsT 7910. Independent Research.** Provides for individually directed research. Prerequisite: Departmental permission. (1-6 cr) (F,Sp,Su) ®

**InsT 7920. College Teaching Seminar.** Develops skills and knowledge necessary for college teaching. Activities are designed to help participants in a variety of areas, including instructional development and presentation skills development. (1-3 cr) (arranged)

**InsT 7960. Practicum, Educational Specialist.** Culminating project/externship in partial fulfillment of the Educational Specialist degree. (1-9 cr) (F,Sp,Su) ®

**InsT 7970. Dissertation.** Individual work on research problems in the PhD program. (1-18 cr) (F,Sp,Su) ®

**InsT 7990. Continuing Graduate Advisement.** Allows graduate students access to faculty and facilities to complete graduate dissertation. (1-9 cr) (F,Sp,Su) ®

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\*Taught 2002-2003.

\*\*Taught 2003-2004.

<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

# *Intensive English Language Institute*

## *College of Humanities, Arts and Social Sciences*

**Director: Associate Professor** *Franklin I. Bacheller*  
Office in Main 067, (435) 797-2081

**Assistant Director: Associate Professor** *Glenda R. Cole*  
Office in Main 067, (435) 797-2081

**Associate Professors** *James E. Bame, Susan Carkin, Lee Ann Rawley, James R. Rogers II, Thomas J. Schroeder*; **Assistant Professor** *Ann E. Roemer*; **Temporary Lecturer** *Karen Hilgeman*

### **Objectives**

The Intensive English Language Institute (IELI) is an academic program in the College of Humanities, Arts and Social Sciences. IELI teaches international students, residents, and refugees the English skills and cultural knowledge they need to be successful university students. IELI also trains international teaching assistants (ITAs) for USU. Information about the ITA training is available through the School of Graduate Studies.

The IELI program accepts students seeking a degree at Utah State University, as well as students who want to study English for personal or professional reasons. Students studying English *only* must meet admission requirements comparable to requirements for undergraduate degree-seeking students.

Undergraduate students who apply to USU without a TOEFL score of at least 173 computerized or 500 paper/pencil and graduate students applying without a minimum TOEFL score of 213 computerized or 550 paper/pencil must take the IELI Placement Examination, given the first day of each semester, including the first day of the IELI summer session. Based on the examination results, students will be required to study in the IELI or exempted from further study and permitted to take classes in their major fields.

### **Curriculum**

Four levels of study are offered each semester. The ability levels of classes range from elementary through advanced. Several of the level 1 and 2 classes are combined into multilevel classes. Classes focus on listening, speaking, reading, writing, and cultural skills. In addition, there are topics courses, covering topics ranging from current events and the environment to academic literacy and the cultures of the U.S. through literature and film. Students must complete one topics course for every level they study in the IELI program.

Students advance from one level of a class to the next higher level by obtaining a grade of C- or higher in the lower-level class. Students who do not obtain a C- or higher in a class must repeat the class. Students who complete all level 4 classes with a C- or higher may begin taking courses outside of IELI. Students at level 4, who have less than a full course load remaining in IELI, may take major field courses. The total number of IELI credits and major field credits taken during a semester may not exceed 16. Exceptions to this policy must be approved by the director of IELI in consultation with students' major field advisors.

### **Credit for Intensive English Study**

Classes in IELI carry academic credit. Full-time students at each level take 18 credits per semester. A student who begins IELI at level 1 and progresses to level 4 may earn a total of 72 undergraduate elective credits. While all the credits will appear on a student's transcript, a maximum of 18 can be counted toward graduation. Application of the 18 credits will be determined by the student's college and major department. Students must, therefore, meet with their departmental advisors to determine the role of IELI credits in their graduation requirements.

### **Area Studies Certificate**

The Intensive English Language Institute administers a College of Humanities, Arts and Social Sciences area studies certificate in Communicating Across Cultures. This certificate program is designed to prepare students to work and live in the global community. Students, both international and American, gain cross-cultural experience within an academic framework by taking language and culture-related classes which broaden and enhance applied cross-cultural experiences. For more information, contact the Intensive English Language Institute.

### **Services**

New students in IELI take the Placement Examination and attend an orientation meeting prior to the beginning of each semester. All students are assigned an advisor in IELI who helps them with various difficulties they may encounter. In addition, all the services and privileges offered to students on campus are available to IELI students. These services include health care services, recreational opportunities, and numerous special programs for international students.

## ***Intensive English Language Institute Courses (IELI)***

**IELI 1210. Reading.** Multilevel course designed to build basic and intermediate-level reading skills. Students read texts individually and collaboratively. Focuses on active reading (i.e., making use of background knowledge, predicting, and critically assessing reading passages). When enrollment permits, class is divided into separate sections for level 1 and level 2. Repeatable for credit for students who placed at basic level on IELI placement exam. (3 cr) (F,Sp,Su) ®

**IELI 1220. Writing from Sources.** Multilevel course focusing on sentence and paragraph writing. Students gather information from various sources, transform and organize it, and present it in both verbal and written form. When enrollment permits, class is divided into separate sections for level 1 and level 2. Repeatable for credit for students who placed at basic level on IELI placement exam. (3 cr) (F,Sp,Su) ®

**IELI 1230. Cross-Cultural Talk Low-Intermediate.** Multilevel course designed to improve oral communication through one-on-one conversation, small group work, and short presentations. Emphasizes interactive language fluency. Repeatable for credit for students who placed at basic level on IELI placement exam. (3 cr) (F,Sp,Su) ®

**IELI 1240. Integrated Skills.** A multi-level course designed to develop intermediate language learning skills through content-based instruction. Repeatable for credit for students who placed at the basic level on the IELI placement exam. (6 cr) (F,Sp,Su) ®

**IELI 2310. Comprehending Authentic Texts.** Introduction to listening and reading strategies focusing on organization and information. Develops strategies for listening to authentic passages, such as news, documentaries, etc., and for reading general periodicals and Internet articles. (3 cr) (F,Sp,Su)

**IELI 2320. Writing from Authentic Texts.** Assists students in developing more sophisticated writing skills, from more complex sentences to coherent paragraphs and various kinds of compositions. Students learn to use the library and the Internet to find resources for their writings. (3 cr) (F,Sp,Su)

**IELI 2330. Cross-Cultural Talk High-Intermediate.** Emphasizes interpersonal communication in conversational tasks with American teaching fellows. Focuses on negotiation of meaning, attending, comprehending, and self-expression in informal and academic settings. (3 cr) (F,Sp,Su)

**IELI 2340. Spoken Discourse for Second Language Learners.** Focuses on communicating one's intentions. After speaking extemporaneously on various general and academic topics, students are critiqued for comprehensibility, grammaticalness, and pronunciation. (3 cr) (F,Sp,Su)

**IELI 2360. Reading in Authentic Texts.** Introduces strategies for reading several genres typical of university assignments, including excerpts from textbooks in sev-

eral disciplines and popular magazine articles having academic value. Brief overview of scholarly journals. Introduction to strategies and exercises for vocabulary development. (3 cr) (F,Sp,Su)

**IELI 2410. Listening and Reading for Academic Purposes.** Develops strategies for understanding language of university classrooms and academic texts. Focuses on information processing. Students listen to planned and unplanned academic discourse and read related academic texts. (3 cr) (F,Sp,Su)

**IELI 2420. Writing from Academic Sources.** Introduction to various academic writing demands. Students gather information from various sources, including interviews, surveys, and academic texts (textbooks, journals, etc.); analyze and summarize the information; and write documented essays and reports. (3 cr) (F,Sp,Su)

**IELI 2430. Cross-Cultural Perspectives of American Culture.** Provides understanding of what culture is and how it influences behavior and beliefs. Provides cross-cultural perspective on American value system and American institutions. (3 cr) (F,Sp,Su)

**IELI 2440. Academic Discourse.** Designed to assist students in developing oral competency, with emphasis on comprehensibility in interpersonal and academic settings. Students perform tasks individually and in small groups. (3 cr) (F,Sp,Su)

**IELI 2450. Topics for ESL.** Introduction to contemporary topics in culture and language. Focuses on language development through content-based instruction. Repeatable for up to 12 credits. (3 cr) (F,Sp,Su) ®

**IELI 2460. Reading from Academic Sources.** Focuses on processes and strategies for a variety of academic and disciplinary genres; strategies for learning from lengthy and complex texts; and vocabulary, speed, and comprehension development. (3 cr) (F,Sp,Su)

**IELI 7920. College Teaching Seminar.** Workshop designed for international students who will hold teaching assistantships at the University. To be accepted into the workshop, students must take a qualifying language test. (1-3 cr) (F,Sp) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

# *Interdisciplinary Studies Major*

**Contact:** Office of the Provost, Main 142, (435) 797-1706

**Advising:** Science/HASS Advising Center, Student Center 302, (435) 797-3883

**Degrees offered:** Bachelor of Science (BS) and Bachelor of Arts (BA)

## *Objectives*

The organization of academic departments and their associated degree programs reflects the history and traditions of study in those fields. The Interdisciplinary Studies major is intended to serve the needs of students who want to design a unique individualized academic program, obtain a broadly-based education, and diversify their professional potential. The degree is not intended to replace existing majors or curricula. Rather, it is designed to provide the small number of students whose degree needs cannot be met with other majors with a program which is less restrictive and more responsive to their individual plans and interests. Students who complete their programs will receive the Bachelor of Science or (if they meet the language requirement) the Bachelor of Arts degree. The degree cannot be used as part of a dual major.

## *Application*

Students may apply for admission to the Interdisciplinary Studies program after completing a minimum of 45 credits. Students who wish to pursue this degree must submit a letter of application which must include the following information: (1) a clear statement of the student's educational objectives, (2) a proposed program of study which includes the specific courses, and (3) a brief statement explaining why the program is worthy of a college degree. A current transcript must also be included.

The application will be reviewed in the Provost's Office to determine (1) that the proposal represents a coherent and carefully planned program of study and (2) that space is available in the

courses proposed for the program. After approval, the Provost's Office will forward the application to an advisor in the Science/HASS Advising Center who will assist the student in completing the program.

## *Requirements*

With guidance and approval from a faculty advisor, the student selects and completes at least 45 credits of coursework for the major. Courses used to meet the 45-credit requirement may come from any department with the following restrictions:

1. At least 24 of the 45 credits in the major must be taken at the 3000 level or above.
2. Courses used for the major must include at least 15 credits each from two different academic disciplines.
3. The selection of the courses in the major must focus on an overarching theme and be consistent with the student's educational and career goals.
4. As part of the 45 credits, the student must complete a 3-credit senior project.
5. Courses used for University Studies may not be counted toward the 45 credits.
6. Students must pass every course approved in the program of study and earn a composite GPA of at least 2.0 in the 45 credits of courses used for the major.

# International Studies Major and Minor

**Contact:** Office of the Provost, Main 142, (435) 797-1706

**Advising:** Science/HASS Advising Center, Student Center 302, (435) 797-3883

**Degrees offered:** Bachelor of Arts (BA), Joint BA with Disciplinary Major

## Overview

Students majoring in International Studies select one of two tracks. The **Breadth Track** is intended for students who want a broad exposure to international studies. Students must take 24 credits of core and elective courses, complete a departmental minor, complete three years of language study, spend at least eight weeks living in a foreign country, and complete a senior project. Students who complete their programs will receive the Bachelor of Arts degree.

The **Depth Track** is pursued as part of a joint major and is intended for students who want to tie their disciplinary skills to an in-depth study of a particular area of the world. Requirements are similar to those for the Breadth Track, except that courses, study abroad, the senior project, and the disciplinary major must be structured to complement one another. Students who complete their programs will receive a joint Bachelor of Arts degree in International Studies *and* the disciplinary major.

The **International Studies minor** requires 12 credits of international studies courses and one year of language study.

## Requirements

**Breadth Track Major.** This track of the International Studies major is intended for students who want breadth in their undergraduate studies. Requirements are as follows:

1. Completion of 24 credits, including 12 credits of international studies core courses and 12 credits of international studies electives. At least 12 of the 24 credits must be at the 3000 level or above. A list of international studies core and elective courses may be obtained from the Provost's Office or from the Science/HASS Advising Center in SC 302.
2. Completion of a departmental minor (other than a foreign language minor).
3. Three years (22 credits) of foreign language study or demonstration of equivalent proficiency.
4. A minimum of eight weeks living in a foreign country or countries. To qualify, this experience should assist the student in meeting the educational goals of the proposed program of study.
5. Completion of a senior project focusing on international issues or problems relating to one or more foreign countries. (Three credits are allowed for the senior project.)
6. Passing grade received in every course approved for the program of study and composite GPA of at least 2.5 in the major.

**Depth Track Major.** This track of the International Studies major is pursued as part of a joint major. It is intended for students desiring to tie their disciplinary skills to an in-depth study of a particular area of the world. For example, by completing both sets of requirements, a student could obtain a BA in Economics and International Studies. Requirements are as follows:

1. Completion of 24 credits, including 12 credits of international studies core courses and 12 credits of international studies electives. At least 12 of the 24 credits must be at the 3000 level or above. A list of international studies core and elective courses may be obtained from the Provost's Office or from the Science/HASS Advising Center in SC 302.
2. Three years (22 credits) of study in a single foreign language or demonstration of equivalent proficiency.
3. A minimum of eight weeks living in a country where the chosen foreign language is spoken. To qualify, this experience should enhance the student's understanding of her or his major discipline.
4. A senior project involving both the student's discipline and the country selected by the student in requirement #3. (Three credits are allowed for the senior project.)
5. With the exception of language credit, no double counting of courses is allowed between the disciplinary and the International Studies majors.
6. Passing grade received in every course approved for the program of study and composite GPA of at least 2.5 in the major.

**Minor.** Requirements for the International Studies minor are as follows:

1. Completion of 12 credits of international studies core courses. A list of international studies core courses may be obtained from the Provost's Office or from the Science/HASS Advising Center in SC 302.
2. One year (8 credits) of foreign language study or a demonstration of equivalent proficiency.
3. With the exception of language credit, no double counting of courses between the disciplinary major and the international studies minor is allowed.
4. Passing grade in every course approved for the program of study.

## Department of

# Journalism and Communication

## College of Humanities, Arts and Social Sciences

**Head: Professor Edward C. Pease**, journalism, media criticism  
Office in Animal Science 310, (435) 797-3292

**Assistant Head: Associate Professor Penny M. Byrne**, broadcasting, media law  
Office in Animal Science 108A, (435) 797-3289

**Graduate Program Coordinator: Assistant Professor Michael S. Sweeney**, print journalism, media history  
Office in Animal Science 311

**FAX** (435) 797-3973

**E-mail** tpease@cc.usu.edu

**WWW** <http://www.usu.edu/communic/>

**Associate Professor Brenda Cooper**, gender and mass media; **Associate Professors Emeritus Scott A. Chisholm**, media management, literary journalism; **James O. Derry**, international mass communication development; **Assistant Professors Cathy F. Bullock**, communication theory and research methodology; **Nancy M. Williams**, print journalism, Internet; **Adjunct Professor Alan M. Hofmeister**, video, new media; **Professional-in-Residence Dean Byrne**, broadcast and electronic media; **Adjunct Instructors Tim Vitale**, public relations; **Jay C. Wamsley**, print journalism; **Temporary Lecturers Emmanuel E. "Emeka" Nneji**, public relations; **Les A. Roka**, public relations

**Degrees offered:** Bachelor of Science (BS) and Bachelor of Arts (BA) in Journalism; Master of Science (MS) and Master of Arts (MA) in Communication

**Undergraduate emphases:** Broadcast/Electronic Media, Media Studies, Print Journalism, Public Relations/Corporate Communications

**Graduate specializations:** Print, Photo, and Broadcast Journalism; Public Relations/Corporate Communications

## Undergraduate Programs

### Objectives

The undergraduate major in the Journalism and Communication Department, leading to the Bachelor of Arts or the Bachelor of Science degree in Journalism, is designed to prepare students for careers in a wide range of communication fields, through instruction in the philosophical groundings, theoretical perspectives, and hands-on applications of communications skills and practice. The curriculum integrates practical mass communications skills training with critical thinking skills, while helping students to understand the processes and effects of communication, as well as the relationships, roles, and interactions of mass communication with other social institutions.

With individual student objectives in mind, the Department of Journalism and Communication offers a flexible program of study having the following goals:

1. Provide students with theoretical and practical understanding of the workings of mass communication principles and practice.
2. Provide students with abilities and practical skills required to work in communications professions.
3. Provide students with a grounding in the philosophical, ethical, and legal frameworks of mass communication, as well as an understanding of the roles and responsibilities of mass communication in a democratic society.

4. Develop in students critical thinking and analytical abilities, facility in social science research methods, and strong written and oral communication skills, within a broad liberal arts context.

The Department of Journalism and Communication maintains professional studios and labs, designed to train students in various communications and journalism skills. These include the multimedia computer newsroom, a video preproduction studio, a full TV studio, and a photographic darkroom. Students receive instruction in traditional journalistic basics, such as writing, information-gathering, reporting, and video production; in new technologies of on-line information gathering; and in critical skills of media literacy.

### Requirements

**Course Requirements.** Journalism majors must complete a minimum of 30 credits and a maximum of 36 credits in Journalism and Communication courses, while pursuing one of the four emphasis course sequences outlined below. Of the 120 semester credits required for graduation from Utah State University, Journalism majors must complete at least 65 credits in other departments within the College of Humanities, Arts and Social Sciences. In addition, majors must complete a minor/cognate area outside of the Journalism and Communication Department, selected with the approval of an advisor.

Therefore, the basic Journalism course of study is as follows: Journalism and Communication courses, 30-36 credits; University Studies courses, 30 credits; courses in the minor/cognate area, 18 credits; electives from outside the Journalism and Communication Department, 36-40 credits; **Total Credits, 120.**

**Major Status.** Students may apply for major status upon completion of a minimum of 60 semester credits, including the Journalism Premajor Core requirements, while maintaining a 2.5 cumulative GPA. Students may declare themselves as Journalism Premajors at any time after their admission to the University. Majors must maintain a minimum 2.5 GPA, both overall and in the major. Students whose GPA drops below 2.5 will be placed on probation and may be dropped from the major if grades do not improve within one semester. No Journalism and Communication class may be repeated more than once. All courses in the major must be taken for a grade (not *Pass-Fail*). Courses must be taken in sequence.

Students transferring from other institutions may be accepted into the major if they fulfill these requirements. Up to 9 transferred semester credits may count toward the major, if approved by an advisor.

**Premajor Core Requirements (9 credits).** The following courses are required for all majors, and must be completed prior to application for major status: JCom 1000, 1110, and 2000. Prior to taking JCom 1110, students must complete Engl 1010, a language proficiency test, and a typing test. Majors must complete each of the premajor requirements with a *C+* or better.

**Major Requirements (6 credits).** The following courses are required for all majors after acceptance into the department: JCom 2110, 4000, and 4030. Premajor core and individual course prerequisites must be taken prior to taking these courses. Prior to taking JCom 2110, students must complete JCom 1110 with a grade of *C+* or higher. Senior standing is required for enrollment in JCom 4000. Junior standing or permission of the instructor is required for enrollment in JCom 4030.

**Emphasis Area.** Each student must select one of the following emphasis areas: Broadcast and Electronic Media, Media Studies, Print Journalism, or Public Relations/Corporate Communications.

**Other Communications Electives.** In addition to the Pre-major, major, and emphasis area courses listed above, students must select additional electives from courses in the Department of Journalism and Communication, to ensure a total of 30-36 credits completed in the Journalism and Communication Department.

### ***Journalism Minor***

Students may select a minor of 18 credits in Journalism and Communication courses, including at least 9 credits in upper-division courses, with advisor approval. All minors must take JCom 1110. GPA requirements are the same as those required for majors.

### ***Financial Support***

In addition to general scholarships and other financial support opportunities available through the University and the College of Humanities, Arts and Social Sciences, the Department of Journalism and Communication awards various scholarships to juniors, seniors, and graduate students. For a listing of scholarships, deadlines, and application requirements, contact the Department of Journalism and Communication. In addition, many professional paid and unpaid internships are available through the department.

### ***Careers in Journalism and Communication***

Journalism majors often begin their careers in various media professions, such as newspapers, radio and TV broadcasting, and public relations, many serving as interns while still attending school. Upon graduation, they land jobs in a variety of capacities for both journalism businesses and other industries requiring workers with excellent communication and problem-solving skills. In recent years, USU journalism students have routinely swept state, regional, and national competitions in print and video journalism, multimedia and new technologies, and, increasingly, public relations.

This success translates into an excellent reputation for USU students among businesses hiring USU students as interns and hiring USU graduates for professional positions. Jobs held by recent graduates include newspaper and magazine reporter, photographer, graphic artist, and editor; radio and television reporter, anchor, and producer; public relations director and account executive; multimedia software designer for HTML, web pages, CD-ROMs, etc.; and public information officer for politicians, legislative and lobbying groups, sports teams, and colleges, as well as for environmental organizations and other groups in the business and public sectors. Training and expertise in communication, including writing and reporting, visual literacy, publication layout and design, computer graphics, and on-line applications, prove to be valuable add-on skills for graduates entering a variety of occupations or going on to graduate school and law school.

In addition to these kinds of opportunities enjoyed by undergraduates, master's degree graduates often return to communication careers in new capacities, or teach at the community college level in journalism and communication departments.

### ***Additional Information***

For further information about publications, curriculum, faculty, and other program offerings, including USU's TV studio facilities, weekly newscasts and TV programs, and the Media and Society Lecture Series, check out the Journalism and Communication Department's website: <http://www.usu.edu/commnic/>.

## ***Graduate Programs***

The Master of Science (MS) and the Master of Arts (MA) degrees in Communication combine professional practice and theoretical training, and are designed to fit individual student needs. Students may specialize in broadcast/electronic journalism, media criticism, public relations/corporate communications, or print journalism. Application to the graduate program is made through the USU School of Graduate Studies.

### ***Objectives***

The master's program in Communication at Utah State University offers a two-track approach to graduate study, designed for the maximum individual flexibility in pursuit of the student's goals.

The Plan A, also known as the "Thesis Option" or "Media Research," is a course of study designed for students considering or planning to go on to a doctoral program. The Plan A option requires more coursework in theory and methodology, as well as in research tools, in order to provide grounding for advanced study at the PhD level, whether in communication or another discipline. This option also requires completion of a master's thesis, consisting of original research.

The Plan B, also known as the “Professional Option” or “Media Practice,” is designed for students seeking the master’s degree as a terminal degree, and planning to go from USU into the mass media professions, or into a teaching position at the junior college level. Typically, Plan B students are mid-career media professionals seeking retooling, refreshers, or credentials for community college teaching. The Plan B option requires a professional project, approved by a major professor, in place of the research thesis.

In either case, graduate students in Communication work closely with advisors throughout their programs to design coursework and a research or professional activity agenda, along with appropriate study in a cognate area outside of Communication, that will permit them to achieve their individual goals, within the core framework of Communication coursework, whether they include professional training or additional doctoral work.

### **Admission Requirements**

For admission to the graduate program in Communication, all students must complete the department’s English Language Proficiency Examination, and must complete or demonstrate competency in the following Communication foundation courses: JCom 1110, 3110, 4020, and 4030. Competency may be demonstrated through previous coursework or experience, and one or more of these requirements may be waived with permission of the graduate program coordinator. These credits do not count toward the graduate degree. In addition, other undergraduate courses may be required.

### **Degree Requirements**

Students may elect either the Plan A (thesis) or the Plan B (professional) option to fulfill the degree requirements of 30 semester credits as outlined below. Plan A is intended for students planning to continue graduate study, to teach, or to enter professions requiring research skills. Plan B is intended for students seeking a terminal professional degree. Selection of either the Plan A or Plan B option must be made in consultation with the student’s advisor and filed with the graduate coordinator by the end of the first semester of study.

All students must complete core requirements in either plan. Students must, in consultation with their advisor, select an appropriate research tools class in research methods; the course need not be taught by the Journalism and Communication Department. To remain in good standing, all students must fulfill Graduate School requirements.

#### **Plan A: Media Research**

**Core Requirements (21 credits).** All students must complete the following courses: JCom 6000 (3 cr.), 6020 (3 cr.), 6040 (3 cr.), 6400 (3 cr.), and 6970 (6 cr.). In addition, students must select an appropriate 3-credit Research Tools course (from any department), providing methodological training most appropriate for the student, in consultation with the advisor.

**Journalism and Communication Electives (6 credits).** Students must select two of the following courses: JCom 6010, 6030, 6050, 6410, and 6420.

**Cognate Area (6 credits).** With advisor permission, students may include additional Journalism and Communication electives.

#### **Plan B: Media Practice**

**Core Requirements (18 credits).** All students must complete the following courses: JCom 6000 (3 cr.), 6020 (3 cr.), 6040 (3 cr.), 6400 (3 cr.), and 6500 (3 cr.). In addition, students must select an appropriate 3-credit Research and Practice course, in consultation with their advisor. A Research Tools course (from any department), providing methodological training most appropriate for the student, must also be selected in consultation with the advisor.

**Journalism and Communication Electives (6 credits).** Students must elect either *Option 1* or *Option 2*, as described below:

*Option 1.* Select two courses from the following: JCom 6010, 6030, 6050, 6110, 6300, 6310, 6320, and 6420.

*Option 2.* Select one course from the following: JCom 6010, 6030, 6050, 6110, 6300, 6310, 6320, and 6420. Also, select one course from the following: JCom 6210, 6220, and 6230 (other courses may be substituted for these, with advisor approval).

**Cognate Area (9 credits).** With advisor permission, students may include additional Journalism and Communication electives.

### **Additional Information**

For more information about graduate studies in the Department of Journalism and Communication, contact the Graduate School or the Department of Journalism and Communication. Also, check out the departmental website at:

<http://www.usu.edu/communic/>.

## **Journalism and Communication Courses (JCom)**

**JCom 1000 (BSS). Introduction to Mass Communication.** History, philosophy, structures, and functions of the mass media (newspapers, magazines, TV and radio, advertising, and public relations) and their intersection with other social institutions. Media economics and the impacts of new technologies on media institutions and society. (3 cr) (F,Sp)

**JCom 1010. Introduction to Women’s Studies.** Survey course covering fundamentals of women’s studies. Explores women’s diverse experiences, perspectives, and contributions to society and its institutions. Examines cultural beliefs and stereotypes concerning women’s roles in society. Reviews feminist theory, socialization, ideology, and history of women’s movement. (3 cr) (F)

**JCom 1110. Beginning Newswriting for the Mass Media.** Techniques of writing news for various media. News values, philosophy, and practice. Elementary news-gathering and interviewing skills. Practice in various newswriting forms. Structures of the news industries and work place. Prerequisites: Engl 1010 or equivalent, English Proficiency Test, and typing test. (3 cr) (F,Sp,Su)

**JCom 2000 (BSS). Media Smarts: Making Sense of the Information Age.** Critical analysis of the roles and performance of mass media content and messages, and their influence on society. Emphasizes critical reading of news, entertainment, and advertising content regarding women, minorities, children, and other groups. Basic mass media ethics and law. (3 cr) (F,Sp)

**JCom 2080. Introductory Communication Internship.** Lower-division, on-line internship for sophomores exploring media-related work experiences. Permission of department head required. (1-2 cr) (F,Sp,Su)

**JCom 2110 (CI). Introduction to On-line Journalism.** Use of interactive computer networks, databases, and other electronic resources for news reporting and writing. Practice in research and information evaluation for news stories and features in news and public relations contexts. Prerequisite: Minimum grade of C+ in JCom 1110. (2 cr) (F,Sp)

**JCom 2120 (CI). Reporting Public Affairs.** Theory and practice of reporting public affairs, community news, and features. Emphasizes advanced news gathering techniques, understanding local political structures, news and feature writing skills, interviewing, media law, ethics, and cultural sensitivity. Prerequisite: Minimum grade of C+ in JCom 1110. (3 cr) (F,Sp)

**JCom 2150. Beginning Photojournalism.** Theory and practice of photojournalism. Roles and functions of photographic images in the news media, both print and electronic. Practice in use of cameras and in darkroom techniques. Students furnish cameras and some materials. Prerequisite: Art 2800 or permission of instructor. (3 cr) (F,Sp)

**JCom 2200. Introduction to Video Media.** Introduction to the theories and practice of video production and functions in broadcasting and the electronic mass media, including concepts, techniques, and impacts of various video approaches. Prerequisite: Minimum grade of C+ in JCom 1000. (3 cr) (F,Sp)

**JCom 2210. Writing for Electronic Media.** Theory and practice of reporting public affairs for broadcast and electronic media. Emphasizes news gathering, understanding local political structures, news and feature writing, commercial and continuity writing, interviewing, media law, ethics, and cultural sensitivity. Prerequisites: Minimum grades of C+ in JCom 1110 and C in JCom 2200. (3 cr) (F,Sp)

**JCom 2300. Introduction to Public Relations.** Survey of theories and practice of public relations in a variety of business, corporate, governmental, and nonprofit organizational settings. Elements of promoting organizational messages and communicating with various publics. Prerequisites: Minimum grades of C+ in JCom 1000 and 1110. (3 cr) (F,Sp)

**JCom 2310 (CI). Writing for Public Relations.** Theory and practice of information-gathering for public relations, including basic news releases, features, speeches, annual reports, newsletters and brochures, broadcasting, and other forms. Emphasizes advanced news gathering techniques, interviewing, media law, ethics, and cultural sensitivity. Prerequisites: Minimum grades of C+ in JCom 1110 and C in JCom 2300. (3 cr) (F,Sp,Su)

**JCom 3010. Communication Research Methods.** Analysis of communication theories and their application in research settings. Basics of communication research methods and analysis of research results in mass media and public relations contexts. (3 cr) (F,Sp)

**JCom 3110 (CI). Beyond the Inverted Pyramid.** Theory and practice of longer literary forms for newspapers and magazines. Feature writing, investigative and interpretive journalism, emphasizing advanced information-gathering and writing skills, analysis of audiences, and markets. Prerequisite: Minimum grade of C in JCom 2120 or permission of instructor. (3 cr) (Sp)

**JCom 3120 (CI). Copy Editing and Publication Design.** Editing and preparation of news stories and artwork for publication. Principles and practice of publication layout and design. Prerequisite: Minimum grade of C in JCom 2120, 2210, or 2310; or permission of instructor. (3 cr) (F,Sp)

**JCom 3140 (DSS). Opinion Writing.** Study and practice of persuasive editorial and opinion writing for the mass media. (3 cr) (F,Sp)

**JCom 3300 (DSS). Corporate Communications.** Theory and practice of communication processes and techniques to connect both internal and external constituencies in business and organizational settings. Emphasizes communication theories and measurement of effectiveness of various strategies. Prerequisites: Minimum grades of C in JCom 2300 and 2310. (3 cr) (F,Sp)

**JCom 3400 (DSS). Gender and Communication.** Processes through which various forms of communication create gender roles and ideals for women and men, resulting in different gender-based communication patterns. Social implications and emphasis on gender in media professions. (3 cr) (F,Sp)

**JCom 3410 (DSS). Film as Cultural Communication.** Analysis of the economic, ideological, political, and cultural constraints influencing film content. How written texts are changed or distorted when translated into film. (3 cr) (F,Sp)

**JCom 4000. Senior Seminar in Mass Communication.** Capstone seminar required of all majors. Includes small discussion groups to pull together and synthesize experiences of students in all concentrations. Examination of fundamental mass communication issues. Preparation for mass media careers. Prerequisite: Senior standing. (1 cr) (F,Sp)

**JCom 4010 (DSS) (d6440).<sup>1</sup> Mass Communication Ethics.** Study of ethical systems and philosophies and their applications to the practice of mass communication. (3 cr) (Sp)

**JCom 4020 (DSS). Mass Media and Society.** Study of theories and practice of the impact of mass media in conjunction with other social institutions: political, social, cultural, ideological, economic, and religious. (3 cr) (F,Sp)

**JCom 4030 (DSS) (d6430). Mass Media Law.** Principles and theories of constitutional and case law governing the mass media, including libel and privacy, copyright, press freedom, broadcast regulation, and press responsibility. (3 cr) (F,Sp)

**JCom 4110 (CI). Computer-Assisted Reporting.** Advanced computer-based investigative and in-depth information-gathering and newswriting, including intensive use of computer databases to collect and analyze data. Prerequisite: Minimum grade of C+ in JCom 2120 or 2210 or 2310 or permission of instructor. (3 cr) (F)

**JCom 4120 (CI). Sports Writing.** Information-gathering and writing of news and feature stories about sports for print and electronic mass media. Prerequisite: Minimum grade of C+ in JCom 2120 or 2210 or 2310, or permission of instructor. (3 cr) (F,Sp)

**JCom 4150. Advanced Digital Photojournalism.** Advanced lab work in the use of cameras and photographic production techniques, photo imaging, and manipulation. Concludes with student exhibition of work. Prerequisite: Minimum grade of C+ in JCom 2150 or permission of instructor. (3 cr) (Sp)

**JCom 4210 (CI). Newscast I.** Basics of electronic newsgathering and writing for electronic news media. Use of electronic video equipment for creation of on-air newscast and other visual news materials. Prerequisite: Minimum grade of C in JCom 2200. (3 cr) (F,Sp)

**JCom 4220 (CI). Newscast II.** Newsroom organization and practice in electronic and video news production, including directing and producing, writing for video news, use of studio equipment, use of video production equipment, staff management, and control room operations. Prerequisite: Minimum grades of C in JCom 2210 and 4210. (3 cr) (F,Sp)

**JCom 4230. Corporate Video.** Project-based lab work in studio video productions for real-world clients. Use of video field equipment and production facilities. Completion of video packages. Prerequisites: Minimum grade of C in JCom 1000, 1110, and 2000; or permission of instructor. (3 cr) (F,Sp)

**JCom 4500. Projects in Communication.** Individualized directed study in communication topics, based upon student proposal to instructor. Prerequisite: Permission of instructor. Repeatable for up to 6 credits. (1-5 cr) (F,Sp,Su) ®

**JCom 4510. Communication Internship.** Supervised, real-world training and practice in communication work places, including news and business environments. Prerequisite: Permission of instructor. Maximum of 6 credits may count toward the student's major. (1-3 cr) (F,Sp,Su) ®

**JCom 4520H. Senior Thesis.** Planning and execution of an in-depth research paper or project, as approved by the instructor, culminating in a formal public presentation. Required of all journalism and communication students for graduation in Honors Program. Students must also complete Honr 4800H. (1-3 cr) (F,Sp)

**JCom 4530. Special Topics in Communication.** Advanced study in specialized communication topic areas. A maximum of 5 credits may be applied toward the major. (3 cr) (F,Sp,Su) ®

**JCom 5010 (d6010). Mass Media Historiography.** Survey of the history and development of the mass media, and their influence on other social institutions. Theory and practice of historical research, with heavy emphasis on use of databases, archival, and other primary sources to conduct original historical research. (3 cr) (F,Sp)

**JCom 5020 (d6020). Mass Communication Theory.** Advanced study of major mass communication theories and issues, and their evidence in case studies. Application of theory to significant societal problems. (3 cr) (F)

**JCom 5030 (d6030). International Communications Problems.** Study of mass communication influences and effects within and between nations. Systems and techniques of mass communication as functions of national identity and development. (3 cr) (F,Sp)

**JCom 5110 (CI) (d6110). Literary Journalism.** In-depth analysis and practice of literary and stylistic elements of long-form journalistic and other nonfiction writers. (3 cr) (F)

**JCom 5210 (d6210). Multimedia.** Principles and practice of producing interactive, computer-based multimedia products in various forms (CD-ROM, Internet), combining text, full-motion video, and sound for news and business clients. Prerequisite: Permission of instructor. (3 cr) (Sp)

**JCom 5220 (d6220). Advanced Video Production.** Training and practice in advanced techniques of video production, including computer graphics generation, non-linear video editing, and other specialized professional techniques for electronic video materials. Prerequisite: Minimum grade of C in JCom 4220 or 4230 or permission of instructor. (3 cr) (F)

**JCom 5230 (d6230). Advanced Video Documentary Production.** Advanced production of long-form video productions and packages, including writing scripts, directing and production, control room applications, and advanced video production techniques. Prerequisite: Minimum grade of C in JCom 4220 or 4230 or permission of instructor. (3 cr) (Sp) ®

**JCom 5300 (CI) (d6300). Public Relations Agency I.** Hands-on experience in public relations and corporate image maintenance. Strategies for organizational positioning and use of mass media in furthering corporate objectives. Prerequisite: Minimum grade of C in JCom 3300. (3 cr) (F,Sp)

**JCom 5310 (d6310). Mass Media Management.** Examines theories, methods, and practice of management of mass media businesses, including personnel, marketing, and market positioning. Prerequisite: Permission of instructor. (3 cr) (F,Sp)

**JCom 5320 (d6320). Public Relations Agency II.** Advanced public relations agency management skills. Prerequisite: Permission of instructor. (3 cr) (F,Sp)

**JCom 5400 (d6400). Mass Media Criticism.** Critical analysis of mass media content, emphasizing the media's social, cultural, and political impacts. Use of advanced research techniques. Prerequisite: Permission of instructor. (3 cr) (Sp)

**JCom 5410 (d6410). Gender and the Mass Media.** Examines the nature of gender-based images in a variety of mass media, from advertising to magazines, television, and film. Analysis of gender stereotypes and portrayals in news and entertainment media, along with resulting social impacts. Prerequisite: Permission of instructor. (3 cr) (F,Sp)

**JCom 5420 (d6420). The Mass Media and Politics.** Examination of the role of the mass media in the political process, including both campaigns and governance. Examination of political advertising, news coverage, polling, opinion formation strategies, and politicians' use of new media technologies. (3 cr) (F)

**JCom 6000. Introduction to Graduate Study in Mass Communication.** Overview of mass communication theories and research methodologies designed to prepare the student for the graduate course of study and to assist in planning research agenda. (3 cr) (F)

**JCom 6010 (d5010). Mass Media Historiography.** Survey of the history and development of the mass media, and their influence on other social institutions. Theory and practice of historical research, with heavy emphasis on use of databases, archival, and other primary sources to conduct original historical research. (3 cr) (F,Sp)

**JCom 6020 (d5020). Mass Communication Theory.** Advanced study of major mass communication theories and issues, and their evidence in case studies. Application of theory to significant societal problems. (3 cr) (F)

**JCom 6030 (d5030). International Communications Problems.** Study of mass communication influences and effects within and between nations. Systems and techniques of mass communication as functions of national identity and development. (3 cr) (F,Sp)

**JCom 6040. Seminar in Mass Media Research Methods.** Introduction to the major theoretical perspectives and methodologies in mass communication research. Repeatable for credit with departmental permission. (3 cr) (Sp) ®

**JCom 6050. Seminar in Mass Media Issues and Problems.** Variable topic seminar concerning research of issues and problems in mass media principles and practice. Repeatable for credit with departmental permission. (3 cr) (F,Sp) ®

**JCom 6110 (d5110). Literary Journalism.** In-depth analysis and practice of literary and stylistic elements of long-form journalistic and other nonfiction writers. (3 cr) (F)

**JCom 6210 (d5210). Multimedia.** Principles and practice of producing interactive, computer-based multimedia products in various forms (CD-ROM, Internet), combining text, full-motion video, and sound for news and business clients. Prerequisite: Permission of instructor. (3 cr) (Sp)

**JCom 6220 (d5220). Advanced Video Production.** Training and practice in advanced techniques of video production, including computer graphics generation, non-linear video editing, and other specialized professional techniques for electronic video materials. Prerequisite: Minimum grade of C in JCom 4220 or 4230 or permission of instructor. (3 cr) (F)

**JCom 6230 (d5230). Advanced Video Documentary Production.** Advanced production of long-form video productions and packages, including writing scripts, directing and production, control room applications, and advanced video production techniques. Prerequisite: Minimum grade of C in JCom 4220 or 4230 or permission of instructor. (3 cr) (Sp) ®

**JCom 6300 (d5300). Public Relations Agency I.** Hands-on experience in public relations and corporate image maintenance. Strategies for organizational positioning and use of mass media in furthering corporate objectives. Prerequisite: Minimum grade of C in JCom 3300. (3 cr) (F,Sp)

**JCom 6310 (d5310). Mass Media Management.** Examines theories, methods, and practice of management of mass media businesses, including personnel, marketing, and market positioning. Prerequisite: Permission of instructor. (3 cr) (F,Sp)

**JCom 6320 (d5320). Public Relations Agency II.** Advanced public relations agency management skills. Prerequisite: Permission of instructor. (3 cr) (F,Sp)

**JCom 6400 (d5400). Mass Media Criticism.** Critical analysis of mass media content, emphasizing the media's social, cultural, and political impacts. Use of advanced research techniques. Prerequisite: Permission of instructor. (3 cr) (Sp)

**JCom 6410 (d5410). Gender and the Mass Media.** Examines the nature of gender-based images in a variety of mass media, from advertising to magazines, television, and film. Analysis of gender stereotypes and portrayals in news and entertainment media, along with resulting social impacts. Prerequisite: Permission of instructor. (3 cr) (F,Sp)

**JCom 6420 (d5420). The Mass Media and Politics.** Examination of the role of the mass media in the political process, including both campaigns and governance. Examination of political advertising, news coverage, polling, opinion formation strategies, and politicians' use of new media technologies. (3 cr) (F)

**JCom 6430 (d4030). Mass Media Law.** Principles and theories of constitutional and case law governing the mass media, including libel and privacy, copyright, press freedom, broadcast regulation, and press responsibility. (3 cr) (F,Sp)

**JCom 6440 (d4010). Mass Communication Ethics.** Study of ethical systems and philosophies and their applications to the practice of mass communication. (3 cr) (Sp)

**JCom 6500. Special Projects in Mass Communication Research and Practice.** Directed study into specified research or real-world problems in the mass media and mass communication industries. Prerequisite: Departmental permission. Repeatable for credit with departmental permission. (1-3 cr) (F,Sp,Su) ®

**JCom 6510. Directed Readings in Mass Communication.** Directed readings, tutorial or experiential learning/project in mass communication. Prerequisite: Instructor and department head approval. (1-12 cr) (F,Sp,Su) ®

**JCom 6600. Internship.** Supervised training in selected communication work places. Prerequisite: Permission of graduate supervisory committee. (1-6 cr) (F,Sp,Su)

**JCom 6970. Thesis Research.** Prerequisite: Departmental permission. Repeatable for credit with departmental permission. (1-3 cr) (F,Sp,Su) ®

**JCom 6990. Continuing Graduate Advisement.** Prerequisite: Departmental permission. Repeatable for credit with departmental permission. (1-3 cr) (F,Sp,Su) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

*Department of*

# *Landscape Architecture and Environmental Planning*

*College of Humanities, Arts and Social Sciences*

**Head: Professor Karen C. Hanna**, GIS applications in regional planning and site design for landscape architects, open space and park planning, and construction

Office in Fine Arts Visual 230, (435) 797-0500

**Undergraduate Program Director: Associate Professor Michael L. Timmons**, site planning and design, recreation planning, and landscape history

**Graduate Program Director: Associate Professor John C. Ellsworth**, visual resources management, computer applications, and disturbed lands rehabilitation

**FAX** (435) 797-0503

**E-mail** ainscoughm@hass.usu.edu (faculty e-mail addresses available on department website)

**WWW** <http://www.usu.edu/laep/>

**Professor Craig W. Johnson**, planting design, land rehabilitation, wildlife habitat planning and design; **Associate Professors David L. Bell**, residential design, landscape construction, and community planning and design; **Vern J. Budge**, landscape construction and recreation planning; **Caroline Lavoie**, urban design/theory; **John K. Nicholson**, urban and regional planning, and computer applications; **Adjunct Instructors David G. Garce; Deborah L. Jensen**

**Degrees offered:** Bachelor of Landscape Architecture (BLA) and Master of Landscape Architecture (MLA); Master of Science (MS) in Bioregional Planning. BLA and first professional MLA programs are fully accredited by the American Society of Landscape Architects.

**Graduate specializations:** *MLA*—Land Rehabilitation/Revegetation, Small Town Rehabilitation, Urban Wildlife, Visual Resource Management, Water Resources Management

## *Department Objectives*

The objectives of the department are to (1) provide an educational and technical program responsive to current societal needs related to environmental planning, landscape architecture, and urban design; (2) give students the opportunity to participate in collaborative learning experiences with other disciplines on campus; (3) prepare students for professional careers in the private or public sector, and (4) conduct original research to advance the body of knowledge in landscape architecture, environmental planning, and design.

## *Undergraduate Programs Admission and Graduation Requirements*

The Bachelor of Landscape Architecture (BLA) degree program is an intensive four-year studio-based course of study, fully accredited by the American Society of Landscape Architects. Accreditation standards require the department to maintain a reasonable faculty/student ratio. Space in the program is limited by available facilities, faculty, and qualified applicants. Admission to the upper division is competitive, and is limited to students who are determined by the faculty to have the best potential for academic success. Matriculation into the upper division will normally be limited to 25 students, although additional students may be ma-

tricated in special circumstances at the discretion of the LAEP faculty.

Any student admitted to USU is eligible for enrollment in lower-division LAEP courses. Declared LAEP majors will be advised of their relative class standing at the end of their freshman year and at the mid-point of their sophomore year, to assist in their personal academic career planning. At the end of the sophomore year, a selection process will determine which students will matriculate into the upper division of the program.

Eligibility for matriculation requires the completion of the following prerequisite courses: LAEP 1030, 1200, 1350, 2300, 2600, 2650, 2700, 2720; PISc 2620; and ITE 1200. Students applying for matriculation must have a minimum USU GPA of 2.5.

Selection of students to be matriculated to the upper division is based on a letter of intent; a portfolio demonstrating creative potential, problem solving skills, and graphic fluency; and cumulative GPA earned in the eight LAEP prefix courses listed above. Portfolios and letters of intent are to be submitted by the last Monday in March. Detailed information regarding the letter of intent and portfolio requirements may be obtained from the LAEP Office. The final selection of students to matriculate to the upper division is a decision of the LAEP faculty. The review of students for matriculation will take place during the week following spring semester final exams, and students will be notified as soon as possible thereafter.

Students who have had LAEP courses waived or covered by articulation from another institution will have their GPA calculated only on the basis of LAEP grades actually earned at USU.

Transfer students from other programs of landscape architecture who have completed the equivalent of the lower-division USU LAEP coursework may apply for admission to the upper division of the program through submission of a portfolio, letter of intent, transcript of grades, and description of landscape architecture courses taken. Students who have previously been enrolled and matriculated into the upper division at USU, and must interrupt their education for up to three academic years, may resume their studies at the same level of the program which they departed upon returning to USU. Students who have stopped-out longer than three years must reapply, following the guidelines specified for transfer students. The decision on applications from transfer students and for readmission rests with the LAEP faculty and will be considered on a case-by-case basis.

**Note:** Students eligible for matriculation during spring semesters 2002 and 2003 will be evaluated under the previous policy, as described in the USU 2000-2002 *General Catalog*.

High school students planning to major in landscape architecture may enhance their preparation with courses in art, natural sciences, social sciences, and math through college algebra.

**BLA Degree.** The Bachelor of Landscape Architecture (BLA) degree is a four-year program consisting of courses relating to theory, design, history, and the various technical areas of the profession. The degree provides a substantial basis for a professional career, as well as an excellent foundation for advanced graduate studies. In addition to the courses required for upper-division status, the following LAEP courses are required for graduation: LAEP 3100, 3120, 3300, 3500, 3610, 3700, 4100, 4110, 4120, and 4920. Additional non-LAEP courses required are: Math 1050, ASTE 3050, Geol 3100, AWER 1200 or FRWS 2200, and Soc 3610 or 4620. Students must also complete the University Studies requirements. For more detailed information, see major requirement sheet available from the department.

**Specialized Service Courses.** LAEP 1030, 1200, 2300, and 3700 are available for majors in other fields who may wish to gain an exposure to the different aspects of landscape architecture and environmental planning. A minor is not given in LAEP; however, these service courses are available, without prerequisites, for those requesting them.

## Graduate Programs

### Admission Requirements

The application deadline for consideration in the first round of reviews is March 15. Applications received later than March 15 will be considered as space availability allows. February 1 is the application deadline for consideration for some scholarships, fellowships, and other financial aid. For general admissions requirements, see the appropriate sections of this catalog.

### Master of Landscape Architecture

The program for the Master of Landscape Architecture (MLA) emphasizes both traditional site scale planning and design, as well as broader areas of the profession, such as large-scale regional landscape analysis and planning, and computer-aided design and planning techniques. The MLA first professional degree is fully accredited by the Landscape Architectural Accreditation Board of the American Society of Landscape Architects.

The Master of Landscape Architecture program is designed to prepare the student for the landscape architect's challenging role of providing a holistic approach to environmental planning and design. In order for landscape architects to contribute effectively to an interdisciplinary effort, they must be competent in the fundamentals of landscape architecture and also have an understanding of the subject matter of other professions. Landscape architects must master the communication skills necessary to achieve meaningful collaboration. In support of this philosophy, the following are the major objectives of the MLA program.

1. To provide a well-structured curriculum in fundamental professional knowledge and skills.
2. To research, analyze, and resolve land use and design issues related specifically to the Intermountain West. The scope of the program examines national, regional, and local issues; and their impact on the visual, physical, and cultural setting of the Intermountain West.
3. To integrate field experience and research into major graduate studio courses structured around real-world projects.
4. To provide opportunities for each student for exploration and development of an area of specialization as noted elsewhere.
5. To draw upon the regional, national, and international relationships of Utah State University to facilitate a program of academic and professional excellence which will allow the student to achieve eminence in practice, research, or education.

### Areas of Faculty Expertise

The Master of Landscape Architecture Program provides opportunities for each student to study and conduct research in areas which take advantage of the strengths of Utah State University and the landscape context of the Intermountain West centered around the expertise of the LAEP Department faculty, including: *Land Rehabilitation/Revegetation*—Ellsworth and Johnson; *Regional Landscape Planning*—Hanna and Nicholson; *Visual Re-*

*sources Management*—Ellsworth; *Urban Wildlife/Refuge Planning*—Johnson; *Riparian Systems*—Johnson and Bell; *Community Planning*—Nicholson, Hanna, and Bell; *Public Lands/Recreation*—Timmons, Ellsworth, and Budge; *Urban Design/Theory*—Lavoie; *Historic Landscapes and Preservation*—Timmons.

These areas of faculty expertise include an assessment of the relevant environmental, design, social, economic, and public policy issues utilizing a wide range of computer-compatible techniques and models.

### Specializations

Graduate specializations (MLA) may be designated on a student's transcript with the approval of the supervisory committee after completion of a Plan A original research thesis. There are currently five specializations: Land Rehabilitation/Revegetation, Small Town Rehabilitation, Urban Wildlife, Visual Resource Management, and Water Resources Management.

### Course of Study

The graduate program director advises all incoming students until they have selected a thesis topic. A major professor whose interests are closely aligned to those of the student (see *areas of faculty expertise* above) supervises thesis work. A minimum of 30 graduate-level credits, including thesis work, is required. Students supplement requirements with courses negotiated with the major professor and supervisory committee. An outside area of emphasis or graduate specialization (see above) may be pursued by concentrating elective coursework in another department.

The department offers two MLA programs. One is for students who have previously earned baccalaureate degrees in landscape architecture from accredited programs and the other is for students with degrees from other fields.

### MLA—Advanced Professional Degree

The MLA—Advanced Professional Degree is a two-year program of study. Applicants must hold baccalaureate degrees in landscape architecture from accredited programs. The advanced degree allows outstanding students to expand their knowledge in areas of special interest under the supervision of a major professor and supervisory committee.

For information about currently required and recommended coursework, as well as other requirements for this degree, contact the LAEP Department.

### MLA—First Professional Degree

A three-year program leading to the MLA degree is available for candidates with previous baccalaureate degrees in fields other than landscape architecture. The curriculum includes a substantial lecture and studio sequence designed to establish fundamental professional skills.

For information about currently required and recommended coursework, as well as other requirements for this degree, contact the LAEP Department.

### *Master of Science in Bioregional Planning (joint degree program with Environment and Society)*

Good planning and management of natural resources and systems supersedes individual disciplines, requiring an interdisciplinary approach for the successful resolution of environmental issues. The intent of this program's curriculum is to integrate the biophysical disciplines more closely while also addressing the social and political sciences.

This program consists of a two-year period of study with a required thesis or paper/project. To maintain a program focus, the student selects from three clusters of coursework (research methods/case studies, landscape ecology, and natural resource policy). A minimum of 33 graduate-level credits, including 3-6 credits of thesis or paper/project is required. An interdisciplinary capstone sequence is required. The program contains a total of nine elective credits from which the candidate and his or her committee can formulate an area of specialization.

### Course of Study

This two-year MS program is comprised of an interdisciplinary core of courses and faculty for addressing complex issues in the areas of bioregional planning and management. Emphasis is placed on four problematic content areas: biophysical, social/demographic, economic, and public policy. The spatial focus is on the planning for large landscape areas with dispersed populations with a primary economic base in agriculture, energy development, tourism/recreation, retirement communities, and natural resources.

The program requires a minimum of 33 graduate-level credits, including 3-6 credits of work on a thesis or paper/project. Nine of the required credits may be in an area of specialization within the candidate's home department. These nine credits are to be negotiated with the candidate's major professor and supervisory committee. Requirements for the MS in Bioregional Planning are as follows:

**Research Methods (3-4 credits).** One of the following courses is required: FRWS 6500, Soc 6100, 6150.

**Ecology (3-4 credits).** One of the following courses is required: FRWS 5400, 5610, 6710, AWER 6750. For those students without a background in ecology, Biol 2220 (General Ecology) or equivalent is also required. Credits earned for Biol 2220 or equivalent *do not apply* to the graduate program.

**Public Policy (7 credits).** One of the following courses is required: EnvS 6000, PolS 5180, Soc 6630, Econ 5560 or 6500. Also, the following two courses are required *for all students*: LAEP 6900 (Special Problems: NEPA/GIS) and FRWS 6900 (Special Topics: GIS).

**Capstone Sequence (8 credits).** The following courses are required *for all students*: LAEP 6100, 6740.

**Areas for Department Emphasis (9 credits).** Nine credits should be available to the candidate for an area of emphasis within his or her home department.

**Thesis or Project (3 or 6 credits).** A thesis or Plan B paper/project option is required and is to be negotiated with the candidate, major professor, and supervisory committee.

**Total Credits: 33-38**

### *Environmental Field Service*

**Practical Education and Community Service.** The department sponsors a program of planning and design services in which MS, MLA, and BLA students may participate. The Environmental Field Service program offers students the opportunity to interact with community leaders and citizens and to test concepts and skills acquired in the classroom while working on real projects.

### ***Internships and Cooperative Education***

Many students take advantage of the practical learning opportunities available through internships and cooperative education programs. The department, student, and government agency or private firm make the necessary arrangements. Internships and cooperative education experiences are not required for degree completion. In some cases, these experiences may be used as the basis for waiver of selected courses, subject to approval in advance by the major professor, graduate program director, and department head. Students completing these experiences are required to make a summary presentation to department faculty and students.

### ***Financial Assistance***

The application deadlines for scholarships and financial assistance vary. For current application deadline information, contact the LAEP Department, the USU Financial Aid Office, and the School of Graduate Studies. Acceptance to pursue graduate study does not guarantee the student financial assistance.

### ***Career Opportunities***

The Department of Landscape Architecture and Environmental Planning provides education for careers in landscape architectural site planning, design, environmental planning, and management, with special consideration for conditions in the Intermountain West. Graduates are employed by local, state, and federal agencies, as well as by private sector professional firms. LAEP graduates also find employment in academia at both the undergraduate and graduate levels.

## ***Landscape Architecture and Environmental Planning Courses (LAEP)***

**LAEP 1030 (BCA). Introduction to Landscape Architecture.** Environment as a basis for land use and design decisions. Topics discussed include environmental awareness, the planning and design process, and design related to open space, communities, and the region. Three one-hour lectures per week. (3 cr) (F,Sp,Su) ©

**LAEP 1200. Basic Graphics in Landscape Architecture.** Graphic techniques for landscape architectural drawings, including plans, elevations, isometrics, perspective, rendering, and model construction. Various media explored for preparing drawings and sketches for presentation. Two three-hour studios per week. (4 cr) (F)

**LAEP 1350. Theory of Design.** Basic elements of design with emphasis upon their relationship to landscape architecture. Form and spatial relationships are stressed through student development of two- and three-dimensional design models. Design theory applied to materials of landform, vegetation, water, and architecture. Two three-hour studios per week. Prerequisite: Must be declared LAEP major or have permission of instructor. (4 cr) (Sp)

**LAEP 2250. Internship and Cooperative Education.** Course credit for professional experience outside the classroom prior to graduation. A statement of professional goals and a summary report following the experience are required. (1-5 cr) ©

**LAEP 2300. History of Landscape Architecture.** An examination of landscape change in the context of its history from ancient to present times, with a primary em-

phasis on the visual qualities of designed landscapes. Three one-hour lectures per week. (3 cr) (F)

**LAEP 2600 (QI). Landscape Construction I.** Introduction to site engineering, grading, cut and fill calculation, stormwater drainage, and erosion control. Two one-hour lectures and two two-hour studios per week. Prerequisite: LAEP 1200 (may be taken concurrently). (4 cr) (F)

**LAEP 2650. Architecture and the Built Environment.** Exploration of architectural form and structure in exterior environments. Emphasis placed on space created by architectural forms and their relationship to the surrounding landscape. Energy and water conservation measures with respect to the built environment. Prerequisite: LAEP 1200. (4 cr) (Sp)

**LAEP 2700 (CI). Site Analysis and Design.** Site survey, analysis, and design synthesis. Focuses on human behavior and natural resources as design considerations for future land use planning. Student teams survey and analyze sites' landscape and cultural resources for future land use planning. (5 cr) (F)

**LAEP 2720. Site Planning and Design.** Serves as a capstone course, synthesizing lower-division landscape architecture coursework and applying that knowledge to site scale design projects. Includes units on design methodology, site planning and circulation, and creative problem solving. Three three-hour studios per week. Prerequisite: LAEP 2700. (5 cr) (Sp)

**LAEP 3100. Recreation/Open Space.** Focuses on regional and urban open space planning and design including project scale recreation design. Includes design seminars, field trips, and guest lecturers. Three three-hour studios per week. Prerequisite: LAEP 2720 or permission of instructor. (5 cr) (F)

**LAEP 3120. Residential Planning and Design.** Focuses on large-scale residential projects, planned unit developments, and community facilities. Three three-hour studios per week. Prerequisite: LAEP 3100. (5 cr) (Sp)

**LAEP 3300. Advanced Computer Applications in Landscape Architecture.** Emphasizes the major analytical and technical components of resource planning and design using computer techniques. Two three-hour studios per week. Prerequisite: LAEP 2720 or instructor's permission. (4 cr) (F)

**LAEP 3500. Planting Design.** Emphasizes plant and environment relationships and plant community dynamics as they relate to planting design. In addition, basic planting design principles will be introduced. Involves application of planting design principles to a variety of project types. One segment will focus on land reclamation planting in nonirrigated landscapes. Two three-hour studios per week. Prerequisite: PISc 2620. (2-4 cr) (F)

**LAEP 3610. Landscape Construction II.** Introduction to construction materials, wood construction, and free-standing and retaining walls. Introduction to layout and dimensioning, basic theory and technical aspects of roadway alignment, and theory and design of sprinkler irrigation. Two three-hour studios per week. Prerequisites: LAEP 2600, Math 1050. (4 cr) (Sp)

**LAEP 3700. City and Regional Planning.** Introduction to historic and current theory and methods of city and regional planning. Includes legislative, administrative, and implementation practices of the general comprehensive plan. Three lectures per week. (3 cr) (Sp)

**LAEP 4100. Urban Theory, Systems, and Design.** Emphasizes historical, cultural, and functional aspects of the city. Planning and design activities focus on social and behavioral contributions to urban form. Three three-hour studios per week. Prerequisite: LAEP 3120. (5 cr) (F)

**LAEP 4110. Construction Document Preparation.** Design project through detail design development and completion of the working drawings and specifications. Two three-hour studios per week. Prerequisite: LAEP 3120. (4 cr) (F)

**LAEP 4120. Emerging Areas in Landscape Architecture.** Exploration of new and emerging areas in the profession of landscape architecture. National and international

issues in regional landscape planning, landscape restoration/bioengineering, and visual resource management are among several issues which may be examined. Three three-hour studios per week. Prerequisite: LAEP 4100. (5 cr) (Sp)

**LAEP 4250. Internship and Cooperative Education.** Course credit for professional experience outside the classroom prior to graduation. Statement of professional goals and a summary report following the experience are required. (1-5 cr) (F,Sp,Su) ®

**LAEP 4350. Travel Course.** Major field trip to examine a variety of projects in planning and design. (1 cr) (Sp) ®

**LAEP 4810. Tutorial.** Directed readings and discussions of landscape issues. Prerequisite: Instructor's permission. (1 cr) (F,Sp,Su) ®

**LAEP 4900. Special Problems.** Selected problems to meet individual needs for students' completion of professional education. Hours arranged. Prerequisite: Instructor's permission. (1-5 cr) (F,Sp,Su) ®

**LAEP 4920 (CI). Professional Practice.** Readings and reports on current topics and trends in professional practice. Also covers contracts, specifications, professional ethics, and general office management. (2 cr) (Sp)

**LAEP 4950. Seminar.** Directed readings and reports on current and emerging areas of the profession. One recitation hour per week. (1 cr) (F,Sp,Su)

**LAEP 6100. Regional Landscape Analysis and Planning.** Landscape planning theory, methods, and case studies focusing on analysis of major physiographic region. Alternative planning scenarios are proposed, including their evaluation. (5 cr) (F)

**LAEP 6110. Landscape Planning for Wildlife.** Application of principles of landscape ecology to planning for wildlife in urban, suburban, and exurban landscapes. Discussion of restoration of disturbed habitats in these environments. Includes real-world projects and field trips. Addresses issues of landscape restoration and bioengineering. (3 cr) (Sp)

**LAEP 6120. Regional Landscape Policy and Implementation.** Case studies and/or implementation strategies for planning alternatives developed in LAEP 6100. (2 cr) (Sp)

**LAEP 6160. Professional Practice.** Assigned readings and reports on current topics and trends in the practice of landscape architecture and environmental planning. (2 cr) (Sp)

**LAEP 6250. Internship and Cooperative Education Program.** Course credit given for professional experience outside the classroom prior to graduation. Statement of professional goals and summary report following the experience are required. (1-5 cr) (F,Sp,Su) ®

**LAEP 6300. Planting Design for Low Water Use Landscapes.** Examines arid ecosystems, emphasizing the Intermountain West, and recreating such ecosystems in a range of amenity landscapes. Also covers procurement, propagation, establishment, and maintenance of plants appropriate for low water landscapes. Also taught as PISC 6300. (3 cr) (F)

**LAEP 6740. Planning Theory and Methods.** Review of planning theory and implementation techniques based on advanced readings, case studies, and research projects. Scale of material proceeds from regional landscape planning to rural and town planning. (3 cr) (F)

**LAEP 6750. Implementation and Regulatory Techniques in Planning.** Analysis of techniques utilized to implement the comprehensive plan. Major topics include zoning, capital improvements, subdivision regulations, code enforcement, and growth controls. (3 cr) (Sp)

**LAEP 6860. Faculty/Interdisciplinary Seminar.** Landscape architecture and planning program options and research potential presented by departmental faculty. Also introduces students to other interdisciplinary programs and faculty within the University. (1 cr) (F)

**LAEP 6890. Seminar on Research Methods and Thesis Proposals.** Explores various research methods from both case studies and faculty presentations. Also includes preparation of thesis proposals and abstracts, and discussion of graduate degree completion requirements. (2 cr) (Sp)

**LAEP 6900. Special Problems.** Selected problems to meet individual student interests and areas of concentration. Registration by permission of departmental faculty. (1-5 cr) (F,Sp,Su) ®

**LAEP 6910. Reading Seminar I.** Selected readings directed by department faculty. (1 cr) (F)

**LAEP 6930. Reading Seminar II.** Selected readings directed by department faculty. (1 cr) (Sp)

**LAEP 6960. Master's Project.** Requires research, analysis, and production of a given subject area, including its final planning, design, and documentation. (1-6 cr) (F,Sp,Su) ®

**LAEP 6970. Thesis Research.** (1-6 cr) (F,Sp,Su) ®

**LAEP 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

Department of

# Languages and Philosophy

College of Humanities, Arts and Social Sciences

**Head: Professor Diane P. Michelfelder**, hermeneutics and existentialism, philosophy of technology, applied ethics, aesthetics  
Office in Main 204, (435) 797-1209

**Assistant Head: Professor John E. Lackstrom**, linguistics, Spanish applied linguistics, TESL

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**Professors** Lynn R. Eliason, 19th century Russian and German novels, Russian culture; Charles W. Johnson, philosophy of mind, Wittgenstein, logic, philosophical methods; Mark D. Larsen, Latin American literature, computer applications in languages; Kent E. Robson, ethics, philosophy of language, history of philosophy, philosophy of science, philosophy of religion; Richard Sherlock, medical and environmental ethics, ethical theory, ethical issues in genetics, political philosophy, philosophy of religion; **Professors Emeritus** Hans K. Mussler, German literature, Lessing, enlightenment, translation, teaching methodology; Alfred N. Smith, Jr., French, foreign language education, cross-cultural studies; **Associate Professors** M. Isela Chiu, Spanish, Portuguese, Latin American literature; Charles D. Huenemann, history of modern philosophy, Kant, metaphysics; Ilona Jappinen, German language, literature and culture, Nietzsche/expressionism; Harold J. Kinzer, organizational communication; Renate Posthofen, German language and literature, contemporary culture and film; John S. Seiter, interpersonal communication, intercultural relations, social influence; Gordon Steinhoff, philosophy of science, logic, metaphysics; William H. Wilcox, Jr., ethical theory, applied ethics, philosophy of law, social and political philosophy; Fuencisla Zomeño, Spanish and Luzo-Brazilian literature; **Associate Professors Emeritus** Jerry L. Benbow, Peninsular Spanish literature and grammar; Lynne H. Goodhart, 20th century French poetry, women in literature; Gordon E. Porter, Spanish, Spanish literature, Portuguese; Norman R. Savoie, contemporary French culture, contemporary French detective fiction; Janet C. Stock, French, business French, 20th century French literature, Proust; **Assistant Professors** Janette K. Bayles, French; Anne F. Carlson, French; María-de Jesús Cordero, colonial Spanish-American literature; Karen M. Daly, Spanish; Taira Koybaeva, Russian, linguistics, international marketing and business relationships; Kevin L. Krogh, Spanish Peninsular literature; Jennifer A. Peebles, speech communication; Felix W. Tweraser, German; **Visiting Assistant Professor** David L. Nielson, Spanish; **Assistant Professor Emeritus** Valentine Suprunowicz, Russian literature; **Principal Lecturer Emeritus** Viva L. Lynn, Spanish literature; **Lecturer** Atsuko Neely, Japanese, second language acquisition

**Degrees offered:** Bachelor of Arts (BA) in French, German, and Spanish; BA and Bachelor of Science (BS) in Philosophy; BA and BS in Speech; Master of Second Language Teaching (MSLT)

## Undergraduate Programs

### Mission Statement

The Department of Languages and Philosophy offers programs in modern languages and literature, philosophy, and speech communication. While these programs differ widely in their curricula, they are bound together by two considerations: (1) an emphasis on humanistic content and method of inquiry; and (2) a recognition on the part of the departmental faculty that a critical part of becoming an educated person lies in achieving a greater understanding of one's self and of others, an understanding opened up through insight into the spoken and written word.

Courses offered by the department provide majors and minors with opportunities to achieve this understanding by increasing their communicative, logical, interpretive, linguistic and research skills; their ability to function within an increasingly globalized society; and their awareness of ethical, aesthetic, and other values. Courses offered by the department also give teaching majors and

minors the opportunity to serve the needs of the education professions.

Through its participation in the University Studies program, the department provides all students with an opportunity to gain knowledge of how people come to understand themselves through their cultural, literary, and philosophical achievements. The department also furthers the education of both traditional and non-traditional students through faculty participation in interdisciplinary programs such as Honors, Liberal Arts and Sciences, Asian Studies, and Women and Gender Studies; and in cooperative education, distance learning, extension, and study-abroad programs.

### Admission Requirements

Admission requirements for freshmen desiring entrance to major programs offered by the Department of Languages and Philosophy are the same as those for Utah State University (see pages 48-51). Transfer students from other institutions and from other majors within Utah State University must have an overall mini-

mum GPA of 2.5 (2.75 for Spanish) to be admitted to the department's major programs.

All students majoring in programs offered by this department must maintain a minimum GPA of 2.5 in their major (2.75 in Spanish) to be in good standing in the department and to obtain official approval for graduation.

### **Career Information**

The Department of Languages and Philosophy maintains a resource center in the departmental office (Main 204) containing general information about graduate schools and nonacademic careers in modern languages, philosophy, and speech communication. Students are invited to use this resource center during office hours.

### **Scholarship Information**

Three scholarships are offered through the Department of Languages and Philosophy. The **Carl T. Degener Memorial Scholarship** is awarded to an outstanding language major at the junior level. Outstanding upper-division students in French (and under some circumstances Spanish) are eligible for the **Jean Inness Scholarship**. The **Thain Scholarship** is awarded to an outstanding high school senior enrolling in a language or philosophy course at USU. For more details, contact the department office.

## **Graduate Program**

### **Master of Second Language Teaching (MSLT)**

The Master of Second Language Teaching (MSLT) degree program is designed for students desiring additional training at the graduate level in an integrative, interdisciplinary program combining coursework in the field of Foreign Language Education, Bilingual Education, and ESL/EFL Education. Attainment of the degree requires the completion of a minimum of 30 credits of coursework in the MSLT program. The program leading to the MSLT consists of a core curriculum of 18 credits and a professional curriculum of 12 credits. Courses in the core curriculum are designed to respond to the program's emphasis areas in language, literacy, and culture. Courses in the professional curriculum address teaching methodology, curriculum preparation, materials development, and testing. A Master's Project in the form of a substantial cumulative Master's Portfolio is also required. The Master's Portfolio will include a comprehensive statement of the candidate's philosophy of second language teaching and learning and how this philosophy will be applied in a professional environment. This project will be defended at the end of the degree program. All candidates must take a research course in the professional curriculum designed to aid in preparing the Portfolio Project.

This master's degree program does not lead to licensure by the Utah State Board of Education. Individuals who do not have Utah State Board of Education licensure and wish to obtain that credential must take the three-semester Secondary Teacher Education Program (STEP) in the College of Education.

For program information, including admission requirements, degree requirements, courses, and financial assistance, contact the departmental office or see the program's website at: <http://www.usu.edu/langphil/mslt>.

## **Languages**

Language faculty members in the Department of Languages and Philosophy teach courses leading to undergraduate degrees in French, German, and Spanish, as well as to undergraduate minors in Chinese, French, German, Japanese, Portuguese, Russian, and Spanish. Teaching majors and minors are also offered in French, German, and Spanish. The department also offers a minor program in Linguistics.

**French, German, and Spanish Major Programs.** The goal of the French, German, and Spanish BA degree programs is to prepare students to be able to take advanced studies in these languages, literatures, and cultures; to be quality teachers of these languages, literatures, and cultures in the public schools; and to provide those who may enter other professions a solid grounding in these languages, literatures, and cultures, in order that they may function as members of the international community. The curricula supporting these goals includes courses in language, literature, civilization, culture, and linguistics. See the course requirements which follow.

### **Course Requirements**

#### **Language Major Requirements**

**Bachelor of Arts in French.** *French Major (33 credits):* 30 credits of upper-division coursework in French, plus Ling 4100; and other University Studies courses as required by the University. Ling 4100 must be taken before Fren 4200. *French Teaching Major (35 credits):* Ling 4100, 3300 or 4300, 4400; Fren 3060 or 4060; Fren 3090 or 4090; 18 credits selected from the following: Fren 3550, 3570, 3600, 3900, 4200, 4610 or 4620, Ling 4920; and other University Studies courses as required by the University.

**Bachelor of Arts in German.** *German Major (33 credits):* Germ 3000, 3040, 3050; Ling 4100; plus 21 credits of additional upper-division coursework selected from German courses, Ling 4900 or 4920, and other University Studies courses as required by the University. *German Teaching Major (35 credits):* Germ 3000, 3040, 3050, 4200; Ling 4100, 3300 or 4300, 4400; plus 16 credits of additional upper-division coursework in German, and other University Studies courses as required by the University.

**Bachelor of Arts in Spanish.** *Spanish Major (33 credits):* Span 3040; at least 3 courses from among the following: Span 3600, 3610, 3620, 3630; Span 3550 or 3570; Span 4900 or 4910; Ling 4100, and three additional credits in Linguistics; plus 9 credits of upper-division coursework in Spanish or Linguistics and other University Studies courses as required by the University. *Spanish Teaching Major (36 credits):* Span 3040, 3550, 3570, 3600 or 3610, 3620 or 3630, 4200, 4900 or 4910; Ling 4100, 4190, 3300 or 4300, 4400; plus 6 credits of upper-division coursework in Spanish or Linguistics, and other University Studies courses as required by the University. At least half of the credits applied toward the major must be completed at USU or through its sponsored programs.

#### **Language Minor Requirements**

**Chinese Minor.** 12 upper-division credits in Chinese.

**French Minor.** 12 upper-division credits in French.

**French Teaching Minor.** Fren 3090 or 4090, 3600, 4200; Ling 4190, 3300 or 4300, 4400.

**German Minor.** Germ 3000, 3040, 3050, and one other upper-division German course.

**German Teaching Minor.** Germ 3000 or 3300, 3040, 3050, 4200; Ling 3300 or 4300, 4400; plus one other upper-division German course.

**Japanese Minor.** 12 credits selected from the following courses: Japn 3010, 3020, 3050, 3100, 3510.

**Portuguese Minor.** Port 1020, 2010, 2020, 3040.

**Russian Minor.** Russ 3040, 3050, 3300, 3510, 3540.

**Spanish Minor.** Span 3040, 3550 or 3570; one of the following: Span 3600, 3610, 3620, 3630; plus one other upper-division course in Spanish or Linguistics from the department, excluding Ling 4920.

**Spanish Teaching Minor:** Span 3040, 3550 or 3570, 4200; one of the following: Span 3600, 3610, 3620, 3630; Ling 3300 or 4300, 4400; plus one other upper-division course in Spanish or Linguistics from the department, excluding Ling 4920.

**Linguistics minor.** 12 credits selected from the following courses: Ling 4100, 4190, 4400, 4900; Engl 3020, 4200, 4210, 4230, 5210.

For additional information on language major and minor programs offered by the Department of Languages and Philosophy, contact the department office.

**Proficiency Tests and Placement in Language Courses.** Students who have completed one or more years of language study in high school may take proficiency tests to determine their proper placement in language courses offered by the department.

**Credit by Special Examination.** Where basic skills in a department-taught language other than Spanish have been acquired by means other than college courses, up to 16 lower-division credits with a letter grade may be earned by completing a course in that language at a higher level than the credits to be acquired. This course needs to be completed with a grade of *B* or better. In Spanish, these credits must be obtained by taking a placement test. To receive all 16 credits in Spanish, students must pass the test with a score of 500 or better. These credits will count as transfer credits. They will not count toward semester or USU GPA, but will be counted into the cumulative GPA.

Where basic skills in a language not offered by the department have been acquired by means other than college courses, up to 12 lower-division credits may be earned by special examination. All credit received by special examination is listed on transcripts as *P* (pass) grade. For further information, contact the department.

**Technology Assisted Language Center.** The department operates a technology assisted language center, located in Main 002, for instructional use associated with language classes, and for students desiring additional language practice outside of the classroom. The center includes computer workstations capable of running multimedia applications, televisions, VCR players, and audio equipment.

**Exchange Programs.** The department serves as the academic administrative home to student exchange programs with the University de la Rioja in Spain, and with three institutions in Japan: Kansai Gaidai, Gifu University, and the Faculty of Cross-Cultural Studies at Kobe University. Information about these programs can be found on the department's website or through the USU Study Abroad Office. (See page 43 in this catalog.)

**Summer Study-abroad Programs.** The department offers summer study programs in Germany, France, and Spanish-speaking countries. Students must be in good standing at the University and must have some language background to participate in these programs. In addition, the department also conducts an annual two- to three-week travel-study tour to Russia, including visits to Moscow and St. Petersburg. Students can receive credit for participating in these programs. For more information, contact the department.

### *National Honor Societies*

**Lambda Pi Eta (LPH)** is the National Communication Honor Society of the National Communication Association for undergraduate junior and senior communication students. Among the goals of LPH are to recognize, foster, and reward outstanding scholastic achievement; and to provide an opportunity for faculty and students to discuss and exchange ideas about their field of interest.

**Sigma Delta Pi (SDP)** is the National Collegiate Hispanic Honor Society of the American Association of Teachers of Spanish and Portuguese for students studying Spanish. Among the goals of SDP are to honor those who attain excellence in the study of the Spanish language and of the literature and culture of the Spanish-speaking peoples, and to encourage college and university students to acquire a greater interest in and a deeper understanding of Hispanic culture.

## *Chinese Courses (Chin)*

**Chin 1010. Chinese First Year I.** Communicative competencies in the four language skills: speaking, listening, reading, and writing with exposure to cultures and customs. Native speaker instructor. (4 cr) (F)

**Chin 1020. Chinese First Year II.** Communicative competencies in the four language skills: speaking, listening, reading, and writing with exposure to cultures and customs. Native speaker instructor. Prerequisite: Chin 1010 or equivalent. (4 cr) (Sp)

**Chin 2010. Chinese Second Year I.** Second-year overview of speaking, listening, reading, and writing with exposure to cultures and customs. Native speaker instructor. Prerequisite: Chin 1020 or equivalent. (4 cr) (F)

**Chin 2020. Chinese Second Year II.** Second-year overview of speaking, listening, reading, and writing with exposure to cultures and customs. Native speaker instructor. Prerequisite: Chin 2010 or equivalent. (4 cr) (Sp)

**Chin 3010. Chinese Third Year I.** First segment of the third-year overview of speaking, listening, reading, and writing, with additional exposure to cultures and customs. Readings include excerpts from televised drama. Prerequisite: Chin 2020 or equivalent. (4 cr) (F)

**Chin 3020. Chinese Third Year II.** Second segment of the third-year overview of speaking, listening, reading, and writing, with additional exposure to cultures and customs. Readings include short essays, Chinese proverbs and folktales, and other literary selections. Prerequisite: Chin 3010 or equivalent. (4 cr) (Sp)

**Chin 3100. Readings in Contemporary Chinese Culture.** Introduction to contemporary Chinese culture through readings from newspapers and other source materials. Prerequisite: Chin 2020 or equivalent. (3 cr) (Sp)

**Chin 3510. Chinese Business Language.** Designed to develop students' business Chinese language skills in speaking, listening, reading, and writing, as well as cultural competence. Classwork focuses on Chinese business terms, business conversation, and basic business practices, as well as the Chinese cultural environment. Prerequisite: Chin 2020 or equivalent. (3 cr) (F)

**Chin 3880. Individual Readings in Chinese.** Individual study of selected readings in Chinese. Designed to broaden student's reading comprehension beyond the level addressed in Chin 3020. Prerequisite: Instructor's permission. (1-2 cr) (F,Sp)

## French Courses (*Fren*)

### Lower Division

**Fren 1010. French First Year I.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Not open to those with more than one year high school French or equivalent. (4 cr) (F,Sp)

**Fren 1020. French First Year II.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Prerequisite: Fren 1010 or equivalent. (4 cr) (F,Sp)

**Fren 1050. French First Year I Study Abroad.** Intensive first-year language course designed to increase proficiency in the four language skills and in intercultural knowledge. Offered only through USU's summer study abroad program in France. Not open to those with more than one year high school French or equivalent. (4 cr) (Su)

**Fren 1150. French First Year II Study Abroad.** Intensive first-year language course designed to increase proficiency in the four language skills and in intercultural knowledge. Offered only through USU's summer study abroad program in France. Prerequisite: Fren 1010 or 1050. (4 cr) (Su)

**Fren 1820. Beginning Independent Study: Experiencing Paris.** Beginning-level independent study project focusing on the city of Paris, its history, culture, and patterns of life. Offered only through USU's summer study abroad program in France. (2 cr) (Su)

**Fren 2010. French Second Year I.** Continued development of communicative competencies in the four language skills, with more emphasis on communication through reading and writing and continued exposure to cultures and customs. Prerequisite: Fren 1020 or equivalent. (4 cr) (F,Sp)

**Fren 2020. French Second Year II.** Continued development of communicative competencies in the four language skills, with more emphasis on communication through reading and writing and continued exposure to cultures and customs. Prerequisite: Fren 2010 or equivalent. (4 cr) (F,Sp)

**Fren 2030. French for Everyday Communication.** Development of conversational skills, communication strategies, and cultural knowledge through immersion in a French-speaking environment. Offered only through USU's summer study abroad program in France. (3 cr) (Su)

**Fren 2050. French Second Year I Study Abroad.** Intensive second-year language course designed to increase proficiency in the four language skills and in intercultural knowledge, with more emphasis on communication through reading and writing. Offered only through USU's summer study abroad program in France. Prerequisite: Fren 1020 or equivalent. (4 cr) (Su)

**Fren 2150. French Second Year II Study Abroad.** Intensive second-year language course designed to increase proficiency in the four language skills and in intercultural knowledge, with more emphasis on communication through reading and writing. Offered only through USU's summer study abroad program in France. Prerequisite: Fren 2010 or 2050 or equivalent. (4 cr) (Su)

**Fren 2820. Intermediate Independent Study: Experiencing Paris.** Intermediate-level independent study project focusing on the city of Paris, its history, culture and patterns of life. Offered only through USU's summer study abroad program in France. (2 cr) (Su)

**Fren 2880. Individual Readings.** Individual study of selected readings in French. Instructor's permission required. (1-4 cr) (F,Sp) ®

### Upper Division

Upper-division French courses (3000 level and above) are available *only* to students who have completed Fren 2020 or who can demonstrate equivalent proficiency through testing.

**Fren 3030. Advanced French for Everyday Communication.** Development of advanced conversational skills, communication strategies, and cultural knowledge

through immersion in a French-speaking environment. Offered only through USU's summer study abroad program in France. May not be taken simultaneously with Fren 2030. (3 cr) (Su)

**Fren 3060 (CI). French Conversation.** Designed to develop effective communication skills, to increase vocabulary, and to teach students to express and justify facts, opinions, ideas, and emotions in French. Not open to students with foreign experience. Designed for students who have not had extended residence in a francophone country or extended exposure to a francophone environment. (3 cr) (F)

**Fren 3070. Advanced French Language Study Abroad I.** Intensive upper-division language course combining grammar review, phonetics, advanced conversation and composition, and the study of culture, with an emphasis on current affairs. Offered only through USU's summer study abroad program in France. (4 cr) (Su)

**Fren 3080. Advanced French Language Study Abroad II.** Intensive upper-division language course combining grammar review, phonetics, advanced conversation and composition, and the study of culture, with an emphasis on current affairs. Offered only through USU's summer study abroad program in France. (4 cr) (Su)

**Fren 3090 (CI). French Intermediate Written Communication.** Provides students with intensive practice in various types of writing (e.g., summary, description, narration, letter-writing, etc.) based on a process approach. Involves discussion, writing, and revising. Stresses grammar review. (3 cr) (F)

**\*Fren 3510 (CI). Business French.** Study of vocabulary, idioms, and expressions used in French business communications and an introduction to French business practices. (3 cr) (F)

**\*\*Fren 3550. French Civilization.** Study of historical, social, political, economic, and cultural conditions and institutions of France from early to modern times. (3 cr) (F)

**Fren 3570. France Today.** Study of contemporary life in France, the French people, their daily habits, and their surroundings. What makes the French French. Extensive use of videos, films, and slides. Prerequisite: Fren 2020 or equivalent. (3 cr) (Sp)

**Fren 3600. Textual Analysis.** Introduction to the methods, terminology, and practice of textual analysis. Development of critical thinking and writing skills through the analysis of selected literary and nonliterary texts from different periods and genres, ranging from poetry, novels, and plays to film, painting, music, and art. Course may be repeated once for credit with different content. (3 cr) (F) ®

**Fren 3820. Advanced Independent Study: Experiencing Paris.** Advanced-level independent study project focusing on the city of Paris, its history, culture, and patterns of life. Offered only through USU's summer study abroad program in France. (2 cr) (Su)

**Fren 3880. Individual Readings.** Individual study of selected readings in French. Instructor's permission required. (1-4 cr) (F,Sp,Su) ®

**\*\*Fren 3900. Topics in French and Francophone Studies.** Studies through literature, media, and film on specific topics or themes. Discussion, analysis, and interpretation of selected literary and/or nonliterary works. Occasionally taught in English. (3 cr) (F)

**Fren 4060 (CI). Advanced French Conversation.** Designed for students who have already reached advanced proficiency in speaking through foreign experience, but need to continue the development of their conversational skills. Prerequisite: Fren 3060 or permission of instructor. (3 cr) (Sp)

**Fren 4090 (CI). Advanced Written Communication.** Continued development of French written communication skills based on a process approach. Includes the more advanced concepts of French grammar and extensive writing practice in variety of genres. Prerequisite: Fren 3090 or permission of instructor. (3 cr) (F)

**\*Fren 4200. Applied French Linguistics and Phonetics.** First part analyzes phonological and phonetic patterns of French. Second part deals with selected morphological and syntactic features of French. (3 cr) (Sp)

**Fren 4520. Information Technologies in French.** Practices, theoretical issues, and policy concerns of information technologies resulting from microcomputers, net-

working, and videodisk. Use of microcomputer with French programs. Taught in French. (3 cr) (F)

**\*Fren 4610 (DHA). Period Studies in French Literature.** Examination of a particular period or century. Involves close reading, discussion, analysis, and interpretation of selected literary and nonliterary texts. Sample topics include: The Medieval Period, The Renaissance, Classicism, Baroque, Romanticism, Naturalism, and Contemporary French Literature. Prerequisite: French 3600 or instructor's permission. (3 cr) (Sp)

**\*\*Fren 4620 (DHA). Genre Studies in French Literature.** Examination of a particular genre or body of works from a variety of periods and authors (e.g., novel, play, poetry, short story, film). Involves close reading, discussion, analysis, and interpretation of selected literary and nonliterary texts. Sample topics include: Romance Novels from the Middle Ages to the Present, From Classical to Contemporary French Theatre, French poetry from Baudelaire to Ponge, The Nouveau Roman, New Wave French Cinema, and The Negritude Movement. Prerequisite: French 3600 or instructor's permission. (3 cr) (F)

**Fren 4880. Individual Readings.** Readings in scientific, technical, or literary French. Prerequisite: Permission of instructor. (1-4 cr) (F,Sp) ®

**\*\*Fren 4900. Seminar in French and Francophone Studies.** In-depth exploration of issues central to understanding language, literature, and culture. Critical reading and viewing of written and nonwritten texts with emphasis on student presentations, independent research, and the completion of extended projects. Seminar topics may focus on authors, literary periods, important historical events and social movements, and aspects of francophone cultures. Used periodically for literature in translation. (3 cr) (Sp) ®

**Fren 6200. French Linguistics and Phonetics.** Analysis of selected phonological, morphological, syntactic, and semantic features of contemporary French, including a study of colloquial French, comparing pronunciation, vocabulary, and grammar with standard forms. (3 cr) (Sp)

## German Courses (*Germ*)

### Lower Division

**Germ 1010. German First Year I.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Not open to those with more than one year high school German or equivalent. (4 cr) (F,Sp)

**Germ 1020. German First Year II.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Prerequisite: Germ 1010 or at least one (but not more than two) years of German in high school or equivalent. (4 cr) (F,Sp)

**Germ 1800. German I Study Abroad.** Intensive study in a German-speaking country, advancing proficiency in the four language skills and multicultural knowledge at the beginning level. No prerequisites. (1-4 cr) (Su) ®

**Germ 2010. German Second Year I.** Further development of first-year competencies with emphasis on language structure, vocabulary expansion, reading, writing, and conversation in the context of cross-cultural analysis. Prerequisite: Germ 1020 or equivalent. (4 cr) (F,Sp)

**Germ 2020. German Second Year II.** Further development of first-year competencies with emphasis on language structure, vocabulary expansion, reading, writing, and conversation in the context of cross-cultural analysis. Prerequisite: Germ 2010 or equivalent. (4 cr) (F,Sp)

**\*Germ 2550. German Civilization.** Covers the most important developments in German-speaking countries from the High Middle Ages to the present. Deals with political, social, literary, historical, and artistic expressions of an emerging culture. Taught in English. (3 cr) (F)

**\*\*Germ 2570. Contemporary Germany.** Covers the most important elements of contemporary German culture in its literary, social, and artistic manifestations, and the political and historical dimensions of agents of change. Taught in English. (3 cr) (Sp)

**Germ 2800. German II Study Abroad.** Intensive study in a German-speaking country, advancing proficiency in the four language skills and multicultural knowledge at the second-year level. (1-4 cr) (Su) ®

**Germ 2880. Individual Readings.** Individual study of selected readings in German. Prerequisite: Instructor's permission. (1-4 cr) (F,Sp) ®

### Upper Division

Upper-division German courses (3000 level and above) are available *only* to students who have completed Germ 2020 or who can demonstrate equivalent proficiency through testing. All upper-division courses are taught in German, unless otherwise indicated.

**Germ 3000 (DHA). Introduction to German Studies.** Introduction to the discipline of German Studies (history, literature, the arts, philosophy, science, economics, politics, etc.), addressing information resources, research methods, student career goals, and practice. Advances oral and written language proficiency. (3 cr) (F)

**Germ 3040 (CI), Germ 3050 (CI). Advanced German Grammar and Composition.** Thorough review of German grammar and style. Application of rules of writing to compositions. Oral presentations of contemporary topics with graded difficulty. (3 cr) (F) (3 cr) (Sp)

**Germ 3300 (DHA). Contemporary German Speaking Cultures.** Multidisciplinary examination of current trends in contemporary cultures. Written, oral, visual, and electronic texts from the post-World War II period will be analyzed and placed in sociopolitical, economic, historical, and literary contexts. Emphasis on Germany as a multicultural society, and on related popular and minority cultural discourse. Interactive format. (3 cr) (Sp)

**\*Germ 3510 (CI). Business German.** Study of current German business and commercial practices, terminology, and business-related communications skills in a multi-disciplinary and global world context. Advances the four language skills. (3 cr) (Sp)

**\*Germ 3540 (CI). Techniques in Translating German Texts.** Approaches to translation. Specialized vocabulary, reference materials, and aids. Translation theory. Practical exercises. (3 cr) (F)

**\*\*Germ 3550 (DHA). Cultural History of German Speaking Peoples.** Overview and critical analysis of cultural, historical, and intellectual developments that have shaped the civilizations of German-speaking peoples from 800 A.D. until the end of World War II. Examination of written, oral, visual, and electronic texts integrated in the context of Western philosophy and humanist thought. Interactive format. (3 cr) (F)

**\*\*Germ 3600 (DHA). Survey of German Literature I.** Overview, with selected readings, of the major literary trends in German-speaking cultures from the medieval period to the early nineteenth century, including the study of genres, epochs, styles, and theories in the context of evolving cultures. (3 cr) (F)

**\*\*Germ 3610 (DHA). Survey of German Literature II.** Overview, with selected readings, of the major literary trends in German-speaking cultures from the early nineteenth century to the present, including the study of genres, epochs, styles, and theories in the context of evolving cultures. (3 cr) (Sp)

**Germ 3800. German III Study Abroad.** Intensive study in a German-speaking country, advancing proficiency in the four language skills and multicultural knowledge at the third-year level. (1-4 cr) (Su) ®

**Germ 3880. Individual Readings.** Individual study of selected readings in German. Prerequisite: Instructor's permission. (1-4 cr) (F,Sp) ®

**\*\*Germ 4200. Applied German Linguistics and Phonetics.** Discussion of syntactical and morphological problems of German, principles of language learning, and analysis of phonological and phonetic patterns. (3 cr) (Sp)

**\*\*Germ 4600. Faust's Legacy.** Examination of the legendary figure of Faust through historical and contemporary perspectives. Analysis of the Faust theme and character as presented in literature, films, stage productions, and musicals. Taught in English. (3 cr) (F)

**\*\*Germ 4610. German Narratives.** Readings from a wide range of narrative texts representing various historical periods. Focus on literary traditions within historical contexts. Examination of styles, motifs, and the theory of the novel. (3 cr) (Sp)

**\*Germ 4650. Trends in Modern German Literature.** Study of literary movements, topics, and styles of modern (twentieth century) German literature. Concentration on texts representing a variety of aesthetic expressions, central to experiences of twentieth century life. (3 cr) (F)

**Germ 4800. German IV Study Abroad.** Intensive study in a German-speaking country, advancing proficiency in the four language skills and multicultural knowledge at the fourth-year level. (1-4 cr) (Su) ®

**Germ 4880. Individual Readings.** Readings in technical, scientific, and literary German. Prerequisite: Instructor's permission. (1-4 cr) (F,Sp) ®

**\*Germ 4900. Special Topics.** Selected critical topics and themes relating to German literature, culture, film, pedagogy, linguistics, and associated theories. Includes readings in English and German. Content determined by student need and interest. (3 cr) (Sp) ®

**\*\*Germ 4910. German for Special Purposes.** Advances German communicative proficiency in the fields of business, science, and pedagogy. Promotes professional applications of German terminologies and procedures for science and commerce, as well as teaching methodology. Discipline-interactive projects advance the four language skills. (3 cr) (Sp)

**Germ 6200. German Linguistics and Phonetics.** Discussion of syntactical and morphological problems of German and principles of language learning. Phonological and phonetic patterns of the German language also discussed. (3 cr) (Sp)

## *Greek Courses (Grk)*

Greek courses are listed with the History Department (see page 284).

## *Italian Courses (Ital)*

**Ital 1010. Italian First Year I.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Native speaker instructor. Self-study with tutorial assistance. (4 cr) (F)

**Ital 1020. Italian First Year II.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Native speaker instructor. Self-study with tutorial assistance. Prerequisite: Ital 1010 or equivalent. (4 cr) (Sp)

**Ital 2010. Italian Second Year I.** Second-year overview of speaking, listening, reading, and writing, with exposure to cultures and customs. Native speaker instructor. Self-study with tutorial assistance. Prerequisite: Ital 1020 or equivalent. (4 cr) (F)

**Ital 2020. Italian Second Year II.** Second-year overview of speaking, listening, reading, and writing, with exposure to cultures and customs. Native speaker instructor. Self-study with tutorial assistance. Prerequisite: Ital 2010 or equivalent. (4 cr) (Sp)

## *Japanese Courses (Japn)*

**Japn 1010. Japanese First Year I.** First course in beginning Japanese. Proficiency in the recognition of the basic Japanese sound system by learning Hiragana and Katakana. Communicative mastery of sentences having polite and plain forms of verbs, adjectives, and copula. Exposure to Japanese culture and customs. (4 cr) (F)

**Japn 1020. Japanese First Year II.** Second course in beginning Japanese. Introduction to the basic 100 Kanji. Mastery of more complicated sentences, including conditional temporal, volitional, and potential expressions. Exposure to Japanese culture and customs. Prerequisite: Japn 1010 or equivalent. (4 cr) (Sp)

**Japn 2010. Japanese Second Year I.** First course in intermediate Japanese. Proficiency in reading and writing 150 additional Kanji. Mastery of the last basic grammar topics, such as passive, causative, passive causative, and giving/receiving expressions. Introduction to honorific/humble expression. Exposure to Japanese culture and customs. Prerequisite: Japn 1020 or equivalent. (4 cr) (F)

**Japn 2020. Japanese Second Year II.** Second course in intermediate Japanese. Proficiency in reading 150 additional Kanji and writing 200 additional Kanji. Mastery of frequently used idioms and expressions. Exposure to more authentic reading materials. Competency in writing short essays. Exposure to Japanese culture and customs. Prerequisite: Japn 2010 or equivalent. (4 cr) (Sp)

**Japn 3010. Japanese Third Year I.** First segment of the third-year Japanese reading/writing course. Proficiency in reading and writing an additional 500 Kanji. Prerequisite: Japn 2020 or equivalent. (4 cr) (F)

**Japn 3020. Japanese Third Year II.** Second segment of the third-year Japanese reading/writing course. Proficiency in reading and writing an additional 500 Kanji. Prerequisite: Japn 3010 or equivalent. (4 cr) (Sp)

**Japn 3050. Japanese Calligraphy.** Study of Japanese writing system through practicing the art of calligraphy. No prerequisites. Also taught as Art 3050. (1 cr) (Sp)

**Japn 3100. Readings in Contemporary Japanese Culture.** Introduction to contemporary Japanese culture through readings from newspapers and other source materials. Prerequisites: Japn 3010 and 3020. (3 cr) (F)

**Japn 3510. Japanese for the Business Environment.** Mastery of technical terms related to Japanese business and its environment. Communicative competency in contemporary Japanese society. Prerequisite: Japn 3020. (3 cr) (Sp)

**Japn 4250. Internship/Coop.** Cooperative education through internship programs provided by companies in Japan. Intended for students participating in the U.S.-Japan internship program. Prerequisites: Japn 3010, 3020, and 3510. (3-9 cr) (Su)

## *Korean Courses (Kor)*

**Kor 1010. Korean First Year I.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. (4 cr) (F)

**Kor 1020. Korean First Year II.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Prerequisite: Kor 1010 or equivalent. (4 cr) (Sp)

**Kor 2010. Korean Second Year I.** Development of grammatical knowledge and writing skills. Prerequisite: Kor 1020 or equivalent. (4 cr) (F)

**Kor 2020. Korean Second Year II.** Development of advanced reading comprehension skill through discussions and summaries of a variety of texts. Prerequisite: Kor 2010 or equivalent. (4 cr) (Sp)

**Kor 3010. Korean Third Year I.** Development of advanced reading, writing, and conversational skills. Prerequisite: Kor 2020 or equivalent. (4 cr) (F)

**Kor 3020. Korean Third Year II.** Continuous development of advanced reading, writing, and conversational skills. Prerequisite: Kor 3010 or equivalent. (4 cr) (Sp)

**Kor 3510. Business Korean.** Designed to help students acquire a broad knowledge of business Korean and relevant Korean culture. Develops language skills and cultural knowledge useful for performing basic functions within the Korean business environment. Focuses on important business terms, phrases, and business etiquette. Prerequisite: Kor 2010 or equivalent language proficiency. (3F)

## Language Courses (Lang)

**Lang 3990. Special Topics.** Additional readings or research done beyond the material covered in other language courses. May be repeated for credit if different topic is covered. Prerequisite: Instructor's permission. (1-5 cr) (F,Sp,Su) ®

**Lang 4200H. Senior Honors Seminar.** Credit for completing and presenting a senior honors thesis project. Requirement may be fulfilled by publishing the thesis in an academic journal, defending the thesis before a faculty committee, presenting the thesis at an academic conference, or presenting the thesis in the languages session during Scholar's Day. (1 cr) (Sp)

**Lang 4210H. Senior Honors Thesis.** Independent study research credits for preparation of a senior honors thesis to fulfill requirements for a degree in languages with departmental honors. Prerequisite: Permission of instructor prior to enrollment. (1-4 cr) (F,Sp) ®

## Latin Courses (Latn)

Latin courses are listed with the History Department (see pages 283-284).

## Linguistics Courses (Ling)

**Ling 2250. Cooperative Education.** Course credit for professional experience outside the classroom. Statement of professional goals and a summary report following the experience are required. (1-3 cr) (F,Sp,Su) ®

**Ling 3300. Clinical Experience I.** First clinical practicum in middle and secondary schools. Arranged by special methods instructor. Required at Level I. Taken concurrently with Ling 4400. Prerequisites set by Secondary Education Department. (1 cr) (F,Sp)

**Ling 4100. The Study of Language.** Investigates ways in which human languages are structured, how they change, how they reflect the cultures in which they are used, and how they are learned. Also taught as Anth 4100. (3 cr) (F,Sp)

**Ling 4190. Language Laboratory Methodology and Techniques in Foreign Language Instruction.** Practical instruction and demonstration of a modern foreign language laboratory operation, including the use of audio, video, and computer equipment to teach the four basic skills: listening, speaking, reading, and writing. Prerequisite: 15 credits in upper-division language courses. (2 cr) (Sp)

**Ling 4250. Cooperative Education.** Course credit for professional experience outside the classroom. Statement of professional goals and a summary report following the experience are required. (1-3 cr) (F,Sp,Su) ®

**Ling 4300. Clinical Experience II.** Second clinical practicum in middle and secondary schools. Arranged by special methods instructor. Required at Level II. Taken concurrently with Ling 4400. Prerequisites set by Secondary Education Department. (1 cr) (F,Sp)

**Ling 4400. Teaching Modern Languages.** Methods course for teaching majors or minors in any of the modern languages. Considers the context of the present secondary language classroom, effective teaching techniques that can be used in that context, and significant trends in teaching and learning languages. (3 cr) (F,Sp)

**\*\*Ling 4520. Modern Technology for Modern Language Teaching.** Web- and disk-based technology for developing electronic course modules for the modern language learning classroom. (2 cr) (Su)

**Ling 4900. Analysis of Cross-Cultural Difference.** Develops awareness of what culture is and how it shapes perceptions and attitudes. Through interactive student-centered activities, students learn to analyze cultural differences. (3 cr) (Sp)

**Ling 4920. Practicum in Language Tutoring.** Allows language students to develop tutoring skills by assisting professors daily in lower-division courses or fulfilling instructional duties for a comparable amount of time in the language laboratory, public schools, or similar activities with departmental approval. May be repeated for up to a maximum of 3 credits. (1 cr) (F,Sp,Su) ®

**Ling 5500. Student Teaching Seminar.** Capstone seminar focused upon student teaching issues, professional development, and principles of effective instruction, with emphasis on reflective teaching. (2 cr) (F,Sp)

**Ling 5600. Student Teaching in Secondary Schools.** Ten-week culminating practicum experience in which students assume full-time teaching responsibilities under direction of cooperating teachers in their major and minor fields. Prerequisites set by Secondary Education Department. (8 cr) (F,Sp)

**Ling 6010. Research in Second Language Learning.** Readings in current SLL literature evaluated in terms of their implications for classroom practice. (3 cr) (F)

**Ling 6190. Language Laboratory Methods.** For students who intend to become teachers of a foreign language. Teaching procedures, as well as administrative and mechanical techniques, relating to the language lab and its components. (2 cr) (Sp)

**Ling 6400. Second Language Teaching: Theory and Practice.** Survey of theories about memory, assigning meaning to recall, and methods L2 teachers and learners use to apply meaning to their teaching and learning. Central to all course topics are social dynamics in the L2 classroom and issues of schooling students of diverse backgrounds. (3 cr) (Sp)

**Ling 6510. Linguistic Analysis.** Comparative study of linguistic patterns across languages. Linguistic structures and language typology for teachers of modern languages. (3 cr) (Sp)

**\*\*Ling 6520. Modern Technology for Modern Language Teaching.** Explores web-based technology for developing electronic course modules for the modern language learning classroom. (2 cr) (Su)

**Ling 6800. Topics in Second Language Acquisition.** Advanced seminar in the acquisition and teaching of languages. (3 cr) (F,Sp,Su) ®

**Ling 6900. Culture Teaching and Learning: Theory and Practice.** Examines culture learning and connection between development of communicative and cultural competence in the second language learner. Reviews theory, research, and practice in the field of intercultural communication as relating to second language learning and teaching. (3 cr) (Sp)

**Ling 6910. Practicum in Language Teaching.** Advanced language-teaching methods and evaluation. Required for first-year teaching assistants. (3 cr)

**Ling 6940. Independent Study.** Individually directed readings and conference. Departmental permission required before registration. Prerequisite: Approval of instructor. (1-3 cr) (F,Sp,Su) ®

**Ling 6960. Research and Consultation.** With guidance and criticism, student conducts individual work on his or her portfolio. (1-3 cr) (F,Sp,Su)

## Navajo Courses (Nav)

**Nav 3040. Navajo Literacy and Grammar for Native Speakers.** Designed to develop advanced skills in the grammar, comprehension, reading, and writing of Navajo. Integrates Diné holistic teaching concepts in accordance with the "Hózhóogo" liná" four-direction Diné philosophy of learning paradigm. Prerequisite: Permission of instructor. (3 cr) (Sp)

**Nav 3050. Navajo Descriptive and Narrative Writing.** Presents reading and writing in the genres of Navajo narration and description. Prepares students to take the Navajo Language Proficiency Exam, and integrates holistic teachings in accordance with the "Hózhóogo" liná" four-direction Diné philosophy of learning paradigm. Prerequisite: Permission of instructor (3 cr) (F)

**Nav 4400. Teaching Navajo as a Second Language.** Addresses major issues in the teaching/learning of second languages, with emphasis on Navajo as taught in the public schools. Integrates Diné holistic teaching concepts in accordance with the “Hózhóogo” liná” four-direction Diné philosophy of learning paradigm. Prerequisite: Permission of instructor. (3 cr) (Sp)

**Nav 4410. Teaching Navajo to Native Speakers.** Addresses major issues and methods in teaching Navajo literacy and Navajo language arts to native speakers of Navajo. Integrates Diné holistic teaching concepts in accordance with the “Hózhóogo” liná” four-direction Diné philosophy of learning paradigm. Prerequisite: Permission of instructor. (3 cr) (F)

## *Portuguese Courses (Port)*

**Port 1010. Portuguese First Year I.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. (4 cr) (F)

**Port 1020. Portuguese First Year II.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Prerequisite: Port 1010 or equivalent. (4 cr) (F,Sp)

**Port 1050. Intensive Portuguese for Spanish Speakers.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Intensive course for Spanish speakers. (4 cr) (Sp)

**Port 2010. Portuguese Second Year I.** Continued development of communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Prerequisite: Port 1020 or equivalent. (4 cr) (F)

**Port 2020. Portuguese Second Year II.** Continued development of communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Prerequisite: Port 2010 or equivalent. (4 cr) (Sp)

**Port 2880. Individual Readings.** Individual study of selected readings in Portuguese. Instructor’s permission required. (1-4 cr) (F,Sp) ®

**Port 3040 (CI). Advanced Portuguese Grammar and Composition.** Review of the more complex Portuguese grammatical points and development of writing skills through composition. Prerequisite: Port 2020 or equivalent. (3 cr) (F,Sp)

**Port 4880. Individual Readings.** Readings in Brazilian and/or Portuguese literature. Prerequisite: Instructor’s permission. (1-4 cr) (F,Sp) ®

## *Russian Courses (Russ)*

**Russ 1010. Russian First Year I.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Not open to those with more than one year high school Russian or equivalent. (4 cr) (F)

**Russ 1020. Russian First Year II.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Prerequisite: Russ 1010, or not more than three years of high school Russian. (4 cr) (Sp)

**Russ 2010. Russian Second Year I.** Further development of first-year competencies with emphasis on language structure, vocabulary expansion, reading, writing, and conversation in the context of culture. Prerequisite: Russ 1020 or two or more years of high school Russian. (4 cr) (F)

**Russ 2020. Russian Second Year II.** Further development of first-year competencies with emphasis on language structure, vocabulary expansion, reading, writing, and conversation in the context of culture. Prerequisite: Russ 2010 or three or more years of high school Russian. (4 cr) (Sp)

**Russ 2880. Individual Readings.** Individual study of selected readings in Russian. Prerequisite: Instructor’s permission. (1-4 cr) (F,Sp) ®

**Russ 3040, Russ 3050. Advanced Russian Grammar and Composition.** Detailed presentation of Russian grammar. Class discussions and work on oral and written assignments. Prerequisite: Russ 2020 or equivalent. (3 cr) (F) (3 cr) (Sp)

**Russ 3300. Contemporary Russian Language and Culture.** Reading and discussion of contemporary popular, literary, and scientific materials in Russian. Also cultural and historical considerations of today’s Russia. Prerequisite: Russ 2020 or equivalent. (3 cr) (F)

**\*Russ 3510 (CI). Business Russian.** Study of current Russian business and commercial terminology and practices. Development of communication skills for international Russian business purposes. Prerequisite: Russ 2020 or equivalent. (3 cr) (F)

**Russ 3540. Russian Translation for Science, Business, and Culture.** Familiarization with approaches to translation, special grammatical structures, specialized vocabulary, and reference materials and aids. Practical exercises. Prerequisite: Russ 2020 or equivalent. (3 cr) (Sp)

**Russ 4880. Individual Readings.** Readings in technical, scientific, or literary Russian. Prerequisite: Instructor’s permission. (1-4 cr) (F,Sp) ®

## *Spanish Courses (Span)*

### *Lower Division*

**Span 1010. Spanish First Year I.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Prerequisite: No more than one year of Spanish in high school or placement in this specific class by examination. (4 cr) (F,Sp)

**Span 1020. Spanish First Year II.** Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Prerequisite: Span 1010 (or equivalent coursework) or placement in this specific class by examination. (4 cr) (F,Sp)

**Span 1050. Intensive First Year Spanish.** Intensive one-semester alternative course to Span 1010 and 1020, emphasizing active usage. (8 cr) (Su)

**Span 1800. Spanish I Study Abroad.** Taught overseas only. Communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. (1-4 cr) (Su) ®

**Span 2010. Spanish Second Year I.** Continued development of communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Prerequisite: Span 1020 (or equivalent coursework) or placement in this specific class by examination. (4 cr) (F,Sp)

**Span 2020. Spanish Second Year II.** Continued development of communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Prerequisite: Span 2010 (or equivalent coursework) or placement in this specific class by examination. (4 cr) (F,Sp)

**Span 2800. Spanish II Study Abroad.** Taught overseas only. Continued development of communicative competencies in the four language skills: speaking, listening, reading, and writing, with exposure to cultures and customs. Prerequisite: Span 1020 or equivalent. (1-4 cr) (Su) ®

### Upper Division

Upper-division Spanish courses (3000 level and above) are available *only* to students who have completed Span 2020 or who can demonstrate equivalent proficiency through testing.

**Span 3040. Advanced Spanish Grammar.** Intense review of selected problematic areas of Spanish grammar for students with advanced language skills. Prerequisite: Span 2020 (or equivalent coursework) or placement in this specific class by examination. (3 cr) (F,Sp)

**Span 3060 (CI). Advanced Spanish Conversation and Composition.** Development of advanced conversation and writing skills through debate and composition on contemporary controversial topics. (3 cr) (F)

**Span 3510. Business Spanish.** Development of communication skills in Spanish for international Hispanic business purposes. (3 cr) (F)

**Span 3550 (DHA). Spanish Culture and Civilization.** Historical, social, political, economic, and cultural conditions and institutions of Spain. (3 cr) (F)

**Span 3570 (DHA). Latin American Culture and Civilization.** Historical, social, political, economic, and cultural conditions and institutions of Latin American countries. (3 cr) (Sp)

**Span 3600 (DHA). Survey of Spanish Literature I.** Selective readings and discussions of major works and authors in Spanish literature from El Cid through Calderon. Prerequisites: Engl 1010 and 2010; Span 3040; and either Span 3550 or 3570. (3 cr) (F,Sp)

**Span 3610 (DHA). Survey of Spanish Literature II.** Selective readings and discussions of major works and authors in Spanish literature from the eighteenth to twentieth centuries. Prerequisites: Engl 1010 and 2010; Span 3040; and either Span 3550 or 3570. (3 cr) (F,Sp)

**Span 3620 (DHA). Survey of Latin American Literature I.** Selective readings and discussions of major works and authors in Latin American literature from Pre-Columbian works through the beginnings of Modernism. Prerequisites: Engl 1010 and 2010; Span 3040; and either Span 3550 or 3570. (3 cr) (F,Sp)

**Span 3630 (DHA). Survey of Latin American Literature II.** Selective readings and discussions of major works and authors in Latin American literature from Modernism to the present. Prerequisites: Engl 1010 and 2010; Span 3040; and either Span 3550 or 3570. (3 cr) (F,Sp)

**Span 3800. Spanish III Study Abroad.** Intense review of selected problematic areas of Spanish grammar for students with advanced language skills. Taught only in studies overseas in Spanish program. (1-4 cr) (Su) ®

**Span 4200. Applied Spanish Linguistics and Phonetics.** Analysis of selected phonological, morphological, syntactic, and semantic features of the Spanish language, including Spanish-English contrastive analysis. Prerequisite: Span 3040. (3 cr) (Sp)

**Span 4800. Hispanic Culture and Civilization—Study Abroad.** Historical, social, political, economic, and cultural conditions and institutions of Hispanic countries. Taught only in studies overseas in Spanish program. (1-4 cr) (F,Sp,Su) ®

**Span 4880. Individual Readings.** Individual readings or projects in Spanish. Prerequisite: Instructor's permission. (1-4 cr) (F,Sp) ®

**Span 4900. Topics of Spanish Literature.** Repeatable for additional credit when topics vary. Prerequisites: At least two of the following: Span 3600, 3610, 3620, and 3630. (3 cr) (F,Sp) ®

**Span 4910. Topics of Latin American Literature.** Repeatable for additional credit when topics vary. Prerequisites: At least two of the following: Span 3600, 3610, 3620, and 3630. (3 cr) (F,Sp) ®

**Span 6200. Spanish Linguistics and Phonetics.** Analysis of phonology, morphology, and syntax of the Spanish language. (3 cr) (Sp)

## Philosophy

Philosophy at USU reflects the ideals of the liberal arts in encouraging the respect for truth without promoting dogmatism, and in offering the opportunity for students to increase their self-understanding at the same time as they increase their knowledge of the world around them.

Philosophy faculty in the Department of Languages and Philosophy teach courses leading to an undergraduate major and a minor in philosophy. The mission of the Philosophy program at Utah State University is to provide a high-quality education leading to an understanding of the major areas of inquiry represented within the discipline of philosophy. Coursework emphasizes the areas of the history of philosophy, logic, ethical theory and applied ethics, and metaphysics and epistemology. The curriculum is designed to meet a wide variety of student interests in pursuing a major in philosophy. It provides a rigorous foundation for students intending to further their education in law school or graduate school in philosophy, and it also provides an exciting and challenging education for those students who enjoy thinking about ideas for their own sake. Coursework is also designed to enrich the education of students majoring in other subjects, by providing them with opportunities to gain an understanding of philosophical perspectives on and philosophical foundations of their chosen fields.

### Course Requirements

**Bachelor of Arts in Philosophy (30 credits).** Phil 1200 or 2200, 2400 or 2500, 3100, 3120; one of the following courses: Phil 3500, 3510, 3520, 4500, 4540, or 4610; two of the following courses, at least one of which must be Phil 4300 or 4400: Phil 4300, 4310, 4400, 4410, 4420; three other upper-division philosophy courses; other University Studies courses as required by the University; completion of the foreign language requirement for the BA degree (see page 53).

The **Bachelor of Science** degree can be awarded in Philosophy to philosophy majors who have not completed the foreign language requirement for the Bachelor of Arts degree in Philosophy.

**Philosophy Minor (18 credits).** Six courses in Philosophy, at least four of which must be at the upper-division level, must be completed for a philosophy minor.

## Philosophy Courses (Phil)

**Phil 1010 (BHU). Introduction to Philosophy.** Introduction to philosophical questions regarding truth, knowledge, reality, mind, God, morality, and meaning. Examination of various philosophical responses to these questions. (3 cr) (F,Sp)

**\*Phil 1200 (BHU). Practical Logic.** Recognition of arguments and their logical structure. Study of formal and informal fallacies in reasoning. Enthymemes, analogical arguments, syllogisms, and Venn diagrams. Logical analysis of writing in the arts and sciences. (3 cr) (Sp)

**Phil 2200 (QI). Deductive Logic.** Study of deductive arguments and techniques for evaluating their validity. Recognizing formal fallacies in reasoning. Symbolizing English sentences and arguments to make their meanings precise. Study of quantifiers and relations. Prerequisite: Math 1030 or Stat 1040. (3 cr) (F,Sp)

**Phil 2400 (BHU). Ethics.** Study of judgments concerning what is good or bad, right or wrong. How judgments are justified and related to action. Relativism, subjectivism, absolutism, freedom, and responsibility. (3 cr) (Sp)

**Phil 2500 (BHU). Social Ethics.** Examination of principles and arguments underlying current debate in American law and politics. Topics may include abortion, euthanasia, capital punishment, discrimination and affirmative action, sexual harassment, freedom of expression, welfare, and duties to help the poor in other nations. (3 cr) (F)

**\*\*Phil 3100 (CI). Ancient Philosophy.** Development of philosophical thought in the Ancient Greek world. Readings from the pre-Socratics, Plato, Aristotle, the Stoics, and Epicureans. (3 cr) (F)

**\*\*Phil 3110. Medieval Philosophy.** Neo-Platonism with stress on Plotinus, St. Augustine, and early Christian philosophy; early medieval thought; St. Thomas Aquinas and the rise of scholasticism; and philosophical thought in the Renaissance. (3 cr) (Sp)

**\*Phil 3120 (CI). Early Modern Philosophy.** Philosophers and philosophical disputes in Western Europe from 1400-1750. Figures and topics may include: Bacon, Hobbes, Descartes, Locke, Hume, nominalism, empiricism, rationalism, religion, politics, and morals. (3 cr) (F)

**\*Phil 3150 (CI). Kant and His Successors.** Philosophers and philosophical disputes in Western Europe from 1750-1900. Study of Kant, Hegel, Bentham, Mill, Marx, Schopenhauer, and Nietzsche. Examination of critical idealism, philosophy of history, utilitarianism, communism, and origins of existentialism. (3 cr) (Sp)

**\*\*Phil 3160 (CI). Contemporary Philosophy.** Twentieth century philosophical thought, including existentialism, logical positivism, analytic philosophy, and postmodernism, as expressed in the works of Heidegger, Husserl, Wittgenstein, Carnap, Russell, Quine, Sartre, Derrida, and others. (3 cr) (F)

**\*Phil 3180 (DHA, CI). Contemporary European Philosophy.** Study of twentieth-century philosophical movements originating and developing on the European continent. Movements to be considered may include: existentialism, phenomenology, hermeneutics, and post-metaphysical philosophy. (3 cr) (F)

**Phil 3500. Medical Ethics.** Key issues in medicine, including: consent, competency, confidentiality, euthanasia, abortion, and the justification of health care. (3 cr) (F)

**Phil 3510 (DHA). Environmental Ethics.** Key issues in the treatment of nature, such as: the value of wilderness, animal rights, comparative views of nature, and moral issues in economic approaches to the wilderness. (3 cr) (F,Sp)

**Phil 3520 (DHA). Business Ethics.** Key issues in business, including: foreign bribery, corporate responsibility, corporate culture, ethical theories, justice, and preferential treatment. (3 cr) (Sp)

**Phil 3700. Philosophy of Religion.** Problems in defining "religion" and the existence of God; the problem of evil; the immortality of the soul; religious experience; faith; alternatives to theism; religious language. (3 cr) (F)

**\*Phil 3710. Philosophies of East Asia.** Study of three Asian philosophies: Confucianism, Taoism, and Buddhism. Focus on appreciating the merits of each system of thought. Emphasis on class discussion and participation. (3 cr) (F)

**\*Phil 3720. Philosophical Theology After Kant.** Explores attempts to reconstruct the reasonable basis of religion in the two centuries after the Enlightenment. (3 cr) (F)

**\*Phil 3730 (CI). Philosophy of the New Testament.** Historical and intellectual context of the development of the New Testament. Character, ideas, and historical setting of the various documents. (3 cr) (Sp)

**\*\*Phil 3800 (DHA). Philosophy in Literature.** Study of philosophical concepts, problems, and issues as they have been presented and dramatized in works of literature and cinema. Discussion of issues concerning ethics, epistemology, ontology, and logic. Students read or view works from a variety of media, including novels, short stories, and films. (3 cr) (F)

**Phil 3810 (DHA). Aesthetics.** Analysis of traditional theories of aesthetics and art criticism. Theories are applied to illustrative examples, including music, painting, photography, sculpture, dance, literature and cinema. (3 cr) (Sp)

**\*Phil 4300 (DHA). Epistemology.** Study of foundations of knowledge and belief systems, and related topics in epistemology, including perception, certainty, and skepticism. (3 cr) (F)

**Phil 4310 (DHA). Philosophy of Science.** Study of different views of the nature of science: the classical traditions of Hempel and Popper, Kuhn's subjectivism, and Feyerabend's anarchism. Topics include confirmation, induction, scientific realism, reductionism, and the growth of scientific knowledge. (3 cr) (Sp)

**\*\*Phil 4320 (DHA). History of Scientific Thought.** Examination of key episodes in the history of science and associated ideas about the nature of scientific knowledge and how this knowledge may be acquired. Also taught as Hist 4320. (3 cr) (Sp)

**\*\*Phil 4400. Metaphysics.** Study of fundamental problems of existence. Topics include: mind and its relation to the body, determinism and human freedom, fatalism, idealism and realism, truth, and our knowledge of the world. (3 cr) (F)

**Phil 4410 (DHA). Philosophy of Mind.** Beginning with the context of Cartesian mind/body dualism, a thorough examination of Cartesian privacy, privileged access, and the problem of other minds is conducted. Ancillary topics may include the mind/machine controversy and animal intelligence. (3 cr) (F)

**\*\*Phil 4420. Philosophy of Language.** Nature and uses of language, concepts of meaning, reference, truth, syntax, semantics, pragmatics, metaphors, ambiguity, vagueness, and definition. Application in linguistics, psychology, anthropology, and literary criticism. (3 cr) (Sp)

**\*Phil 4500. Contemporary Ethical Theory.** Careful examination of one or more topics playing a central role in current moral philosophy. Focus on work produced in philosophical literature within last twenty years. (3 cr) (Sp)

**\*Phil 4530 (DSC) (d6530).<sup>1</sup> Ethics and Biotechnology.** Interdisciplinary examination of key issues such as: cloning, human genetic screening and therapy, and transgenic animals and food. (3 cr) (Sp)

**\*Phil 4540 (DHA) (d6540). Human Values and Information Technology.** Philosophical investigation of relations between technological change, human values, and the good life. Emphasis on growth of computer-mediated communication and its impact on values such as autonomy and privacy. (3 cr) (Sp)

**\*Phil 4600. Philosophy of Law.** Examines the nature of law, relations between law and morality, the obligation to obey law, ways to interpret law, the justification of legal punishment, and appropriate conditions for civil and criminal liability. (3 cr) (F)

**\*\*Phil 4610 (DHA). Social and Political Philosophy.** Explores the nature of a just society, political obligation, and justification and proper limits of political power. (3 cr) (Sp)

**Phil 4900. Special Topics.** Detailed consideration of a particular philosopher or philosophical problem. Instructor approval required. Course may be repeated when a different topic is discussed. (3 cr) (F,Sp) ®

**Phil 4910. Readings and Research.** Independent study of a particular philosopher or philosophical topic. Consent of instructor required. Course may be repeated when a different topic is discussed. (1-4 cr) (F,Sp) ®

**Phil 4920H. Senior Honors Seminar.** Credit for completing and presenting a senior honors thesis project. Requirement may be fulfilled by publishing the thesis in an academic journal, defending the thesis before a faculty committee, presenting the thesis at an academic conference, or presenting the thesis in the philosophy session during Scholar's Day. (1 cr) (Sp)

**Phil 4930H. Senior Honors Thesis.** Independent study research credits for preparation of a senior honors thesis to fulfill requirements for a degree in philosophy with departmental honors. Prerequisite: Permission of instructor prior to enrollment. (1-4 cr) (F,Sp,Su) ®

**Phil 4990. Philosophy Seminar.** Advanced study of recent work in philosophy. Topic will vary by instructor. Especially appropriate for students planning to go on to graduate or professional school. (3 cr) (Sp)

**\*\*\*Phil 5200. Symbolic Logic.** Study of the metatheory for truth functional and predicate logic. Examination of systems employing modal, epistemic, and deontic operators. Set theory, fuzzy logic, and Godel's undecidability theorem may also be considered. If time permits, applied logic will be considered. Prerequisite: Phil 2200 or instructor's approval. (3 cr) (Sp)

**\*\*Phil 5510. Ethics and the Environment.** Study and analysis of both individualistic and holistic approaches to environmental ethics, with emphasis on contemporary debates within the field and their implications for the formation of public policies. Prerequisite: Phil 3510 or graduate standing. (3 cr) (F)

**\*\*\*Phil 5600. Legal Ethics.** Study and analysis of major issues arising in the practice of law within the context of the American adversarial system of justice. Prerequisite: Phil 4600, graduate standing, or permission of instructor. (3 cr) (F)

**\*\*Phil 6420. Philosophy of Language.** (3 cr) (Sp)

**\*Phil 6530 (d4530). Ethics and Biotechnology.** Interdisciplinary examination of key issues such as: cloning, human genetic screening and therapy, and transgenic animals and food. To receive graduate credit, extra readings and a 25-30 page paper will be required. (3 cr) (Sp)

**\*Phil 6540 (d4540). Human Values and Information Technology.** Philosophical investigation of relations between technological change, human values, and the good life. Emphasis on growth of computer-mediated communication and its impact on values such as autonomy and privacy. To receive graduate credit, extra readings and a 25-30 page paper will be required. (3 cr) (Sp)

**Phil 6890. Philosophy of Science.** (3 cr) (Sp)

**Phil 6900. Independent Study.** (1-4 cr) (F,Sp,Su) ®

## Speech Communication

Speech Communication has been taught continuously at USU almost from the University's founding in 1888. Speech Communication faculty in the Department of Languages and Philosophy teach courses leading to a Bachelor of Arts or Bachelor of Science degree in Speech, as well as to minors in Organizational Communication and Speech Communication Teaching.

The **speech major** emphasizes organizational communication. Organizational communication is the study of how communication creates organizations and of how organizations shape communication. Coursework in the program addresses the theories and analytical skills enabling students to identify common communication problems arising in organizational contexts and to develop appropriate communication policies and practices. The program also teaches important aspects of intercultural and interpersonal communication theory.

Students majoring in speech are encouraged to earn a BA degree by completing two years of study in a foreign language. This broadens cultural and social awareness and can increase one's understanding of the nature of language in general.

Admission to the speech major will be limited to 25 students each year. Admission decisions will be based on (1) academic record, (2) realistic career or professional study objective, (3) ability of this program to prepare the student for intended career, (4) satisfactory speaking and writing competencies, and (5) motivation and creativity demonstrated by class performance, work experience, volunteer activities, and other means offered by the student during the application process.

Students not admitted may apply the following year. If not admitted on the second application, the student will be permitted to complete a minor, but will not be considered again for the major.

To obtain guidelines for applying to the speech major, contact the Department of Languages and Philosophy.

The minor program in **Organizational Communication** is designed for students who seek communication and human relations competencies, an understanding of human communication behavior, and the critical thinking skills required for success in a variety of careers.

The course of study leading to a minor in **Speech Communication Teaching** is designed to develop the communication competencies and the understanding of communication processes and theory necessary for effective high school speech communication instruction. Prior to student teaching, the program features practicum experience in which students learn how to critique and coach speech communication students.

### Course Requirements

**Speech Major (30 credits).** As many as 15 credits taken at other colleges or universities may be used to partially satisfy these requirements. For more information, students should contact their advisor. *Communication Core (6 credits):* Complete the following: Spch 1050, 2600. *Capstone Course (3 credits):* Spch 5100. *Organizational Communication Theory (9-12 credits):* Complete at least three of the following, for a total of 9 credits: Spch 3250, 3300, 3400, 5000, 5090, 5250, 5280, JCom 3400. *Organizational Communication Application (9-12 credits):* Complete at least three of the following (at least two having a Spch prefix), for a total of 9-12 credits: Spch 2280, 3000, 3050, 3600, 4280, 4800, Ling 4900, BIS 4350, 5660, MHR 3710, 3820.

**Organizational Communication Minor (15 credits).** Spch 1050 or 2600, 3250, and 9 other credits in Speech Communication courses, selected in consultation with a program advisor. At least 3 of these 9 credits must be from a class offered at the 4000 or 5000 level.

**Speech Communication Teaching Minor (19 credits).** Spch 1050, 2600, 3000, 4280, 5100, 5280, and either Spch 3330 or 5090.

## Speech Communication Courses (Spch)

**Spch 1050 (CI). Public Speaking.** Speaking in formal public communication situations. Development of skills in speech preparation, audience adaptation, and delivery. (3 cr) (F,Sp)

**Spch 2280. Listening.** Development of comprehension, critical, and relationship listening skills. Experience in developing listening training for kindergarten to adult education. (2 cr) (Sp)

**Spch 2600 (CI). Interpersonal Communication.** Examination of theories, methods, and competencies relevant to studying, establishing, and maintaining interpersonal relationships in family, intercultural, professional, and other contexts. Classroom experiences with topics such as perception, language, nonverbal behavior, conflict resolution, and listening. (3 cr) (F,Sp)

**Spch 3000. Speech Communication Teaching Practicum.** Intensive speech teaching workshop. Supervised on-campus teaching experience. Must be completed prior to student teaching experience. Repeatable to a maximum of 2 credits. (1 cr) (Sp) ®

**\*\*Spch 3050 (DSS). Technical and Professional Communication.** Skill development in oral technical reporting, interviewing, and interpersonal communication to meet the unique communication requirements of business, industry, and the professions. (3 cr) (Sp)

**Spch 3250 (CI). Organizational Communication.** Study of internal communication requirements of organizations. Analysis of communication problems associated with conflict, diversity, interpersonal influence, communication technology, and information flow. Development of effective communication practices. (3 cr) (F)

**Spch 3300. Clinical Experience I.** First clinical practicum in middle and secondary schools. Arranged by special methods instructor. Required at Level I. Must be taken concurrently with Spch 5370. Prerequisites are set by the Secondary Education Department. (1 cr) (F)

**Spch 3330 (DSS). Intercultural Communication.** Study of how communication shapes culture and how culture, in turn, affects communication. Development of active intercultural communication in professional and personal contexts. (3 cr) (F)

**Spch 3400 (CI). Interpersonal Influence.** Survey of theory and research investigating social influence in face-to-face interactions. Topics include: compliance-gaining strategies, enactment and detection of deception, verbal and nonverbal influence, attitude change, communicator characteristics, credibility, and ethics. (3 cr) (F)

**Spch 3600. Communication and Conflict.** Study of contemporary theories on conflict and communication. Analyses of the roles of culture, gender, and personal and/or organizational ethics in conflict and disputes. Discussion and application of negotiation, mediation, and facilitation skills. (3 cr) (F)

**Spch 4280. Argumentation and Debate.** Techniques of analysis, investigation, evidence, reasoning, brief making, refutation, and construction and delivery of the argumentative speech and academic debate. (3 cr) (F)

**Spch 4300. Clinical Experience II.** Second clinical practicum in middle and secondary schools. Arranged by special methods instructor. Required at Level II. Must be

taken concurrently with Spch 5370. Prerequisites are set by the Secondary Education Department. (1 cr) (F)

**\*\*Spch 4800 (CI). Nonverbal Communication.** Examination of theories, methods, and competencies relevant to studying, enacting, and perceiving gestures, facial expressions, body movements, touches, and other nonverbal cues. Investigation of environmental, cultural, and social influences on nonverbal communication in a variety of contexts. (3 cr) (F)

**Spch 5000. Studies in Speech Communication.** Study of special topics in interpersonal, small group, organizational, or intercultural communication theory and research. Prerequisite: Permission of instructor. (1-5 cr) (F,Sp) ®

**\*\*Spch 5090. Small Group Theory.** Study of theories of group processes such as decision-making, leadership, power, conflict, deviance, and the development of group structures, functions, norms, and roles. (3 cr) (Sp)

**Spch 5100 (CI). Theories of Speech Communication.** Social, scientific, and humanistic inquiry into the process of human communication. Multi-theoretical approach, including perspectives and research on interpersonal, persuasive, organizational, intrapersonal, group, and intercultural communication. (3 cr) (Sp)

**Spch 5250. Environmental Rhetoric.** Study of persuasive tactics and strategies as used by social advocates. Focuses on environmental issues and organizations. Analysis of environmental messages with an emphasis on the development of writing and critical thinking skills. (3 cr) (Sp)

**\*\*Spch 5280. Communication Education Theory.** Study of contemporary theories and research in communication education. Emphasis on communication competency development, communication apprehension, critical thinking, communication assessment, development of communication ethics, freedom of speech, instructional communication, and history of communication education. (3 cr) (Sp)

**Spch 5370. Methods in Teaching Theatre and Speech.** Development of materials and strategies for teaching secondary school speech and theatre. Team taught by Speech and Theatre Arts faculties. Also taught as Thea 5370. Prerequisite: Admission to teacher education. (3 cr) (F)

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

\*\*\*Taught 2004-2005.

# *Liberal Arts and Sciences Major*

**Contact:** Office of the Provost, Main 142, (435) 797-1706

**Advising:** Science/HASS Advising Center, Student Center 302, (435) 797-3883

The Liberal Arts and Sciences (LAS) Major offers a broad and challenging course of study in the humanities, sciences, arts, and social sciences. Through a multi-disciplinary but coherent approach to learning, the program meets the needs of students majoring in professional fields, as well as those desiring a general background for adaptability and mobility in employment. LAS offers USU students the training required to be competitive and to contribute effectively in the organizations, professions, and communities of the twenty-first century.

This major allows the student to develop an individualized curriculum in consultation with the program advisor (Student Center 302). This major requires a 2.3 overall GPA for admission and graduation.

Although the emphasis of this major is in the humanities, arts, and social sciences, the student is encouraged to seek out other educational interests as part of an academic program. The following credit distribution will be typical of most students:

**University Studies** (30 credits)

**Foreign Language** (2 years)

The focus of study for the Liberal Arts and Sciences major is to help students gain a basic understanding of the development of civilization, including historical and cultural traditions, political institutions and processes, an appreciation of arts and literature, and expanded capacities for critical thought. Four learning goals are identified, each requiring a minimum of 9 credits, for a total of 36 credits.

Students plan a multi-disciplinary academic program providing a focus for study, with emphasis in primarily social sciences, humanities, and arts.

## **Pre-professional and Elective Credits**

Depending on a student's career objectives, a student may take courses leading to further study in medicine, law, business, or other graduate programs, or continue to study in a number of different disciplines.

## *Liberal Arts and Sciences Courses (LAS)*

**LAS 2020 (CI). Pathways to Thinking.** *Communications Intensive* version of the "Pathways" course. Like its cousin, LAS 2120, it offers students intellectual tools to enhance their involvement as informed citizens of the human community. Specifically, it offers ways to explore different fields by comparing their perspectives on special topics of the instructor's choice. This particular "Pathways" version asks students to think about different fields, partly through writing. Also emphasizes reading, discussing, and listening. Prerequisite: Engl 2010. (3 cr)

**LAS 2120 (QI). Pathways to Reasoning.** *Quantitative Intensive* version of the "Pathways" course. Like its cousin, LAS 2020, it offers students intellectual tools to enhance their involvement as informed citizens of the human community. Specifically, it offers ways to explore different fields by comparing their perspectives on special topics of the instructor's choice. This particular "Pathways" version asks students to think about different fields, partly through numbers and data. Prerequisite: Math 1030 or Stat 1040. (3 cr)

**LAS 4900. Independent Study/Workshop.** Independent, interdisciplinary study resulting in an original work. After obtaining permission from a Liberal Arts and Sciences advisor to take this course under the supervision of a particular instructor, the student must also obtain the instructor's permission. (1-3 cr) (F,Sp,Su) @

Department of  
**Management and Human Resources**  
 College of Business

**Head: Professor Caryn L. Beck-Dudley**, business law, employment law, and social responsibility  
 Office in Business 411

**Undergraduate Program Advisor: Senior Lecturer Mary Jo Blahna**, organizational behavior, teams, and interpersonal skill development

**Graduate Program Director: Associate Professor Gaylen N. Chandler**, human resources, management, entrepreneurship  
**Associate Graduate Program Director and Graduate Advisor: Senior Lecturer Mary Jo Blahna**, organizational behavior, teams, and interpersonal skill development

**Director of the Utah Center for Productivity and Quality: Caryn L. Beck-Dudley**  
**Director of the Management Institute: Glenn M. McEvoy**

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**E-mail** mhr@b202.usu.edu  
**WWW** <http://www.usu.edu/mhrdept/index.htm>

**Professors** Glenn M. McEvoy, human resources, organizational behavior, management; David B. Stephens, business strategy and labor relations; **Adjunct Professor** Patricia S. Terrell, student services; **Professors Emeritus** Vernon M. Buehler, Howard M. Carlisle, John R. Cragun, Gary B. Hansen, Leon R. McCarrey, Y. Krishna Shetty; **Associate Professors** David R. Daines, business law, employment law, and social responsibility; Steven H. Hanks, business strategy, management, and entrepreneurship; Ross E. Robson, lean manufacturing, management; **Assistant Professors** Ronda R. Callister, management, organizational behavior, international management; David L. Dickinson, labor and employee relations, labor economics; Douglas W. Lyon, management, business strategy; **Adjunct Assistant Professors** Andrew Hong, international management; Shari Tarnutzer, international management; **Senior Lecturer** Alan P. Warnick, human resource management

**Degrees offered:** Bachelor of Science (BS) and Bachelor of Arts (BA) in Management; BS and BA in Human Resource Management; Master of Science (MS) in Human Resources; department coordinates the Master of Social Sciences (MSS) degree with a specialization in Human Resources Management. Students can also get an emphasis in Student Services Personnel Administration in conjunction with the MSS.

The department also participates in the College of Business Master of Business Administration (MBA) Degree. A description of the MBA degree and program requirements can be found on pages 160-161. Graduate-level courses offered by the department are included in the plans of study of graduate students in a wide variety of disciplines. Students can specialize in Entrepreneurship or Human Resource Management in the MBA program.

## Undergraduate Programs

### Objectives

The programs in the Department of Management and Human Resources are designed to prepare students for administrative and leadership positions in business, government, and other institutions. Specialized training is provided in Management and Human Resource Management, as well as training directed at understanding the broader aspects of business as it functions within a national and international environment. The study of management is approached from an organizational leadership framework.

**Management** deals with the skills and attributes of organizational leadership. These include the ability to critically assess issues currently facing one's organization or unit; the ability to develop a vision for the organization and translate it into a mission, objectives, and strategies; and the ability to accomplish these through the acquisition and allocation of resources, and organizing, leading, and empowering people.

**Human Resource Management** deals with those processes which provide, develop, and maintain a productive workforce. Subject areas include recruiting employees, determining what tasks need to be performed, placing the right person in the right position, determining fair benefits and compensation, evaluating

performance, determining current and future employment needs, training and development, labor-management relations, and following legal/ethical practices in employment.

### **Requirements for Majors**

**College of Business Requirements.** All students majoring in management or human resource management must satisfy the College of Business requirements, provided on pages 83-84. Academic advising about these requirements is available in the College of Business Student Service Center, Business 308.

**Departmental Admission Requirements.** New freshmen admitted to USU in good standing qualify for admission to the College of Business. Students with 1-46 semester credits, who are transferring from other institutions or from other colleges at USU, need a minimum overall GPA of 2.20. Students transferring with 46 or more semester credits are required to have a minimum overall GPA of 2.50. Upon admission, all degree-seeking students will be identified with the College of Business Prespecialization Unit for the purpose of qualifying for advanced standing within their chosen major field. Transfer students and others desiring to be admitted to advanced standing in the Department of Management and Human Resources must meet the prespecialization requirements stated below.

**Prespecialization.** For approximately the first two years, a student will be identified with the College of Business Prespecialization Registration Unit. The basic objective of this portion of the student's studies is to provide a broad and sound educational foundation upon which to build a specialized education relating to business.

All students at the University are required to satisfy the University Studies requirements of the University as described on pages 56-63 of this catalog. Additional requirements for Management and Human Resources majors consist of two basic components.

**1. College of Business Prespecialization Core.** The following courses are required: MHR 1000, 2990; Acct 2010, 2020; BIS 2450, 2550; Econ 1500, 2010; Math 1050, 1100; Stat 2300; and Psy 1010 or Soc 1010.

**2. Department of Management and Human Resources Prespecialization Requirement.** The following courses are required for majors in Management and Human Resource Management: Math 1100; Soc 1010 or Psy 1010; Spch 2600, 3050, or BIS 2450.

Completion of 20 credits of university work with a minimum GPA of 2.2 is necessary before a student is allowed to enroll in BIS 2550; Acct 2010, 2020; and MHR 2990.

Access to 3000-level Management and Human Resources courses is restricted. Only those students who have completed a minimum of forty (40) semester credits with a minimum GPA of 2.50 will be allowed to enroll in 3000-level Management and Human Resources courses.

**College of Business Enrollment Restrictions.** Admission to the college does not insure access to the prespecialization core courses required for graduation. The following admission requirements must be met by all USU students:

1. An overall GPA (transfer credits included) of 2.20 and 20 semester credits of college-level work are required for admission into Acct 2010, 2020; MHR 2990; and BIS 2550.

2. An overall GPA of 2.50 and completion of 40 semester credits are required for admission into Acct 3110, 3120, 3310, 3410; BA 3080, 3400, 3500, 3700; BIS 3000, 3100, 3140, 3330, 3500, 3550; Econ 3400; and MHR 3110, 3710, 3720, 3810, 3820.

3. All 4000- and 5000-level courses in the College of Business are restricted to students with unconditional Advanced Standing and the continued maintenance of a 2.50 overall GPA.

4. An overall GPA of 2.50, unconditional Advanced Standing, and completion of 84 credits are required for admission into MHR 4880 and 4890.

5. To earn a College of Business bachelor's degree, at least 60 semester credits must be from courses outside the College of Business.

6. Many of the courses in the College of Business require prerequisites. Before registering for courses within the College of Business, students should consult with their advisor or refer to the current *General Catalog* to ensure they have completed the necessary prerequisites.

**Advanced Standing.** The objective of the advanced standing portion of the program is to provide sufficient specialized business training to prepare the student to successfully enter the business world in a chosen field of interest. The program is also directed at providing the type of business education that develops the attitudes, analytical ability, and the social conscience required for future professional advancement.

Students are required to achieve unconditional advanced standing to be admitted to the Department of Management and Human Resources. Until they have attained unconditional advanced standing, students are not allowed to take 4000-level courses.

The requirements for attaining unconditional advanced standing in the Department of Management and Human Resources are as follows:

1. Students must have completed a minimum of 53 credits and must have earned an overall grade point average (GPA) of at least 2.50 for all the hours of study taken up to the time the petition for advanced standing is made. This will include all transfer credits.

2. Students must have completed the prespecialization requirements for both the College of Business and the Department of Management and Human Resources, as indicated above, and must have earned a GPA of 2.50 or above in these courses.

(Some courses may have prerequisites, and students would be expected to satisfy the course prerequisites as well.)

3. File a request for advanced standing with the College of Business Student Service Center, Business 308.

It is strongly recommended that each student make the transition from prespecialization in the college to unconditional advanced standing in the Department of Management and Human Resources as soon as possible after having met the 53-credit requirement.

**Departmental Core for Both Undergraduate Majors.** During the initial portion of the Management and Human Resources upper-division programs, all degree seeking students will be required to take the following core classes, which are designed to provide a broad background in the various areas of business: BA 3400, 3500, 3700; Econ 3400; MHR 3110, 3250, 3710, 3820, 4630; MHR 4880<sup>1</sup> or 4890<sup>1</sup>.

<sup>1</sup>MHR 4880 and 4890 are both capstone courses, and should not be taken until near the end of the senior year.

During the latter portion of the program, the student working toward a degree in the Department of Management and Human Resources will be devoting his or her efforts toward fulfilling the requirements in one of the two areas of specialization.

**Major in Human Resource Management.** In addition to the core requirements, students majoring in Human Resource Management must complete two of the following classes: MHR 3720, 3810; Phil 3520 or MHR 4730; MHR 5640; BIS 4350 or Econ 5660; Econ 5670 or 5680. It is recommended that students wishing to work in a human resource position, and who are not planning to pursue a graduate degree in human resource management, take MHR 3810, BIS 4350 or Econ 5660, and either Econ 5670 or 5680.

**Major in Management.** In addition to the core requirements, students majoring in Management must complete two of the following classes: MHR 3720, 3810; Phil 3520 or MHR 4730; MHR 5640; BIS 4350; Econ 5670 or 5680; or other classes as determined through advisement.

If a College of Business student elects to take a minor, he or she is encouraged to select one from outside the College of Business.

### ***Requirements for Minors***

A minor in Management and a minor in Human Resource Management are available, as outlined below. Any deviation from the programs as outlined must be submitted in writing, with justification for the changes, to the department head for approval. A 2.50 GPA in the minor courses is required.

**Minor in Management.** This minor is for students with **majors outside the College of Business** who want to work in an organization where they will assume leadership or management responsibilities. The Management minor consists of 12 credits. MHR 3110 is required. In addition, three courses must be selected from the following: MHR 2990, 3710, 3720, 3810, 4630, 4730, 5640; Phil 3520 or MHR 4730; BIS 4350 or Econ 5660; Econ 5670 or 5680; or other classes as determined through advisement.

**Minor in Human Resource Management.** This minor is for students with **majors outside the College of Business** who want to work in any human resource function of an organization. The Human Resource Management minor consists of 12 credits. MHR 3110 and 4630 are required. In addition, one course must be selected from the following: MHR 2990, 3710, 3720, 3810, 3820, 5640; Econ 5670 or 5680; Phil 3520 or MHR 4730; BIS 4350 or Econ 5660; or other classes as determined through advisement.

**Minors for Students with majors within the College of Business.** Students with majors within the College of Business may elect to take a minor in either Management or Human Resource Management. In such cases, in consultation with the head of the Department of Management and Human Resources, an appropriate minor will be determined based on the student's career objectives. Students will be expected to complete 12 credits of related coursework beyond the College of Business Pre-specialization Requirements and Core Requirements. All such minors must be approved by the head of the Department of Management and Human Resources.

### ***Graduation Requirements***

To be recommended by the department for graduation, majors in the Department of Management and Human Resources must have a grade point average of at least 2.50 in their upper-division core and specialization courses, as well as an overall GPA of 2.50. This includes transfer credits. The College of Business requires that at least 60 semester credits be taken in courses taught outside the College of Business. Up to 9 semester credits of economics and 6 semester credits of statistics can be considered as courses taught outside the College of Business. At least fifty percent of the business credits required for a business degree must be taken on the Utah State University campus or at a designated residence center.

### ***Financial Assistance***

The Department of Management and Human Resources and the College of Business award scholarships in addition to those available through the University Financial Aid Office. Information and application forms are available from the College of Business Student Service Center Office, Business 308.

### ***Student Organization***

The department sponsors a student organization. Membership in the organization is open to all students, both undergraduate and graduate, who meet the membership requirements.

**Society for Human Resource Management (SHRM)** is the professional Human Resource Management organization co-sponsored by the Bridgerland Chapter of SHRM.

## ***Graduate Programs***

### ***Master of Science in Human Resources (MS HR)***

The MS in Human Resources degree prepares students for professional careers in the field of Human Resource Management. The instruction is designed to teach students to assume a strategic role in helping organizations gain competitive advantage by building employee commitment, competence, and effectiveness. Required subject areas include human resource planning, recruiting, selection, placement, compensation and benefits, performance management, career planning, training and organizational development, labor and employee relations, ethical/legal employment practices, statistical methods, and program evaluation.

Students without sufficient relevant work experience are required to complete an approved internship. The executive in residence in the MHR Department and/or the MS in Human Resources steering committee will serve as facilitators to help secure internship opportunities. All students are strongly encouraged to take the certification exam of the Human Resource Certification Institute (HRCI).

Students are expected to be admitted to the program as matriculating students before taking coursework leading to the degree.

**Degree Requirements.** Students are held responsible for meeting requirements as outlined in this catalog. Requirements specific to this degree are outlined below. It is the student's responsibility to be aware of all requirements and initiate the resolution of apparent inconsistencies.

The typical degree option is Plan C, which includes coursework to meet the degree requirements. The student should consult with the graduate program director if the Plan B option is being considered.

The MS in Human Resources degree usually requires 33 credits beyond the Business Core. The total number of credits is 51 for students without an undergraduate business degree or commensurate work experience. Coursework includes MHR 6160, 6250, 6330, 6360, 6510, 6550, 6620, 6630, 6640, 6650, 6690, 6760; Econ 6670; and one 3-credit elective approved by the steering committee. Students with applicable and relevant work experience may waive MHR 6250 (Graduate Internship) on approval of the MS in Human Resources steering committee. Students with an undergraduate degree from an AACSB-accredited business school or equivalent work experience will not be required to take MHR 6160. Students are also strongly encouraged to take the HRCI (Human Resource Certification Institute) exam.

Additional information about the MS in Human Resources degree may be obtained by contacting the Department of Management and Human Resources.

### ***Human Resources Management Specialization in the Master of Social Sciences (MSS)***

The MSS is an interdisciplinary degree involving social science courses designed to provide breadth in content and the perspective of the social and work environment in which people operate (see pages 424-425). This degree is available *only* through Continuing Education. The Human Resources Management specialization deals with those processes which provide, develop, and maintain a productive work force. Subject areas include human resource planning, recruiting, selection, placement, benefits and compensation, performance management, career planning, training and development, labor/management relations, and ethical/legal employment practices.

A dynamic and changing work environment within an increasingly complex social environment provides unique challenges and opportunities for students in this discipline. One focus of this degree is to prepare students for professional certification by the Human Resource Certification Institute. The program advisor of the graduate program has information on the institute and its accreditation designations.

This program is open to students with a variety of undergraduate majors. However, students who have specialized in human resources at the undergraduate level should see the program director for advisement.

Students are expected to be admitted to the program as matriculated students before taking coursework leading to the degree.

**Degree Requirements.** Students are held responsible for meeting requirements as outlined in this catalog. Requirements specific to this degree are outlined below. It is the student's responsibility to be aware of all requirements and initiate the resolution of apparent inconsistencies.

The typical degree option is Plan C, which includes coursework to meet the degree requirements. The student should consult with the MSS/HRM Program Director if the Plan B option is being considered.

A minimum of 36 semester credits is required for the degree. Under Plan C, no thesis credit is allowed. The required core courses include a capstone course which meets the requirement of a Plan C culminating experience. A maximum of three credits may be earned either from readings/conferences or from independent research. A maximum of three supervised internship credits is also permitted. Eighteen (18) credits are taken from the MHR Department and must be approved by the Graduate Program Director. In addition, a minimum of 6 credits in each of two coop-

erating minor disciplines, or 6 credits in a cooperating minor and a minimum of 6 credits in a cluster, is required. A cluster is a grouping of courses outside of the major and the minor which is complementary to the degree and which meets the professional goals of the student. All clusters must be approved by the Program Director. In some instances, a minor from a discipline other than the cooperating minor disciplines may be approved. A list of cooperating minor disciplines and preapproved courses is available from the Graduate Program Office in the Management and Human Resources Department. Up to 3 credits of 3000- or 4000-level coursework may be included in a program of study with the prior approval of the Graduate Program Director and the dean of the School of Graduate Studies (see page 74).

Courses include: MHR 6330, 6360, 6510, 6550, 6620, 6630, 6640, 6650, 6690, 6760; MHR/Econ 6670; and Soc 6100 or Psy 6010. If a student has taken a comparable course, an acceptable substitute may be approved by the Director of the MSS/MHR Graduate Program. Students are encouraged to work closely with the Graduate Program Director when selecting their coursework.

All students who have not completed a basic statistics course with a grade of *B* or better will be required to complete Stat 2300 or equivalent with a grade of *B* or better. Further information or assistance can be obtained from the MSS/HRM Program Office.

### ***Human Resources Management Specialization in the Master of Social Sciences (MSS) with Emphasis in Student Services Personnel Administration***

The Student Services Personnel Administration emphasis builds on the core Human Resources Management courses by studying: higher education and student services in the U.S.; organization and administration of student services; student development theory; legal developments in higher education; current issues in student services; and applied internships.

Students choosing the SSPA emphasis work closely with the professional staff in Student Services at USU. Opportunities to participate in staff meetings, developmental workshops, and regional professional conferences are incorporated into the SSPA emphasis. For more information, contact the graduate program director in the Department of Management and Human Resources.

### ***Admission Requirements***

See Admission Procedures on pages 72-73. Students are required to submit scores on either the Graduate Record Examination (GRE) or the Graduate Management Admissions Test (GMAT). Prospective students may request information on the expected test performance standards for acceptance. Applicants are expected to have strong written and oral communication skills.

### ***Financial Assistance and Assistantships***

A limited number of graduate assistantships, scholarships, and other departmental awards are provided to outstanding on-campus students on a competitive basis. Acceptance to the program does not guarantee financial assistance. Application forms are available from the MHR Department. The deadline for financial aid assistance is March 15.

### ***Additional Information***

Additional information about graduate degrees may be obtained by contacting the Department of Management and Human Resources.

For additional information about the MSS degree, see *Interdepartmental Program in Social Sciences*, on pages 424-425 of this catalog. For details about other MSS programs, see program descriptions in the Department of Economics (page 207), the Department of History (page 279), and the Department of Sociology, Social Work and Anthropology (page 432).

### **Master of Business Administration (MBA)**

The department also participates with other departments in the College of Business in offering the Master of Business Administration (MBA) Degree. A description of the MBA degree and program requirements can be found on pages 160-161 of this catalog.

## **Management and Human Resources Courses (MHR)**

**MHR 1000. Business Orientation.** Orients freshmen and transfer students to College of Business programs, academic and student services, professional organizations, and career possibilities. Also taught as Acct 1000, BA 1000, BIS 1000, and Econ 1000. (0.5 cr) (F,Sp)

**MHR 1160. Developing Self-Management Skills.** A practical course designed to provide basic self-management skills contributing to personal effectiveness. For freshmen and sophomores only. (1 cr) (F,Sp,Su)

**MHR 2160. Student Applied Leadership Training.** Available to students involved in structured leadership training provided as part of their role and responsibility at the University. For details, contact the Office of Advising and Transition Services (SC 304). Prerequisite: Approval of course coordinator. (1-3 cr) (F,Sp,Su) ®

**MHR 2250. Introductory Internship.** Introductory-level experience in a career-related position approved by the Cooperative Education Office. One credit for every 75 hours of internship experience, with a maximum of 9 credits. A maximum of 12 credits of 2250 and 4250 combined can be counted toward the minimum degree requirements for the College of Business. (1-9 cr) (F,Sp,Su) ®

**MHR 2350. Small Business Management.** Provides practical overview of management principles and practices as they apply to the small business enterprise. For non-business majors. (3 cr) (Sp) ©

**MHR 2990. Legal and Ethical Environment of Business.** Surveys the legal and ethical environment of business. Introduction to elementary legal research and writing and critical thinking techniques. Lecture and laboratory. (3 cr) (F,Sp)

**MHR 3110 (DSS). Managing Organizations and People.** Overview of the role of management, and an introduction to leadership theory and practice. Includes defining of mission and goals, organizing work, and managing human performance. (3 cr) (F,Sp) ©

**MHR 3250. Discussions With Business Leaders.** Students attend Partners in Business Program seminar sessions to examine new methods for improving performance in organizations. Repeatable to a maximum of 1.5 credits. (0.5 cr) (F,Sp) ®

**MHR 3710. Developing Team and Interpersonal Skills.** Experientially-driven course focusing on the role of teams in organizations and on developing skills which individuals and teams need to be effective. Topics include self-awareness, supportive communication, problem solving, and conflict management. (3 cr) (F,Sp)

**MHR 3720 (DSS). Leading Organization Change.** Explores the topic of organizational change and transformation, with special emphasis on the role of leadership, vision, and organization culture in change programs. Extensive use of case studies and experiential exercises. Also covers the history of organization development, change facilitation, and dealing with resistance to change. Prerequisite: MHR 3110. (3 cr) (F)

**MHR 3810 (DSS). Employment Law and Policy Development.** Examines laws related to employment, labor relations, civil rights, compensation, safety, health, and retirement. Provides hands-on experience in drafting and reviewing human resource policies in a business setting. Addresses implementing and influencing public policy. Prerequisite: MHR 2990. (3 cr) (F,Sp)

**MHR 3820 (DSS). International Management.** Exploration of international culture and context of management, the impact of globalization on businesses today, and the pressures and complexities of operating in global markets, including the processes of managing multi-cultural human resources. (3 cr) (F,Sp)

**MHR 4250. Advanced Internship.** Advanced or middle-level internship experience in a career-related position approved by the Cooperative Education Office. One credit for every 75 hours of internship experience, with a maximum of 9 credits. (1-9 cr) (F,Sp,Su) ®

**MHR 4630. Human Resource Management.** Introduces the process of managing human resources, including human resource planning, recruitment, selection, training, performance evaluation, compensation, career management, and labor relations. Also discusses diversity, human resource strategy, and related ethical issues. (3 cr) (F,Sp)

**MHR 4710.<sup>3</sup> Senior Leadership Project.** Students plan and complete advanced leadership projects, present results, and document accomplishments. Students gain practical experience and demonstrate ability to manage complex projects, contributing to organizational goals and their own career objectives. Prerequisite: Permission of instructor. (3 cr)

**MHR 4730.<sup>3</sup> Business and Society.** Examines the relationship of business enterprises with their external environment and helps students to develop an analytical framework for addressing the business and society relationship over one's career in business or government. Helps students recognize, formulate, and analyze moral issues, as well as trace decisions forward to personal, cultural, and societal consequences. (3 cr)

**MHR 4800. Independent Research and Readings.** Provides opportunity for student to pursue special interests under tutorship of faculty. Prerequisite: Approval of faculty member and department head. (1-3 cr) (F,Sp,Su) ®

**MHR 4880 (CI). Business Strategy in an Entrepreneurial Context.** Integrative capstone course dealing with processes, methods, and steps involved in starting and growing small to mid-size business ventures. Emphasizes cross-functional challenges of market entry, finance, operations, managing business growth, and entrepreneurs' responsibilities to society. Prerequisites: Senior standing; MHR 3110, BA 3400, 3500, 3700. (3 cr) (F,Sp)

**MHR 4890 (CI). Business Strategy in a Global Context.** Integrative capstone course dealing with challenges and strategies associated with international business. Students develop global business judgment and perspective through addressing problems related to global market entry and growth, finance, operations, strategic alliances, social responsibility, and business-government relationships. Prerequisites: Senior standing; MHR 3110, BA 3400, 3500, 3700. (3 cr) (F,Sp,Su)

**MHR 4950H. Senior Honors Thesis/Project.** Creative project that will then be written up, and presented, as a Senior Thesis as required for an Honors Plan. (3 cr) (Sp)

**MHR 5350 (d6350).<sup>2</sup> Contemporary Manufacturing Management.** Examines contemporary principles, techniques, and research findings of high-performance manufacturing. Analysis of leading models of management and continuous improvement, based upon best company practices, particularly lean, just-in-time manufacturing. (3 cr) (F)

**MHR 5640 (d6640). Selected Topics in Management and Human Resources.** Selected topics in management and/or human resources are pursued in depth. Topics and instructor may vary. (1-3 cr) ®

**MHR 6010.<sup>3</sup> Advanced Business Law.** Detailed investigation of business law, including law of contracts, torts, property, secured transactions, commercial paper, and business organizations. Prerequisite: MHR 2990. (3 cr)

**MHR 6160. Integrative Pre-MBA Core.** Integrates financial reporting, analysis, and markets; domestic and global economic and legal environments; creation and distribution of goods and services; and human behavior in organizations. Upon completion, students without undergraduate degrees in business are prepared to enter advanced MBA (or MS HR) core. Also taught as Acct 6160, BA 6160, BIS 6160, and Econ 6160. (18 cr) (Su)

**MHR 6250. Graduate Internship.** Graduate-level internship in a career-related position for graduate students wishing to develop or expand their occupational experience. Maximum of 6 credits. (1-6 cr) (F,Sp,Su) ®

**MHR 6330. Human Resource Applied Research.** Provides applied research for selected human resource topics. (1-3 cr) (F)

**MHR 6350 (d5350). Contemporary Manufacturing Management.** Examines contemporary principles, techniques, and research findings of high-performance manufacturing. Analysis of leading models of management and continuous improvement, based upon best company practices, particularly lean, just-in-time manufacturing. (3 cr) (F)

**MHR 6360. Human Resource Certification Preparation.** Prepares students for certification as human resource professionals. (1 cr) (F)

**MHR 6370.<sup>3</sup> Project Management.** Teaches concepts of project management, while intensively involving students in production and operations related projects. Requires integrative organizational and industry research and a professional report. (3 cr)

**MHR 6410.<sup>3</sup> New Venture Creation.** Focuses on development of new ventures, including entrepreneurial competencies, venture teams, recognizing business opportunities, gathering resources, new venture finance, entry strategies, legal structure, licensing and regulatory requirements, patents, copyrights, and product liability. (3 cr)

**MHR 6430.<sup>3</sup> New Venture Growth and Expansion.** Analyzes the growth phase of business development. Topics include organizational competencies and systems, growth strategies, growth finance and staging, cash-flow, franchising, estate and family business issues, harvest strategies including buyouts and public offerings, and employment law for small employers. (3 cr)

**MHR 6470.<sup>3</sup> Entrepreneurship Project.** Teaches concepts of project management, while intensively involving students in entrepreneurship-related projects such as initiating a start-up or consulting with management of an emerging business. Requires integrative organizational and industry research and a professional report. (3 cr)

**MHR 6500. Managing Individuals and Groups.** Focuses on development of interpersonal and team skills. Includes development of organizational systems supporting effective use of human resources, including performance management, motivation, selection, training, rewards, and career development. (3 cr) (F)

**MHR 6510.<sup>3</sup> Performance Management.** Introduces Human Resource Management, and then undertakes an in-depth analysis of performance management process, including job analysis, choice of raters, performance feedback, employee motivation and discipline, and training for improvement of individual performance. (1-3 cr)

**MHR 6550. Human Resource Planning and Staffing.** Focuses upon creation of competitive advantage through strategic human resources planning and staffing. Topics include job analysis, preparing candidate specifications, recruitment, assessment, and placement. Also covers pertinent laws/regulations and applicable descriptive/inferential statistics. (3 cr) (F)

**MHR 6620. Training and Organizational Development.** Provides advanced treatment of employee, management, and organizational development. Specific topics include: historical background, needs assessment, program design and implementation, outcomes evaluation, and how individuals and organizations change. (3 cr) (Sp)

**MHR 6630. Compensation and Benefits.** Strategic analysis of compensation and benefits policies and programs. Includes job evaluation systems, job pricing, wage and salary surveys, statistical methods used in compensation, group and individual pay for performance, executive compensation, and employee benefits. (3 cr) (Sp)

**MHR 6640 (d5640). Selected Topics in Management and Human Resources.** Selected topics in management and/or human resources are pursued in depth. Topics and instructor may vary. (1-3 cr) ®

**MHR 6650. Team and Interpersonal Effectiveness.** Experiential course designed to develop team effectiveness, and specific managerial and leadership skills contributing to interpersonal competence and effectiveness in work groups and organizations. (3 cr) (F)

**MHR 6670. Employee Relations and the Labor Movement.** Comprehensive survey of union-management relationships, including labor markets and the labor movement, labor history and law, union organization and government, and contract negotiation and administration. Includes exercises and cases in negotiations and grievance processes. Also taught as Econ 6670. (3 cr) (Sp)

**MHR 6690. Human Resource Policy and Strategy.** Capstone course in Human Resource Management, designed to integrate concepts learned in specialized courses to the management of a total Human Resource function, with integration from both strategic and tactical perspectives. Covers domestic and international issues, as well as organizational change and development. (3 cr) (Sp)

**MHR 6760. Employment Law.** Examines laws related to employment, labor relations, civil rights, compensation, safety, health, and retirement. Provides experience in dispute resolution techniques in a nonunion employment setting, including negotiation, mediation, and arbitration. (3 cr) (F)

**MHR 6890. Global Business Strategy.** Integrative capstone course, taking a CEO's perspective, addressing global competitiveness, strategic assessment, policy development, and strategy execution. Must be taken at end of advanced MBA core. (3 cr) (Sp)

**MHR 6900. Independent Research and Readings.** Provides opportunity for students to pursue special interests under tutorship of the faculty. Prerequisite: Approval of faculty member and department head. (1-3 cr) (F,Sp,Su) ®

**MHR 6960. Professional Paper.** Preparation of paper of professional quality, designed to demonstrate ability to complete a major project and effectively present the results. (3 cr)

**MHR 6970. Thesis.** Designed for students preparing a master's degree thesis. (1-4 cr) (F,Sp,Su) ®

**MHR 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

<sup>2</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

<sup>3</sup>This course will be taught as needed. For information about availability, check with Management and Human Resources Department.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

Department of  
**Mathematics and Statistics**  
 College of Science

**Head: Professor Russell C. Thompson**, differential equations  
 Office in Lund Hall 211, (435) 797-0244

**Assistant Head: Associate Professor Daniel C. Coster**, experimental design, linear models

**Undergraduate Program Coordinator: Professor Chris S. Coray**, numerical analysis

**Graduate Program Coordinator: Associate Professor Joseph V. Koebbe**, numerical analysis, applied mathematics, computational fluid dynamics

**Mathematics Education Program Director: Professor James S. Cangelosi**, mathematics education

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**Professors** *Ian M. Anderson*, differential geometry, global analysis; *LeRoy B. Beasley*, matrix theory, linear algebra, combinatorics; *Lawrence O. Cannon*, topology, mathematics education; *E. Robert Heal*, analysis, statistics, mathematics education; *Lance L. Littlejohn*, differential equations, special functions; *Duane Loveland*, geometric topology, continuum theory; *Jerry Ridenhour*, differential equations; *David H. Sattinger*, differential equations; *Renate Schaaf*, nonlinear differential equations; *Zhi-Qiang Wang*, nonlinear differential equations, non-linear analysis; *Stanley C. Williams*, measure theory, modern analysis; **Professors Emeriti** *Ronald V. Canfield*, multivariate and industrial statistics; *Joe Elich*, mathematics education; *Donald V. Sisson*, statistical methods, experimental design; *Konrad Suprunowicz*, logic; *David White*, categorical data analysis; **Associate Professors** *Adele Cutler*, statistical computing; *D. Richard Cutler*, generalized linear models; *Mark E. Fels*, differential geometry; *Kevin Hestir*, applied probability; *Michael C. Minnotte*, nonparametric density estimation, statistical visualization; *James Powell*, applied mathematics, mathematical biology; *Emily F. Stone*, dynamical systems; *Kathryn Turner*, numerical analysis, optimization, linear algebra; *Dariusz M. Wilczynski*, geometric and algebraic topology; **Associate Professors Emeriti** *Wayne R. Rich*, mathematics education; *E. Eugene Underwood*, matrix theory, linear algebra; *James D. Watson*, numerical analysis; **Assistant Professors** *Christopher D. Corcoran*, biostatistics and computational statistics; *Piotr Kokoszka*, probability and time series analysis; *Xiaofeng Ren*, partial differential equations, applied mathematics; *Juergen Symanzik*, computational and graphical statistics; *Mourad Tighiouart*, survival analysis, Bayesian reliability; **Principal Lecturers** *David D. Bregenzer*, *Beverly Ridenhour*; **Senior Lecturer** *Eric Rowley*

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), and Master of Science (MS) in Mathematics; BS and BA in Mathematics Education; BS in Composite Mathematics-Statistics Education; Master of Mathematics (MMath); BS, BA, and MS in Statistics; MS in Industrial Mathematics; Doctor of Philosophy (PhD) in Mathematical Sciences

**Graduate specializations:** *PhD in Mathematical Sciences*—College Teaching, Interdisciplinary Studies, Pure and Applied Mathematics, and Statistics

## Undergraduate Programs

### Objectives

The Department of Mathematics and Statistics offers a variety of programs and courses designed to prepare students for careers in teaching and for positions as mathematicians and statisticians in industry and government. The department also provides service courses for students in many other disciplines and contributes to the University Studies program by providing Quantitative Literacy and Quantitative Intensive classes.

### Placement of New Students

The mathematics ACT score, on-campus placement tests, and Advanced Placement (AP) calculus and statistics scores are used for placement in 1000-level and 2000-level mathematics and statistics courses. New students and students who are registering for a math class at USU for the first time should have a math ACT score of at least 18 to register for Math 1010 (Intermediate Algebra), a score of at least 19 to register for Stat 1040, and a score of at least 23 to register for Math 1030 (Quantitative Reasoning), Math 1050 (College Algebra), and Math 1060 (Trigonometry).

The alternative to this is to take a placement examination in the Testing Services Office, University Inn 115. A student who has already taken a math class at USU may register for the next higher numbered course, providing he or she received a grade of C- or better in the prerequisite course. Equivalent transfer courses must also have a C- or better grade. Entering students with math ACT scores of less than 18 should register for Math 0900 (Elements of Algebra) or take the placement examination to qualify for a higher-level course. The placement exam requires a small fee.

A math ACT score of at least 27 is needed to begin in Math 1100 or 1210.

Entering students with passing scores on AP calculus or statistics exams will be given 8 semester credits in mathematics for passing either one of the calculus exams, and 4 semester credits for passing the statistics exam. Usually at least part of this credit will be for specific USU courses. Students with an AP calculus AB score of 3 will generally be advised to start in Math 1210 (Calculus I). Students with a score of 4 or 5 on the calculus AB exam or a score of 3 or 4 on the calculus BC exam will be given credit for Math 1210, and will be advised to begin in Math 1220 (Calculus II). Students with a score of 5 on the calculus BC exam will be given credit for Math 1210 and 1220, and advised to begin in Math 2210 (Multivariable Calculus). Students with a score of 3 or higher on the AP statistics exam will be given credit for Stat 2000. Students may also take a placement test in the USU Testing Center to determine if Math 1100 (Calculus Techniques) or Math 1210 (Calculus I) is an appropriate place to start.

The calculus courses Math 1210, 1220, and 2210 are designed for students in mathematics, the sciences, and engineering. Math 1100 (Calculus Techniques) is designed primarily for students in business and a few other majors. All students in calculus classes need strong backgrounds in the material covered in Math 1010 and Math 1050. In addition, the Math 1210, 1220, 2210 sequence requires trigonometry (Math 1060) and a graphics calculator.

Students with outstanding mathematics records in high school and transfer students with some experience in calculus may wish to consult with a departmental advisor prior to registration.

### Departmental Admission Requirements

1. New freshmen admitted to USU in good standing qualify for admission to the major.
2. Transfer students from other institutions need a 2.2 transfer GPA, and students transferring from other USU majors need a 2.0 total GPA for admission to this major in good standing.
3. Students may be admitted to the Mathematics Education major by satisfying either of the above conditions. However, in order to be admitted to the Secondary Teacher Education Program (STEP), and to graduate from the Mathematics Education major (and minor), students must have a cumulative GPA of at least 3.0 in the equivalent of Math 1210, 1220, and 2210, and an overall GPA of at least 2.75.

### University Requirements

All students in the Department of Mathematics and Statistics must satisfy the requirements of USU's University Studies program, described on pages 56-63 of this catalog.

### College of Science Requirements

Every bachelor's degree candidate in the College of Science must complete the following coursework or its equivalent:

1. One year of calculus: Math 1210 and 1220. In some degrees or emphases within degrees, the second semester of calculus may be replaced by Stat 3000. The substitution will be for specific degree programs, not by student choice.
2. One of the following year-long sequences: Biol 1210, 1220; Chem 1210, 1220; Geol 1150, 3200; Phyx 2110, 2120; Phyx 2210, 2220. The chosen sequence must be *outside the student's major department*.

### Bachelor of Arts (BA) Degree

For this degree, students must complete the major requirements for the corresponding BS degree, plus the equivalent of two years of training in a foreign language. The Languages and Philosophy Department is responsible for approving the foreign language coursework for this degree.

### Major Requirements

Major and minor requirements in the Department of Mathematics and Statistics vary from time to time. Students may obtain from the department information about the exact requirements in effect at any given time. Major and minor requirements in effect at the beginning of Fall Semester 2002 are given below.

**Mathematics Major.** Math 1210, 1220, 2210, 2270, 2280, 4200, 4310, 5210, and 5710; any two courses (6 credits) from Math 5110, 5220, 5270, 5310, and 5510; any three additional courses (9 credits) in mathematics at the 5000-level, excluding Actuarial Mathematics (Math 5570, 5580). Note: Math 2250 may substitute for both Math 2270 and 2280; however, Math 2270 and 2280 are recommended.

**Mathematics Education Major.** Stat 1040; Math 1210, 1220, 2210, 2250, 3110, 4200, 4310, 4400, 4620, 5500, and 5710; *Secondary Teacher Education Program (STEP)*: Level 1—ScEd 3100, 3210, Math 3300, 4500; Level 2—ScEd 4200, 4210, SpEd 4000, Math 4300; Level 3—ScEd 5300, 5500, 5600, InsT 5200. Admission to the STEP requires a GPA of at least 3.00 in the equivalent of Math 1210, 1220, and 2210, and an overall GPA of at least 2.75. Graduation from this major also requires an overall GPA of at least 2.75. No more than three repeats in *all* required courses may be used in GPA computations. The STEP is normally completed during the last three semesters of the degree program, and consequently nearly all the mathematics classes in the Mathematics Education Major must be completed before beginning the STEP.

**Composite Mathematics-Statistics Education Major.** Math 1210, 1220, 2210, 2250 or 2270, 3110, 4200, 4310, 4400, 4620, 5500, 5710, Stat 1040, 2000 or 3000, 4920, 5100, 5200, 5890; *Secondary Teacher Education Program (STEP)*: Level 1—ScEd 3100, 3210, Math 3300, 4500, Stat 4500; Level 2—SpEd 4000, ScEd 4200, 4210, Math 4300; Level 3—InsT 5200, ScEd 5300, 5500, 5600. Admission to the STEP requires a cumulative GPA of at least 3.00 in the equivalent of Math 1210, 1220, 2210 and a cumulative GPA of at least 3.00 in Stat 1040, 2000 or 3000, and an overall GPA of at least 2.75. No more than three repeats in all required courses may be used in GPA computations. The STEP is mostly completed in the last three semesters of the degree program.

**Statistics Major.** Math 1210, 1220, 2210, 2270, 4200, 5710 and 5720; CS 1700; Stat 2000 or 3000; Stat 4920, 5100, 5200, 5890; any three additional statistics classes (9 credits) at the 5000-level. One of the three additional classes may be selected from Math 4630, 5570, 5610, and 5760. Note: Math 2250 may substitute for Math 2270.

### **Emphasis Requirements**

**Computational Mathematics Emphasis.** This emphasis, available in the Mathematics Major, requires the following: Math 1210, 1220, 2210, 2270, 2280, 3310, 4200, 5210, 5610, 5620, and 5710; two courses (6 credits) in mathematics at the 4000-level or above, not including Actuarial Mathematics (Math 5570, 5580); CS 1700, 1710, 1720, 2200, and 2370; any two computer science courses numbered above 4000. Note: Math 2250 may substitute for Math 2270 and 2280. Math 4620 *may not* be counted towards the elective mathematics credit requirement. Students who complete the computer science coursework with a GPA of at least 2.5 automatically earn a minor in computer science.

**Actuarial Science Emphasis.** This emphasis, available in *either* the Mathematics Major *or* the Statistics Major, requires the following: Math 1210, 1220, 2210, 2270, 2280, 4200, 4310, 5210, 5570, 5580, 5710, 5720; Stat 2000 or 3000; Stat 4920, 5100; CS 1700; Acct 2010; Econ 2010; BA 3400; one business administration course (3 credits) numbered above 4000. Note: Math 2250 may substitute for Math 2270 and 2280. Admission to this emphasis requires explicit departmental approval.

### **Dual Major Requirements**

Students who are interested in two or more major areas (in different departments) should consult with a departmental advisor to discuss the possibility of an individually designed degree program. Such programs typically entail completing major requirements in two or more departments, but cooperating departments may agree to waive some requirements in each department to facilitate a dual or triple major.

By meeting requirements for any two separate majors, USU students may earn a **dual major**, meaning *one bachelor's degree* in the *combination* of two approved majors. Students majoring in Mathematics may benefit from combining their major with a Computer Science, Electrical Engineering, Physics, or Statistics major. Following are the requirements for each of these dual majors.

**Mathematics-Computer Science.** Math 1210, 1220, 2250 (or 2270 and 2280), 3310, 4200, 5210, 5610, 5620, 5710; CS 1700, 1710, 1720, 2200, 2370, 2550, 2560, 3000, 3100, 4700, 5000 or 5050; Spch 1050; one of Phil 2400, 2500, 3520, or 4540; 13 credits from the following list: CS 5000, 5050, 5100, 5200, 5300, 5370, 5400, 5450, 5600, 5650, 5700, 5800, 5850, 5890, 5950 (note that CS 5000 and 5050 may not be double counted); Spch 1050; one of the following sequences: Phyx 2210, 2220 *or* Biol 1210, 1220, *or* Chem 1210, 1220, 1230, 1240 *or* Geol 1150, 3200, plus one additional computer science advisor-approved science course so that the total in this sequence section is at least 13 credits; plus one additional University Studies class (3 credits) from the BAI, BHU, BSS, or BCA approved lists.

**Mathematics-Electrical Engineering Major.** All courses in the Electrical Engineering major; Math 1210, 1220, 2210, 2250, 4200, 4310, 5210, 5710; and three additional courses (9 credits) in mathematics numbered above 4600, excluding Math 5570 and 5580. Note: Only one of Math 4620 and 4630 may count towards the elective credit in mathematics.

**Mathematics-Physics Major.** Math 1210, 1220, 2210, 2270, 2280, 4200, 4310, 5210, 5710; Phyx 2210, 2220, 2710, 3550, 3600, 3650 or 3700, 3870, and 4900; two additional courses in mathematics numbered above 4600; 8 additional credits in physics numbered above 3500, excluding University Studies Depth courses. Note: Math 2250 may substitute for Math 2270 and 2280. Math 4620 *may not* count towards the elective credit in mathematics. Phyx 2110 and 2120 may substitute for Phyx 2210 and 2220.

**Mathematics-Statistics Major.** Math 1210, 1220, 2210, 2270, 2280, 4200, 4310, 5210, 5710, and 5720; Stat 2000 or 3000; Stat 4920, 5100, 5200, 5890; CS 1700; at least two mathematics courses (6 credits) numbered above 5000; at least two statistics courses (6 credits) numbered above 5000. Note: Math 2250 may substitute for Math 2270 and 2280. Either Math 5570 or 5760 may substitute for one of the statistics elective courses.

### **Minor Requirements**

**Mathematics Minor.** Math 1210, 1220, 2210, 2270, 2280; two courses (6 credits) in mathematics numbered above 4000, excluding Math 4300, 4400, 4500, and 4620. Note: Math 2250 may substitute for Math 2270 and 2280.

**Statistics Minor.** Stat 2000 or 3000; Stat 5100, 5200; two courses (6 credits) from statistics courses numbered above 5000 or from Math 5710, 5720, and 5760.

**Mathematics Education Minor.** Stat 1040; Math 1210, 1220, 2210, 2270, 3110, 4200, 4310, 4400, 4500, 4620, 5500; Secondary Teacher Education Program (STEP) for the student's Secondary Education major. Note: Math 2250 may substitute for Math 2270. Admission to the STEP requires a GPA of at least 3.00 in the equivalent of Math 1210, 1220 and 2210, and an overall GPA of at least 2.75. Graduation from this minor also requires an overall GPA of at least 2.75. No more than three repeats in *all* required courses may be used in GPA computations. The STEP is normally completed during the last three semesters of study, and consequently nearly all the mathematics classes in the Mathematics Education Minor must be completed before beginning the STEP.

**Biomathematics Minor.** Biol 1210, 1220; Math 1210, 1220, 2270, 2280; Stat 3000; Math/Biol 4230. (Note: Math 2250 may substitute for Math 2270 and 2280.) Biology majors must take one course from the biology electives (listed below), and two courses from the mathematics and statistics electives (listed below). Mathematics and Statistics majors must take two courses from the biology electives, and one course from the mathematics and statistics electives. All other majors must take two courses from each set of electives. *Biology Electives:* Biol 5170, 5200, 5600, 5620; PubH 5330; FRWS 3400; Bmet 5500. *Mathematics and Statistics Electives:* Math 4630, 5410, 5420, 5460, 5610, 5620, 5710; Stat 5100, 5110, 5120, 5200, 5300, 5600.

### **Additional Information**

Students who enter the University with AP credit in Mathematics and/or Statistics, and about 30 additional AP or CLEP credits, may be able to complete both a BS and an MS degree within five years or less. Interested students should consult with a departmental undergraduate advisor.

## Financial Support

The department offers several one-, two-, and four-year scholarships to qualified students who enroll as full-time Mathematics, Mathematics Education, or Statistics majors. The winner of the Hunsaker Scholarship receives a cash award each semester for two years. This award is given in addition to any four-year scholarship or tuition waiver for which the student is eligible. During the final two years, the recipient is expected to work as a grader or tutor for the department. The department also offers other scholarships (Elich, Ellis, and departmental). The amount of these scholarships varies from year to year. The Ellis Scholarship is awarded to a junior or senior Mathematics Education major, and the recipient is selected by the department. In the coming years, a new scholarship from the Arthur van Vliet endowment will be awarded. To apply for any of these scholarships (except for the Ellis Scholarship, for which there is no application) send a statement of qualifications, including high school transcripts and SAT or ACT scores, and three letters of recommendation to:

Scholarship Committee  
Department of Mathematics and Statistics  
Utah State University  
3900 Old Main Hill  
Logan UT 84322-3900

Applications must be received by April 1.

## Graduate Programs

### Admission Requirements

See the general admission requirements for graduate programs at Utah State University on pages 72-73 of this catalog. In general, students wishing to pursue graduate studies in mathematics or statistics should have a bachelor's degree in mathematics, statistics, or a closely related field, with extensive coursework in one of the departmental disciplines.

Students entering the Master of Mathematics (MMath) program must either possess a valid secondary school teaching license or be concurrently enrolled in a secondary school teacher licensure program.

### Degree Programs

**Master of Science (MS).** The department offers MS programs in mathematics and statistics. This degree is a terminal degree for most students, but is also a "stepping stone" for students who ultimately wish to pursue a doctorate in mathematics or statistics.

**Master of Mathematics (MMath).** This program is designed specifically for secondary school teachers of mathematics. The purpose of this degree is to provide students with a broad background in mathematics.

**Master of Science (MS) in Industrial Mathematics.** The Industrial Mathematics master's degree is designed to broaden the learning experiences and job opportunities for master's students in mathematics. The program of study incorporates fundamental applied mathematics and interdisciplinary coursework in support of an industrial internship experience.

**Doctor of Philosophy (PhD) in Mathematical Sciences.** This is a terminal degree for mathematics and statistics researchers in academe, government, and industry, as well as for prospective college teachers.

## Specializations for PhD in Mathematical Sciences

The **College Teaching Specialization** is designed to prepare students to teach undergraduate mathematics in two- and four-year colleges and in universities. This program is less specialized than the other two options. Students in the College Teaching specialization receive broad training in pure and applied mathematics. The dissertation for this specialization includes exposition of important mathematical theories and their historical relationships in an area of mathematics of the student's choosing.

The **Interdisciplinary Studies Specialization** offers advanced training in mathematics as a research tool. The mathematical component emphasizes areas of applied mathematics. In addition, the student receives graduate-level training in the chosen area of application. The student's course of study and research is directed both by scholars in mathematics and by scholars in the related discipline. The dissertation involves the development and application of mathematics in the context of research problems arising in the chosen interdisciplinary area.

The **Pure and Applied Mathematics Specialization** is a traditional doctoral program in mathematics, offering broad training in the foundations of modern mathematics together with specialized training in an area of mathematical research. The dissertation represents a significant contribution to mathematics research in the chosen area of specialization.

The **Statistics Specialization** offers broad training in theoretical and applied statistics for students seeking careers in academia, industry, or government. The dissertation represents a significant contribution to statistical research.

### Course Requirements

Departmental requirements change from time to time. Check with the Department of Mathematics and Statistics for the list of requirements currently in effect. The requirements listed below are in effect for Fall Semester 2002.

**Master of Science in Mathematics.** This degree requires 30 credits of approved coursework at or above the 5000 level. At least 18 of these credits must be at the 6000 level or above, excluding Math 6990 and 7990 (Continuing Graduate Advisement) and Math 7910 (College Teaching Internship). Generally, most of the coursework will be in mathematics, but the student's supervisory committee may approve courses in statistics, physics, engineering, or any other discipline, if it seems such coursework is appropriate for the student's program of study.

The MS in mathematics has three options. The Plan A or the thesis option requires taking 6 credits of Math 6970 (Thesis and Research) and working with a faculty member on a substantial research project. The research must be presented in a thesis, which must be approved by the student's supervisory committee and the dean of the School of Graduate Studies. An oral defense of the thesis must be arranged through the School of Graduate Studies.

The Plan B or project option requires taking 3 credits of Math 6970 and working with a faculty member on a smaller research project. A written report of the research must be approved by the student's supervisory committee. An oral defense of the report must be scheduled through the School of Graduate Studies.

The third option of the MS in Mathematics requires only coursework, and is called the Plan C option.

All students in the MS program in Mathematics must pass a written qualifying examination covering the introductory analysis and advanced calculus material presented in Math 4200, 5210, and 5220. Students may take this exam before beginning formal coursework in the MS program, and must take the exam at the end of the first full year of matriculation. The exam is typically given twice a year, in May and September. Matriculated students who fail on their first try must pass the exam at the next scheduled opportunity. A detailed exam syllabus is contained in the *Graduate Handbook*, available from the department.

**Master of Science in Statistics.** This degree requires 30 credits of approved coursework at or above the 5000 level. At least 18 credits must be at the 6000 level or above, excluding Stat 6990 and Stat 7990 (Continuing Graduate Advisement). All students must take Stat 6710 and 6720 (Mathematical Statistics I and II). Generally, most of the coursework will be in statistics, but the student's supervisory committee may approve courses in mathematics, biology, economics, or any other discipline if it deems such coursework to be appropriate for the student's program of study.

The MS in statistics has Plan A (thesis), Plan B (report), and Plan C (coursework only) options. The Plan A and Plan B options require students to work with a faculty member on a research project, taking 6 or 3 credits of Math 6970, respectively, and presenting the results of the research in a written report. For both the Plan A and Plan B options, the report must be approved by the student's supervisory committee. A Plan A report (thesis) must also be approved by the dean of the School of Graduate Studies. Both Plan A and Plan B reports require an oral defense that must be scheduled through the School of Graduate Studies.

Students in all three options of the MS in Statistics must pass a written qualifying examination based on the material presented in Stat 3000 (Statistics for Scientists), Math 5710 (Introduction to Probability), and Math 5720 (Introduction to Mathematical Statistics). Students may take the exam before beginning any formal coursework in the MS program. Students must attempt the exam by the end of the first full year of matriculation. The exam is usually given in late May and early August each year. Matriculated students who fail the exam on their first try must pass the exam at the next scheduled opportunity. A detailed exam syllabus is available in the *Graduate Handbook*, available from the department.

**Master of Mathematics.** This program requires at least 36 credits approved by the Graduate Committee within the Department of Mathematics and Statistics. At least 21 of these credits must come from mathematics classes numbered above 5000. Math 4620 or an approved substitute must also be included. The GPA for the 36 credits and for the 21 math credits must be at least 3.0.

**Master of Science in Industrial Mathematics.** This degree requires 36 credits of coursework at or above the 5000 level. At least 15 of these credits must be completed in Math courses at the 6000 level or above. Additionally, students must complete a total of 9 credits outside of Mathematics which complement their internship and final project. A maximum of 3 of these credits may be taken at the 5000-level (i.e., one 3-credit course in another department). See the departmental website or the *Graduate Handbook* for more detailed information about coursework requirements.

Students are required to pass the Advanced Calculus examination (see the Master of Science in Mathematics examination re-

quirements), *or* the Statistics qualifying examination (see the Master of Science in Statistics examination requirements), *or* an examination based on material presented in four core courses chosen by the student during the first year. The exam, which can be taken before or at the beginning of the student's second year in the program, is usually given in late May or early August. Students are also required to complete a final project based on work done during an internship, either with a company or possibly with another department on campus. The project will include a technical write-up suitable to the industry/field, and presentation to the involved faculty and students in the program. This follows the Plan B option listed for the Master of Science in Mathematics degree.

The Departmental Graduate Committee supervises all MS and MMath students until a supervisory committee for the student is established and approved. Prior to advancement to candidacy, students in Plan A and Plan B options for the MS degree in mathematics and statistics must pass an examination in English writing. This exam is administered by the Department of Mathematics and Statistics.

**PhD in Mathematical Sciences.** In all the doctoral specializations, a course of study consists of 90 credits beyond a bachelor's degree or 60 credits beyond a master's degree. The minimal course requirements described below assume that the student needs 90 credits. In all specializations, credit may be earned toward a master's degree, as part of the 42 required credits (see below), but coursework cannot be applied to two degrees. The complete course of study must be approved by the student's supervisory committee.

**College Teaching Specialization.** Seven course sequences (42 credits) in mathematics courses numbered 6000 and above, excluding Math 7970 and including at least 6 credits in seminars and topics courses in mathematics at the 7000 level and 6 credits of Math 7910 (College Teaching Internship), are required.

**Interdisciplinary Studies Specialization.** Forty-two (42) credits in courses numbered 6000 and above, excluding Math 7970 and including at least four course sequences (24 credits) in mathematics, 6 credits in seminars and topics courses in mathematics at the 7000 level, and approved courses in the student's interdisciplinary area, are required.

**Pure and Applied Mathematics Specialization.** Seven course sequences (42 credits) in mathematics courses numbered 6000 and above, excluding Math 7970 and including at least 6 credits in seminars and topics courses at the 7000 level, are required.

**Statistics Specialization.** Seven course sequences (42 credits) in mathematics or statistics in courses numbered 6000 and above, excluding Math 7970 and Stat 7970 and including at least 6 credits in seminars and topics courses at the 7000 level, are required.

### **Common Degree Requirements**

For all students in the Pure and Applied Mathematics, the Interdisciplinary Studies, and the Statistics specializations, a maximum of 30 credits of Math 7970 (Dissertation Research) is allowed. Students in the College Teaching Specialization are allowed a maximum of 20 credits of Math 7970.

Besides the coursework described, the general requirements for the PhD include:

1. Competency in advanced calculus.
2. Passing three written comprehensive examinations. The exams are given in May and September. Some latitude in subject is permitted, although all students in mathematics must pass an examination in real analysis. All comprehensive exams in mathematics and statistics must be passed within a single 13-month period. This period begins with the first sitting for such an examination, but may not begin later than the September following the first full academic year as a matriculated PhD student. Students are encouraged to sit for all three exams within a 7-day period, but sitting for fewer is permitted. A student need not repeat exams already passed. For the Statistics Option, all students must pass three written exams, two of which must be examinations in probability, linear models, or mathematical statistics. Detailed syllabi for all exams may be obtained from the Department of Mathematics and Statistics. Old exams are also available.
3. Completion of an examination in English writing.
4. Completion of a dissertation.
5. Passing a final oral examination defending the dissertation and demonstrating a general knowledge of mathematics.

## Research

Mathematics research opportunities within the department are many and varied, and students are urged to contact faculty about mutual interests at as early a stage as feasible. The interdisciplinary option permits and encourages study with a broad spectrum of outstanding nationally recognized University research programs.

## Financial Assistance

The department offers full-time teaching assistantships, half-time paper-grading assistantships, research fellowships, and work-study assistance for students in all graduate degree programs. Stipends vary from \$6,500 for a half-time paper-grading assistantship to \$13,000 for teaching assistants pursuing a master's degree. Stipends for PhD students range from \$14,000 for incoming students to \$16,000 for students who have passed all three comprehensive examinations. Normally, a teaching assistant has responsibility for a single course each semester. Out-of-state tuition waivers are usually given with each full-time teaching or half-time paper-grading assistantship. All tuition is usually waived for PhD students. Applications for teaching assistantships should be mailed by March 1 of each year.

## Mathematics Courses (Math)

**Math 0900. Elements of Algebra.** Review of elementary algebra in preparation for Math 1010. Remedial class not carrying USU or transfer credit. Remedial fee required. (3 cr) (F,Sp,Su) ©

**Math 1010. Intermediate Algebra.** Linear equations and inequalities, polynomials and exponents, rational expressions, roots and radicals, quadratic equations, lines and systems of linear equations. Prerequisite: Math 0900 or Math ACT score of at least 18, or successful completion of placement test. Required for entrance to USU. Course fee required. (3 cr) (F,Sp,Su) ©

**Math 1030 (QL). Quantitative Reasoning.** Exploration of contemporary mathematical thinking, motivated by its application to problems in modern society. Emphasizes development of skill in analytical reasoning. Prerequisite: Math ACT score of at least 23, satisfactory score on placement exam for Math 1050, or Math 1010. (3 cr) (F,Sp,Su)

**Math 1050 (QL). College Algebra.** Real and complex number systems, graphs, inverse functions, polynomial and rational functions, exponential and logarithmic functions, systems of equations, elementary matrix algebra, induction, binomial theorem, permutations and combinations. Graphing calculator required. Prerequisite: Math 1010, or Math ACT score of at least 23, or satisfactory score on placement exam. (4 cr) (F,Sp,Su) ©

**Math 1060. Trigonometry.** Trigonometric functions, equations, identities, and applications. Graphing calculator required. Prerequisite: Math 1010, or Math ACT score of at least 23, or satisfactory score on placement exam. May be taken concurrently with Math 1050. (2 cr) (F,Sp,Su) ©

**Math 1100 (QL). Calculus Techniques.** Techniques of elementary calculus, differentiation, integration, elementary optimization, and introduction to partial derivatives. Applications in business, social science, and natural resources. Graphing calculator required. Prerequisite: Math 1050, or a math ACT score of at least 25. (3 cr) (F,Sp,Su)

**Math 1210 (QL). Calculus I.** Analytic geometry, differential and integral calculus, transcendental functions, and applications. Graphing calculator required. Prerequisites: Math 1050 and 1060, or an AP calculus score of at least 3 on the AB test, or a math ACT score of at least 27. (4 cr) (F,Sp,Su)

**Math 1220 (QL). Calculus II.** Integration, infinite series, introduction to vectors, and applications. Graphing calculator required. Prerequisite: Math 1210, or AP score of at least 4 on calculus AB exam or at least 3 on calculus BC exam. (4 cr) (F,Sp,Su)

**Math 2020 (QI). Introduction to Logic and Geometry.** Logic; introduction to algebraic geometry and Euclidean geometry. Math 2020 is a mathematics content course, not a methods course. Prerequisite: Math 1050 or math ACT score of at least 25. Course fee required. (3 cr) (F,Sp)

**Math 2210 (QI). Multivariable Calculus.** Vector calculus, multiple integration, partial derivatives, line and surface integrals. The theorems of Green, Gauss, and Stokes. Prerequisite: Math 1220 or AP calculus score of 5 on BC exam. (3 cr) (F,Sp,Su)

**Math 2250 (QI). Linear Algebra and Differential Equations.** Linear systems, abstract vector spaces, matrices through eigenvalues and eigenvectors, solution of ode's, Laplace transforms, first order systems. Prerequisite: Math 1220 or AP calculus score of 5 on BC exam. (4 cr) (F,Sp,Su)

**Math 2260. Internship and Cooperative Studies.** Lower-division internship/cooperative work experience. (1-6 cr) (F,Sp,Su) ®

**Math 2270 (QI). Linear Algebra.** Topics from linear algebra, including matrices, abstract vector spaces, linear independence, bases, eigenvalues, eigenvectors, orthogonality, least squares approximation, and linear transformations. Recommended for Math and Math Education majors. Prerequisite: Math 1220 or AP math score of 5 on calculus BC exam. (3 cr) (F)

**Math 2280 (QI). Ordinary Differential Equations.** First-order differential equations: solution techniques, numerical methods and applications. Higher-order scalar equations; linear systems, phase plane analysis. Additional topics selected from: series solution techniques, boundary value problems, Sturm-Liouville theory, bifurcation analysis. Prerequisites: Math 2210 and 2270. (3 cr) (Sp)

**Math 2910. Directed Reading and Conference.** Prerequisite: Prior arrangement with specific instructor. (1-3 cr) (F,Sp,Su) ®

**Math 3110. Modern Geometry.** Euclidean and non-Euclidean geometry, with emphasis on historical significance of parallel postulate. Axiomatic development of geometry and theorems. Prerequisite: Math 1220. (3 cr) (Sp)

**Math 3300. School Laboratory for Mathematics Teachers Level I.** Provides preservice mathematics teachers with supervised experiences working with teachers and students in middle and secondary schools. Activities coordinated with other Level I professional education courses, including Math 4500 and ScEd 3100. Concurrent enrollment required in InsT 5200, ScEd 3210, and a special methods course. (1 cr) (F,Sp)

**Math 3310. Discrete Mathematics.** Logic and axiomatics, sets, functions, counting methods, recurrence relations, graph theory, Boolean algebras, combinatorial circuits, automata, grammars, and languages. Prerequisite: Math 1220. (3 cr) (F,Sp,Su)

**Math 4200 (CI). Foundations of Analysis.** Fundamental concepts of analysis studied from a rigorous point of view. Rigorous development of the real number system and calculus. Emphasis on learning how to construct proofs. Prerequisites: Math 2210, 2250; or Math 2210, 2270, 2280. (3 cr) (F,Sp)

**\*\*Math 4230 (QI). Applied Mathematics in Biology.** Formulation, analysis, and experimental tests of mathematical models in biology. Combines mathematics, computing, experimental design, and statistical analysis while applying the scientific method to biological systems. Lectures, recitations, and a laboratory. Prerequisites: Biol 1220 and Math 2250; or permission of instructor. Programming experience recommended. Also taught as Biol 4230. (3 cr) (Sp)

**Math 4250. Advanced Internship/Co-op.** An internship/cooperative work experience which has been determined by the department to be at the 4000-level. (1-6 cr) (F,Sp,Su) ®

**Math 4300. School Laboratory for Mathematics Teachers Level II.** Provides preservice mathematics teachers with supervised experiences working with teachers and students in middle and secondary schools. Activities coordinated with other Level II professional education courses, including Math 4500 and ScEd 4100. Concurrent enrollment required in SpEd 4000, ScEd 4200, 4210, and a special methods course. (1 cr) (F,Sp)

**Math 4310 (CI). Introduction to Algebraic Structures.** First course in theory of algebraic structures. Topics include elementary group and ring theory. Prerequisites: Math 2210, 2270, 2280; or Math 2210, 2250. (3 cr) (F,Sp)

**Math 4400. History of Mathematics and Number Theory.** Chronological parallel of math history with civilization, evolution of mathematical thought, historical foundations of numbers, computation, geometry, algebra, trigonometry, and calculus. Introduction to number theory. Prerequisites: At least one of Math 4200 and 4310, and concurrent enrollment in the other. (3 cr) (Sp)

**Math 4500. Methods of Secondary School Mathematics Teaching.** A teaching methods course required of all prospective secondary school mathematics teachers. Prerequisites: Math 3110; and one of Math 4200 or 4310. (3 cr) (F,Sp)

**Math 4620. Computer Aided Math for Secondary Math Teachers.** Problem solving using symbolic manipulation software on computers. Topics include material introduced in Math 1210, 1220, 2210, 2250, 2270, and 2280. Includes instruction in the use of modern computerized devices in the classroom. Prerequisites: Math 2210, 2250; or Math 2210, 2270, 2280. (3 cr) (F)

**Math 4630. Computer Aided Math for Scientists and Engineers.** Problem solving for scientists and engineers, using symbolic manipulation software on computers. Undergraduate mathematical concepts are revisited and extended. Prerequisites: Math 2210, 2250; or Math 2210, 2270, 2280. (3 cr) (Sp)

**Math 4910. Directed Reading and Conference.** Registration requires prior arrangement with specific instructor. (1-3 cr) (F,Sp,Su) ®

**\*\*Math 5110. Differential Geometry.** Introduction to geometry of curves and surfaces in three dimensions, using graphic and symbolic software. Prerequisites: Math 2210, 2250; or Math 2210, 2270, 2280. (3 cr) (F)

**Math 5210. Introduction to Analysis I.** One and several variable calculus from an advanced point of view. Proofs of all main theorems in calculus. Prerequisite: Math 4200 or 5510. (3 cr) (F)

**Math 5220. Introduction to Analysis II.** Continuation of Math 5210. Rigorous development of multivariable advanced calculus. Prerequisite: Math 5210. (3 cr) (Sp)

**\*\*Math 5270. Complex Variables.** Basic theory and applications of complex variables for mathematics, physics, and engineering students. Topics include analytic functions, contour integration, and residue theorem conformal mappings. Prerequisites: Math 2210, 2250; or Math 2210, 2270, 2280. (3 cr) (Sp)

**\*\*Math 5310. Introduction to Modern Algebra.** Continuation of Math 4310. Topics include: Sylow theory for finite groups, factorization theory for commutative rings, and Galois theory. Prerequisite: Math 4310. (3 cr) (Sp)

**Math 5340. Theory of Linear Algebra.** Vector space theory, linear transformations and matrices, eigenvalues and eigenvectors, inner product spaces, orthogonality, canonical forms, and Hermitian matrices. Prerequisites: Math 2250 or 2270; or consent of instructor. (3 cr) (Sp)

**Math 5410. Methods of Applied Mathematics.** Basic modeling and qualitative understanding, including dimensional analysis (Buckingham Pi theorem). Asymptotic solutions, perturbation approaches, boundary layers in differential equations, variational calculus, Hamilton's principle, and conservation of energy. Emphasizes practical approaches to science and engineering problems. Prerequisites: Math 2210, 2250; or Math 2210, 2270, 2280. (3 cr) (F)

**Math 5420. Partial Differential Equations.** Modeling with partial differential equations, diffusion, and wave equations. Classical solution techniques including: maximum principles, separation of variables (eigenfunctions), method of characteristics, Fourier and Laplace transforms, and singularity methods (Green's Functions). Emphasizes understanding and solving physical equations. Prerequisite: Math 2250 or 2280. (3 cr) (Sp)

**Math 5460. Introduction to the Theory and Application of Nonlinear Dynamical Systems.** Qualitative behavior of nonlinear maps and ordinary differential equations. Stability of solutions, bifurcation theory, chaos, and applications. Prerequisite: Math 2250 or 2280. (3 cr) (Sp)

**Math 5500. Capstone Mathematics and Statistics for Teachers.** Builds on competencies attained in mathematics and statistics, enabling students to connect with and relate mathematics and statistics to real-world problem solving, while enhancing their capacity to explain conceptual mathematics. Prerequisites: Math 4200, 4310, and 4400. (3 cr) (F)

**Math 5510. Introduction to Topology.** Elementary point-set topology, topological spaces, separation axioms, metric spaces, compactness, connectedness, order topology, countability axioms, continuity, and homeomorphisms. Prerequisite: Math 2210 or equivalent. (3 cr) (F)

**\*\*Math 5570. Actuarial Math I.** Introduction to theory of risk and its application to construction and analysis of models for insurance systems. Prerequisites: Math 5710, Stat 3000, and permission of instructor. (3 cr) (F)

**\*\*Math 5580 (CI). Actuarial Math II.** Continuation of Math 5570. Prerequisite: Math 5570. (3 cr) (Sp)

**Math 5610. Computational Linear Algebra and Solution of Systems of Equations.** Numerical solutions of systems of linear and nonlinear equations, methods for eigensystems, least squares problems, finding roots of functions and nonlinear systems, constrained and unconstrained optimization. Prerequisites: Math 2210, Math 2250 or 2270, and a high-level programming language. (3 cr) (F)

**\*Math 5620. Numerical Solution of Differential Equations.** Numerical solution of differential equations, initial and boundary value problems, finite difference, finite element, and spectral methods (FFT) applied to ODEs and PDEs. Prerequisites: Math 2210; Math 2250 or 2270; Math 2280; and a high-level programming language. (3 cr) (Sp)

**Math 5640. Optimization.** One-semester introductory survey of optimization, including both continuous and combinatorial problems. Topics include: linear programming, constrained and unconstrained optimization, network models, dynamic programming, and integer programming. Prerequisites: Math 2210; and Math 2250 or 2270. (3 cr) (Sp)

**Math 5710. Introduction to Probability.** Discrete and continuous probability, random variables, distribution and density function, joint distributions, conditional probabilities and expectations, Bayes' theorem, moments, moment generating functions, inequalities, convergence in probability and distribution, and central limit theorem. Prerequisites: Math 2210; and Math 2250 or 2270. (3 cr) (F,Sp)

**Math 5720. Introduction to Mathematical Statistics.** Basic theory of point and interval estimation and hypothesis testing. Topics include: sufficiency and completeness; method-of-moments, best unbiased, maximum likelihood, Bayes', and empirical Bayes' estimators; Neyman-Pearson lemma; and likelihood ratio tests. Prerequisite: Math 5710. (3 cr) (Sp)

**\*Math 5760. Stochastic Processes.** Application of stochastic processes to engineering and science. Topics include Markov chains, Poisson processes, renewal theory, and Brownian motion. Prerequisite: Math 5710. (3 cr) (F)

**Math 5810, Math 5820. Topics in Mathematics.** Prerequisite: Permission of instructor. (1-3 cr) (F,Sp,Su) (1-3 cr) (F,Sp,Su) ®

**Math 5910. Directed Reading and Conference.** Prerequisite: Prior arrangement with a specific instructor. (1-3 cr) (F,Sp,Su) ®

**Math 5950H. Honors Senior Project.** A senior project required for completion of the departmental honors program. Prerequisite: Permission of instructor. (1-4 cr) (F,Sp,Su)

**\*Math 6110, Math 6120. Differential Geometry.** Topics include manifolds, calculus on manifolds, tensor calculus and differential forms, Lie groups, Riemannian geometry, deRham's Theorem, and Hodge theory. Prerequisite: Math 5110 or 5220; Math 6110 must be completed prior to Math 6120. (3 cr) (F) (3 cr) (Sp)

**\*Math 6210, Math 6220. Real Analysis.** Measure theory, abstract integration, differentiation, introduction to functional analysis, Hilbert and Banach spaces. Prerequisite: Math 5210; Math 6210 must be completed prior to 6220. (3 cr) (F) (3 cr) (Sp)

**\*Math 6250. Graduate Internship/Cooperative Studies.** Graduate internship/cooperative work experience. (1-6 cr) (F,Sp,Su) ®

**\*Math 6270. Complex Variables.** Analytic functions, singular points, conformal maps, harmonic functions, analytic continuation, Residue theory. Prerequisite: Math 5210 or 5270. (3 cr) (Sp)

**\*Math 6310, Math 6320. Modern Algebra.** Algebraic structures, including vector spaces, groups, rings, algebras, and modules. Topics include: category theory, elementary commutative ring theory, and algebraic geometry. Prerequisite: Math 5310; Math 6310 must be completed prior to 6320. (3 cr) (F) (3 cr) (Sp)

**\*Math 6340, Math 6350. Multilinear Algebra and Matrix Theory.** Permutation groups and representations, tensor spaces, symmetry classes of tensors, generalized matrix functions, matrices and graphs, and combinatorial matrix algebra. Prerequisite: Math 5340; Math 6340 must be completed prior to 6350. (3 cr) (F) (3 cr) (Sp)

**\*Math 6410. Ordinary Differential Equations I.** Existence-uniqueness theory, linear equations and systems, nonlinear equations, and stability. Prerequisite: Math 5210. (3 cr) (F)

**\*Math 6420. Partial Differential Equations I.** Introduction to the theory of partial differential equations, including existence and uniqueness. Prerequisite: Math 5220 or 6410. (3 cr) (Sp)

**\*Math 6440. Ordinary Differential Equations II.** Asymptotic behavior, periodicity, boundary value problems, and perturbation methods. Prerequisite: Math 6410. (3 cr) (Sp)

**\*Math 6450. Partial Differential Equations II.** Advanced existence and uniqueness theorems, behavior of solutions, Sobolev spaces. Prerequisites: Math 6210; and Math 5420 or 6420. (3 cr) (Sp)

**\*Math 6470. Advanced Asymptotic Methods.** Theory of asymptotics and perturbations. Boundary layers for ordinary and partial differential equations. Free boundary problems, shocks, multiple-scale methods, and WKB methods. Prerequisite: Math 5420. (3 cr) (Sp)

**\*Math 6510, Math 6520. Topology.** Homotopy theory, fundamental groups, covering spaces, singular homology with applications to spheres and Euclidean spaces, CW complexes, cohomology ring, and Poincare duality. Prerequisites: Math 4310, 5510; and Math 5310 or consent of instructor. Math 6510 must be completed prior to 6520. (3 cr) (F) (3 cr) (Sp)

**\*Math 6610. Numerical Analysis.** Linear and nonlinear equations, large scale problems, and eigenvalues. Prerequisites: Math 5210, 5610, or consent of instructor. (3 cr) (F)

**\*Math 6620. Numerical Analysis.** Numerical solution of ordinary and partial differential equations. Prerequisite: Math 6610 or consent of instructor. (3 cr) (Sp)

**\*Math 6640. Optimization.** Unconstrained problems, smooth function methods, linearly constrained problems, linear and quadratic programming, nonlinearly constrained methods, and practicalities. Prerequisite: Math 5220 or consent of instructor. (3 cr) (Sp)

**\*Math 6750, Math 6760. Probability Theory.** Probability spaces, random variables, distribution functions, expectations, independence, modes of convergence, limit theorems, and applications. Prerequisite: Math 5210; Math 6750 must be completed prior to 6760. (3 cr) (F) (3 cr) (Sp)

**\*Math 6810, Math 6820. Topics in Mathematics (Topic).** Prerequisite: Consent of instructor. (3 cr) (F) (3 cr) (Sp) ®

**\*Math 6910. Directed Reading and Conference.** Prerequisite: Prior arrangement with specific instructor. (1-3 cr) (F,Sp,Su) ®

**Math 6970. Thesis.** (1-9 cr) (F,Sp,Su) ®

**Math 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

**\*Math 7110, Math 7120. Geometry (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Math 7210, Math 7220. Analysis (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Math 7310, Math 7320. Algebra (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Math 7410, Math 7420. Differential Equations (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Math 7510, Math 7520. Topology (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Math 7610, Math 7620. Numerical Analysis (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Math 7750, Math 7760. Probability (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Math 7810, Math 7820. Topics in Mathematics (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**Math 7910. College Teaching Internship.** (3 cr) (F,Sp,Su) ®

**Math 7970. Dissertation Research.** (1-15 cr) (F,Sp,Su) ®

**Math 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

## Statistics Courses (Stat)

**Stat 1040 (QL). Introduction to Statistics.** Descriptive and inferential statistical methods. Emphasis on conceptual understanding and statistical thinking. Examples presented from many different areas. Prerequisite: Math ACT score of 19 or greater, Math 1010, or 70 percent or greater on Math 1050 placement test. (3 cr) (F,Sp,Su) ©

**Stat 2000 (QI). Statistical Methods.** Introduction to statistical concepts, graphical techniques, probability, distributions, estimation, one and two sample testing, chi-square tests, and simple linear regression. Prerequisite: Math 1050. (3 cr) (F,Sp,Su) ©

**Stat 2250. Internship and Cooperative Studies.** Lower-division internship/cooperative work experience in statistics. (1-6 cr) (F,Sp,Su)

**Stat 2300 (QL). Business Statistics.** Descriptive and inferential statistics, probability, sampling, estimation, tests of hypotheses, linear regression and correlation, chi-square tests, analysis of variance, and multiple regression. Prerequisite: Math 1050. (4 cr) (F,Sp,Su) ©

**Stat 2950. Directed Reading and Conference.** Prerequisite: Prior arrangement with specific instructor. (1-3 cr) (F,Sp,Su) ®

**Stat 3000 (QI). Statistics for Scientists.** Introduction to statistical concepts, graphical techniques, discrete and continuous distributions, parameter estimation, hypothesis testing, and chi-square tests. Prerequisites: Math 1100 or 1210. (3 cr) (F,Sp)

**Stat 4250. Advanced Internship/Co-op.** Advanced educational work experience in statistics. Prerequisite: Approval of instructor. (1-6 cr) (F,Sp,Su) ®

**Stat 4500. Methods of Teaching Statistics in Secondary and Middle School.** Teaching methods course required for all prospective mathematics and statistics composite teaching majors. (3 cr) (F,Sp)

**Stat 4910. SPSS Shortcourse.** Access to and use of the SPSS statistical software package. (1 cr) (F,Sp,Su)

**Stat 4920. SAS Shortcourse.** Access to and use of the SAS statistical analysis program. (1 cr) (F,Sp)

**Stat 4950. Directed Reading and Conference.** Prerequisite: Prior arrangement with specific instructor. (1-3 cr) (F,Sp,Su) ®

**Stat 5100 (CI, QI). Linear Regression and Time Series.** Methods for prediction and hypothesis testing in multiple linear regression models, including analysis of variance and covariance, logistic regression, introduction to time series, and signal processing. Prerequisite: Stat 2000 or 3000. (3 cr) (F)

**Stat 5110. Theory of Linear Models.** Theory and methods of correlation, regression, and least square analysis of experimental data. Prerequisites: Math 2210, 2250, or Math 2210, 2270; and Stat 3000. (3 cr) (F)

**Stat 5120. Categorical Data Analysis.** Analysis of categorical data, contingency tables, goodness of fit, random sampling, log-linear and logistic regression models, and sampling for proportions, as well as stratified and cluster sampling. Prerequisite: Stat 5100. (3 cr) (F)

**Stat 5200. Design of Experiments.** Design, analysis, and interpretation of experiments, split plots, incomplete blocks, confounding, fractional factorials, nested designs, two- and three-way analysis of variance, covariance, and multiple regression. Prerequisite: Stat 2000 or 3000. (3 cr) (Sp)

**Stat 5300 (QI). Statistical Process Control.** Techniques and applications of statistics in modern management of industrial processes. Control charts, acceptance sam-

pling, design of industrial experiments, and analysis of process failures. Prerequisite: Stat 2000 or 3000. (3 cr) (Sp)

**Stat 5600 (CI). Applied Multivariate Statistics.** Introduction to multivariate statistical procedures for data analysis. Topics include MANOVA, principal component analysis, factor analysis, clustering, and classification. Prerequisite: Stat 5100. (3 cr) (F)

**Stat 5810, Stat 5820. Topics in Statistics.** Prerequisite: Consent of instructor. (1-3 cr) (F) (1-3 cr) (Sp) ®

**Stat 5890 (CI). Problem Solving in Statistics.** Capstone course for Statistics majors, applying course material covered in the undergraduate major. Prerequisite: Permission of instructor. (3 cr) (Sp)

**Stat 5940. Directed Reading and Conference.** Prerequisite: Prior arrangement with specific instructor. (1-3 cr) (F,Sp,Su) ®

**Stat 5950H. Senior Honors Project.** A senior project, required for completion of the departmental honors program and developed under the direction of a departmental faculty member. Prerequisite: Permission of instructor. (1-4 cr) (F,Sp,Su)

**Stat 5970. Seminar.** Review of current literature and developments in the field of statistics. (1-3 cr) (F,Sp) ®

**\*Stat 6120. Generalized Linear Models.** Theory of generalized linear models and application to categorical data, and to regression-like and ANOVA-like data that do not meet the usual assumptions. Topics include link functions, error structures, deviance, quasi-likelihood estimation, and diagnostics. Prerequisites: Math 5720, Stat 5110. (3 cr) (Sp)

**\*Stat 6180. Time Series.** The domain and frequency domain time series analysis, including Box-Jenkins methods, spectral analysis and filtering, introduction to state space methodology. Prerequisites: Stat 5100, Math 5720. (3 cr) (Sp)

**\*Stat 6200. Analysis of Unbalanced Data and Complex Experimental Designs.** Contrasts; Type I, II, III, IV contrasts; sums of squares; and resulting tests. Random and mixed effects models for complex designs, such as split-plot, repeated measures, and hierarchical (nested) designs; expected mean square algorithm; and approximate F-tests. Prerequisite: Stat 5200. (3 cr) (F)

**\*Stat 6250. Graduate Internship/Co-op.** Educational work experience at the graduate level. Prerequisite: Permission of instructor. (1-8 cr) ®

**\*Stat 6510. Resampling Methods.** Covers theory and applications of computer intensive resampling methods: Bootstrap, Cross-validation, and Subsampling. Applications include hypothesis testing, confidence intervals, regression, time series, multivariate analysis, and nonparametric statistics. Prerequisite: Math 5710. (3 cr) (F)

**\*Stat 6520. Nonparametric Density Estimation and Smoothing.** Nonparametric density estimation and smoothing are generalizations of classical techniques that do not require such stringent distributional and functional form assumptions. This course covers theory, application, and implementation of histograms, frequency polygons, kernel-based methods, and spline-based methods. Prerequisites: Math 5710 and recommended concurrent enrollment in Math 5720. (3 cr) (Sp)

**\*Stat 6550. Statistical Computing.** Survey of algorithms and tools for modern statistical computing. Topics include simulation design and implementation, algorithms for linear regression and subset selection, smoothing algorithms, fast fourier transform, EM algorithm, numerical methods for maximum likelihood estimation, and neural networks. Prerequisites: Stat 5110, Math 5720, and knowledge of a programming language. (3 cr) (F)

**\*Stat 6560. Graphical Methods.** Statistical graphics and scientific visualization of one, two, and higher dimensional data. Well-chosen and designed graphics are vital in exploratory data analysis, model diagnostics, and data presentation. Includes spe-

cific methods and general principles, such as effective use of color and motion. Prerequisites: Stat 3000 and programming experience. (3 cr) (Sp)

**\*Stat 6600. Multivariate Analysis.** Statistical methods for analyzing multivariate data and the theory behind them. Topics include multivariate normal distribution and multivariate distributions derived from it, multivariate t-tests, regression, MANOVA, principal components and factor analysis, multidimensional scaling, classification, and cluster analysis. Prerequisites: Math 5720 and concurrent enrollment in Stat 5110. (3 cr) (F)

**Stat 6710. Mathematical Statistics I.** Modes of convergence of random variables, laws of large numbers, characteristic functions, and the central limit theorem. Prerequisite: Math 5720. (3 cr) (F)

**Stat 6720. Mathematical Statistics II.** Consistency, loss functions, risk, and notions of optimality of estimations. Hypothesis testing and confidence regions. Large sample theory, notions of robustness. Prerequisite: Stat 6710. (3 cr) (Sp)

**\*Stat 6810, Stat 6820. Topics in Statistics (Topic).** Prerequisite: Permission of instructor. (3 cr) (F) (3 cr) (Sp) ®

**\*Stat 6890. Practical Statistical Consulting.** Introduction to statistical consulting for graduate students, for faculty in other research departments, and for business, industry, and government. Prerequisite: Permission of instructor. (1-3 cr) (F,Sp,Su) ®

**\*Stat 6910. Seminar in Statistics.** Review of current literature and developments in statistics. Prerequisite: Permission of instructor. (1-3 cr) (F,Sp) ®

**\*Stat 6950. Directed Reading and Conference.** Prerequisite: Prior arrangement with specific instructor. (1-4 cr) (F,Sp,Su) ®

**Stat 6970. Thesis and Research.** Outlining and conducting research in statistics. Thesis preparation. (1-6 cr) (F,Sp,Su) ®

**Stat 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

**\*Stat 7110, Stat 7120. Linear Models (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Stat 7180, Stat 7190. Time Series Analysis (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Stat 7210, Stat 7220. Experimental Design (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Stat 7310, Stat 7320. Business and Industrial Statistics (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Stat 7510, Stat 7520. Nonparametric Statistics (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Stat 7550, Stat 7560. Computational and Graphical Statistics (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Stat 7610, Stat 7620. Multivariate Statistics (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Stat 7710, Stat 7720. Mathematical Statistics (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**\*Stat 7730, Stat 7740. Bayesian Statistics and Decision Theory (Topic).** (3 cr) (F) (3 cr) (Sp) ®

**Stat 7810, Stat 7820. Topics in Statistics (Topic).** (1-3 cr) (F) (1-3 cr) (Sp) ®

**Stat 7970. Dissertation Research.** (1-15 cr) (F,Sp,Su) ®

**Stat 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Offered by demand. Contact department.

\*\*Taught 2003-2004.

All course offerings are based on demand.

*Department of*

# *Mechanical and Aerospace Engineering*

*College of Engineering*

**Head: Trustee Professor J. Clair Batty**, thermal science, cryogenics, space systems  
Office in Engineering Laboratory 178, (435) 797-2867

FAX (435) 797-2417

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**Professors** *P. Thomas Blotter*, structural dynamics; *Alma P. Moser*, (associate dean, College of Engineering), engineering mechanics, piping systems; *Warren F. Phillips*, aerodynamics, flight mechanics; *Frank J. Redd*, space systems; *Robert E. Spall*, thermal/fluids; **Adjunct Professor** *Dell K. Allen*, manufacturing; **Professors Emeriti** *Ralph H. Haycock*, mechanics, manufacturing; *Russell M. Holdredge*, heat transfer, fluid mechanics; *Owen K. Shupe*, nuclear, material science; *Carl D. Spear*, material science; *Edward W. Vendell, Jr.*, cryogenics, heat transfer, thermal systems design; **Associate Professors** *Steven L. Folkman*, applied mechanics, structural dynamics, space structures; *Thomas H. Fronk*, mechanics of composites and materials; *R. Rees Fullmer*, manufacturing, controls, robotics, dynamics, spacecraft; *Carl G. Wood*, design, manufacturing; **Research Associate Professor** *Sue Ellen Haupt*, fluid mechanics, atmospheric sciences; **Assistant Professors** *Elgin A. Anderson*, thermal/fluids; *Ning Fang*, manufacturing; *Barton L. Smith*, thermal/fluids; **Adjunct Assistant Professors** *Scott M. Jensen*, thermal management of space systems; *Paul J. Mueller*, thermal science, propulsion; *Steven R. Wassom*, controls, dynamic spaceflight

**Degrees offered:** Bachelor of Science (BS), Master of Engineering (ME), Master of Science (MS), and Doctor of Philosophy (PhD) in Mechanical Engineering; BS in Manufacturing Engineering

**Undergraduate Emphasis:** *Mechanical Engineering*—Aerospace Engineering

**Graduate specializations:** Aerospace Engineering, Dynamics and Controls, Manufacturing Engineering, Solid Mechanics, Thermal/Fluids

## *Undergraduate Programs*

### *Mission*

The Department of Mechanical and Aerospace Engineering provides graduates with a foundation of knowledge and experience upon which to build successful careers in mechanical, manufacturing, or aerospace engineering, or other fields where a strong engineering background is required or desirable. Undergraduate programs emphasize mechanical engineering fundamentals and computer-based problem solving, while teaching students to learn, synthesize, and communicate engineering information. Graduate programs emphasize fundamental and applied research, providing students with enhanced preparation for engineering practice, research, and education. Students, faculty, and staff are committed to excellence in learning, discovery, and engagement in an environment that fosters diversity and mutual respect.

### *Undergraduate Program Objectives (Mechanical Engineering)*

1. Graduates will succeed in entry-level engineering positions with mechanical, manufacturing, or aerospace firms in regional, national, or international industries, as well as with government agencies.
2. Graduates will succeed in the pursuit of advanced degrees in engineering or other fields where a solid foundation in mathematics, science, and engineering fundamentals is required.
3. Graduates will be able to synthesize mathematics, science, engineering fundamentals, and laboratory and work-based experiences to formulate and solve engineering problems in both thermal and mechanical systems areas.
4. Graduates will have proficiency in computer-based engineering, including modern numerical methods, software design and development, and the use of computational tools.

5. Graduates will be prepared to communicate and work effectively on team-based engineering projects.
6. Graduates will recognize the importance of, and have the skills for, continued independent learning.

### ***Undergraduate Program Outcomes (Mechanical Engineering)***

#### **Fundamentals**

Students will identify, formulate, and solve basic engineering problems utilizing:

1. linear algebra
2. calculus-based statistics
3. multivariable calculus
4. differential equations
5. calculus-based physics
6. chemistry
7. material science
8. solid mechanics
9. fluid mechanics
10. thermal science
11. manufacturing science

#### **Communication**

Students will develop and demonstrate the ability to communicate engineering information, including geometry, technical concepts, and results, by:

1. participating in oral presentations.
2. writing proposals and reports.
3. developing engineering drawings and specifications.
4. participating in team-based engineering projects.

#### **Laboratory Experiences**

Students will participate in and evaluate laboratory experiences, which:

1. include experimental design, data collection, and data analyses.
2. incorporate the use of modern laboratory and data acquisition equipment.
3. utilize statistical analysis and interpretation of data.
4. develop basic manufacturing skills.
5. may include work-based learning experiences, such as internships.

#### **Computer-based Engineering**

Students will demonstrate proficiency in the application of computer technology to engineering problem-solving through:

1. application of modern numerical methods and computational techniques.
2. design and development of engineering software.

3. integration of numerical solutions into the engineering process of design and analysis.
4. use of current commercial engineering software.

#### **Humanities and Social Sciences**

Students will acquire significant exposure to the humanities and social sciences, so as to:

1. gain an appreciation for the broad impact of engineering solutions on society.
2. demonstrate an understanding of the fundamentals of the history, principles, form of government, and economic system of the United States.
3. demonstrate a knowledge of contemporary global issues.
4. contribute to the development of the individual as a responsible well-rounded citizen.

#### **Design and Synthesis**

Students will participate in the design and realization process, in which they will:

1. develop a set of multidisciplinary engineering requirements.
2. synthesize material from mathematics, science, and engineering fundamentals to solve engineering problems.
3. design, develop, and verify software to solve engineering problems.
4. bring a system from requirements definition to concept development, then specification, prototype and testing, and production or fabrication using significant engineering analysis.
5. demonstrate the links between design, prototyping, testing, manufacturing, and other disciplines.
6. manage a project, including budgeting and detailed planning.

#### **Independent Learning**

Students will recognize the importance of, and demonstrate the skills required for, independent learning through:

1. independent study required in the engineering curriculum.
2. exposure to case studies in ethics and professional responsibility.
3. exposure to advanced topics in engineering science.
4. exposure to advanced topics in engineering research.
5. studying for and passing the Fundamentals of Engineering Examination.

#### ***Assessment and Quality Improvement***

The MAE faculty and staff are committed to excellence and to continuous quality improvement. A responsive assessment and feedback process involving major constituencies, including faculty, students, alumni, and industrial employers of students and graduates, is in place and ongoing.

### ***Options for Undergraduate Study***

The **Mechanical Engineering** BS degree provides the broadest background of any discipline in the field of engineering. Mechanical Engineering graduates are prepared to pursue careers in such widely diverse industries as aerospace, agricultural equipment, automotive, biotechnical, chemical processing, composite materials, computer equipment, defense, electrical utilities, food processing, industrial equipment, manufacturing, materials processing, nuclear, petroleum, robotics, and solar energy. Most Mechanical Engineering graduates are prepared for graduate studies and enhanced career prospects in engineering or other areas, such as consulting, law, medicine, business management, or teaching. In addition, students who are preparing to apply for admission to medical school will find that Mechanical Engineering provides an excellent foundation for the increasingly technology-oriented field of medicine.

The **Aerospace Engineering** emphasis within the Mechanical Engineering BS degree serves to focus mechanical engineering fundamentals on the mechanics and dynamics of both flight within the atmosphere and space flight. Included within its scope are studies in aerodynamics, aircraft flight dynamics and control, aircraft design, spacecraft orbital mechanics, spacecraft attitude motion and control, and space systems design. Graduates who complete the aerospace engineering emphasis are prepared to pursue careers in aircraft design and development, aircraft flight testing, spacecraft and space systems design, and spacecraft trajectory design and analysis. As fully qualified Mechanical Engineers, graduates with the aerospace engineering emphasis are also well-prepared to pursue graduate studies or careers in the industries listed above under Mechanical Engineering.

The **Manufacturing Engineering** BS degree prepares students to be proficient in the fundamentals of engineering, as well as in materials and manufacturing processes; process, assembly, and product engineering; manufacturing competitiveness; manufacturing systems design; and laboratory experience. Graduates will understand the behavior and properties of materials as they are altered and influenced by processing in manufacturing; the design of products and the equipment, tooling, and environment necessary for their manufacture; the creation of competitive advantage through manufacturing planning, strategy, and control; the analysis, synthesis, and control of manufacturing operations using statistical and calculus based methods; and how to measure manufacturing process variables and make technical inferences about the process. Graduates will have the necessary background to pass the Certified Manufacturing Technologist and Certified Manufacturing Engineer exams. Graduates who complete the Manufacturing Engineering degree are prepared to pursue graduate studies or careers in any industry that manufactures a product. For example, the aerospace, automotive, electronics, machine tool, petroleum, and electronics industries all employ manufacturing engineers as product designers, process designers and managers, maintenance engineers, and quality control engineers.

The first two years of the MAE curriculum are structured to concentrate on the fundamentals of mathematics, chemistry, physics, computer science, and basic engineering science. During the second two years, students apply these fundamentals to more concentrated courses in the essentials of mechanical, aerospace, and/or manufacturing engineering. Laboratory activities and computer usage are integrated throughout the curriculum to give students opportunities for hands-on exposure to modern computer hardware and software, as well as other modern hardware and laboratory facilities. Engineering design activities begin during the

first two years and progress in depth as the student's proficiency increases. The engineering design experience culminates in a capstone senior design course, integrating the engineering coursework into a focused, realistic design project.

Both the Mechanical Engineering and the Manufacturing Engineering programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET). The Aerospace Engineering emphasis is included within the Mechanical Engineering degree.

### ***Admission and Graduation Requirements***

Freshman and transfer students must satisfy the admission policies and entrance requirements of both the University and the College of Engineering. Each new student will be assigned an advisor, who will help plan an educational program fulfilling the student's professional goals. Placement of incoming students will depend on high school and/or prior college coursework. Those who complete a portion of the University Studies requirements by examination (CLEP) and/or by advanced placement (AP) credit may complete the requirements for a Bachelor of Science degree in less than four years.

**Curriculum.** At the beginning of each school year, each student should obtain a detailed, four-year requirement sheet. This sheet, which lists semester requirements for each of the three curricula (mechanical, manufacturing, and aerospace), may be obtained from the departmental office. All students in the department follow the preprofessional engineering curriculum for the freshman and sophomore years. Prior to the junior year, the student must apply for admission to the professional program and, in consultation with the faculty advisor, select an area of emphasis. Students who are unable to take courses during the semester indicated on the curriculum requirement sheet may develop alternative schedules, consistent with prerequisites and the timing of course offerings.

**GPA Requirement.** A 2.3 GPA in all technical courses is the minimum standard which preprofessional students must attain in order to be considered for admission to any MAE professional program. A 2.0 overall GPA is required to be considered for graduation from any undergraduate program in the Mechanical and Aerospace Engineering Department.

**Course Requirements.** The specific course requirements for the MAE preprofessional program and the MAE professional programs are quite extensive and may occasionally change. For these reasons, the complete requirements are not listed here. For more information, contact the department or send an Internet e-mail request to [jpsmith@mae.usu.edu](mailto:jpsmith@mae.usu.edu).

**A passing grade on the Fundamentals of Engineering Exam**, the first step in becoming a licensed professional engineer, is required for graduation. Past experience has shown that the USU Mechanical and Aerospace Engineering students are well-prepared for this locally administered, national exam.

For additional information on academic requirements, see the College of Engineering (pages 89-93) and the Undergraduate Graduation Requirements (pages 53-55) sections of this catalog.

### **Financial Support**

Scholarships, assistantships, grants-in-aid, and work-study programs are available to undergraduate students through the University. In addition, the MAE department employs undergraduates to assist in engineering research and development. Aerodynamics, design of instrumentation and payloads for the upper atmosphere and space, buried structures, and manufacturing processes and controls are some of the research programs that involve undergraduate students. Cooperative education and industrial employment opportunities for students are coordinated by the University Placement Office.

### **Concurrent BS/Master's Program**

The concurrent BS/Master's program allows engineering students to begin taking graduate-level classes during their senior year. This permits them to complete requirements for *both* the BS degree *and* the master's degree concurrently during two years. Students in this program have a greater selection of graduate courses, since many graduate courses are taught during alternate years. In addition, the student's senior design project could be a start for a graduate design project or thesis. After completing their BS degree, students in the program can earn a master's degree in only one additional year. Both the BS and the master's degree can generally be earned with 150 total credits, although students should note that a Plan C MS requires 3 extra credits. Finally, students with a master's degree can expect a much higher starting salary following graduation. (For more information, see *College of Engineering* section of this catalog, page 92.)

## **Graduate Programs**

### **Admission Requirements**

All students intending to pursue graduate studies at Utah State University must complete and return an *Application for Admission* to the School of Graduate Studies. In addition to the general graduate admission requirements listed on pages 72-73, the department requires all graduate applicants to have a bachelor's degree from an accredited institution in Mechanical Engineering, Aerospace Engineering, Manufacturing Engineering, or a closely related engineering discipline. A minimum GPA of 3.0 for MS applicants and 3.3 for PhD applicants is required for the last 60 semester or 90 quarter credits earned. All MAE graduate students are expected to be well-acquainted with either the FORTRAN or C programming language. Those students who do not have a BS degree in an appropriate engineering discipline may be admitted with nonmatriculated status and required to complete some remedial requirements. Applicants are also required to submit evidence of potential graduate-level success through GRE scores in the verbal, quantitative, and analytical categories.

### **Specializations**

The Department of Mechanical and Aerospace Engineering offers ME, MS, and PhD degrees in Mechanical Engineering, with specializations in Aerospace Engineering, Manufacturing Engineering, and Mechanical Engineering (including Solid Mechanics, Thermal/Fluids, and Dynamics and Control).

**Aerospace Engineering** addresses atmospheric and space flight. Included are such disciplines as computational fluid dynamics, experimental fluid mechanics, aerodynamics, aircraft flight dynamics, aircraft design, spacecraft orbital mechanics,

spacecraft attitude motion and control, aircraft and spacecraft propulsion systems, space system design, thermal management of space deployed systems, and the space environment. Mechanical Engineering graduates choosing the aerospace specialization may pursue careers in such areas as aircraft design and development, aircraft flight testing, spacecraft and space systems design, and spacecraft trajectory design and analysis, as well as the broader, traditional mechanical engineering fields.

**Manufacturing Engineering** concentrates on the theory of manufacturing systems, including manufacturing processes, the design of manufacturing systems, product design, productivity, quality, and life cycle analysis. Principal areas of emphasis include manufacturing automation, machining theory, and mold flow analysis, as well as flexible manufacturing systems and computer-integrated manufacturing. Manufacturing engineers are prepared to pursue product and process design careers in any electronics, food processing, and petroleum industries.

**Mechanical Engineering** deals with the creation of the mechanical systems and machines that serve society. Areas of specialization include solid mechanics, thermal/fluids, and dynamics and control. The **solid mechanics** specialization is concerned with the mechanics of displacement and stress analysis combined with material science for selection of an optimum design. Students learn to use the finite element method as well as classical methods for the determination of stresses, strains, and displacements. Included are studies of elasticity, plasticity, and failure in traditional metals and high-tech composite materials. The **thermal/fluids** specialization is concerned with the transport of mass, momentum, and energy in solids, liquids, and gasses. Included within its scope are the fundamental studies of thermodynamics, heat transfer, and fluid mechanics. The **dynamics and control** specialization is concerned with describing and controlling the motion of mechanical systems. Included within its scope are the fundamental studies of dynamics, kinematics, vibrations, control theory, hydraulics and pneumatics, electromechanical systems, and machine design. Graduates who select the broad mechanical engineering option are prepared to pursue careers in such widely diverse disciplines as aerospace, automotive, building, chemical, defense, electronics, environmental engineering, food processing, heating and air conditioning, heavy equipment, machine tools, manufacturing, nuclear, petroleum, public utilities, and solar energy.

### **Degree Programs**

The **Plan A MS Degree** requires 6 credits of graduate-level coursework in Mechanical Engineering fundamentals; 12 credits of 6000-level (or above) engineering coursework, exclusive of MAE 6930, 6950, 6970, and 6990; a minimum of 3 credits of 5000-level (or above) coursework in approved mathematics; and 9 credits selected from any one of five declared areas of emphasis. A minimum of 30 credits is required beyond the BS, including a 6-credit thesis (MAE 6970). The thesis must meet School of Graduate Studies requirements. A paper with the student as author or coauthor, submitted for publication in a refereed journal, is also required.

The **Plan C MS Degree** requires 6 credits of graduate-level coursework in Mechanical Engineering fundamentals; 18 credits of 6000-level (or above) engineering coursework, exclusive of MAE 6930, 6950, 6970, and 6990; a minimum of 3 credits of 5000-level (or above) coursework in approved mathematics; and either 12 credits selected from any one of five declared areas of emphasis, or 15 credits selected from any two of the areas. A minimum of 33 credits is required beyond the BS, which may not in-

clude a thesis (MAE 6970), but may include up to 3 credits of Design Project (MAE 6950). MAE 6950 requires a report written to thesis standards.

The **Master of Engineering Degree** requires 6 credits of graduate-level coursework in Mechanical Engineering Fundamentals; 15 credits of 6000-level (or above) engineering coursework exclusive of MAE 6930, 6950, 6970, 6990, 7930, 7970, and 7990; a minimum of 3 credits of 5000-level (or above) coursework in approved mathematics; and either 15 credits selected from Group A or at least 9 credits from Group A and the remainder chosen from Group B. A minimum of 30 credits is required beyond the BS, which may not include a thesis (MAE 6970), but may include up to three credits of Design Project (MAE 6950). MAE 6950 requires a report written to thesis standards. Students are not required to defend the report. However, the report must be approved by the major professor.

The **PhD Degree** requires 12 credits of graduate-level coursework in Mechanical Engineering fundamentals; 24 credits of 6000-level (or above) engineering coursework, exclusive of MAE 6930, 6950, 6970, 6990, 7930, 7970, and 7990; a minimum of 6 credits of 5000-level (or above) coursework in approved mathematics; and 18 credits selected from any one of five declared areas of emphasis. A minimum of 90 credits is required beyond the BS, including a dissertation (MAE 7970). The dissertation must meet School of Graduate Studies requirements and be at least 24 credits, but no more than 30 credits. A paper with the student as author or coauthor, submitted for publication in a refereed journal, is also required.

**GPA Requirement.** A 3.0 GPA is the minimum acceptable for an ME, MS, or PhD degree from Utah State University.

**Course Requirements.** The specific course requirements for the ME, MS, and PhD degrees offered through the department may occasionally change. For this reason, prospective students are advised to seek current details concerning graduate degree requirements and program coursework by contacting the department or sending an Internet e-mail request to: [jpsmith@mae.usu.edu](mailto:jpsmith@mae.usu.edu)

## Research

The Department of Mechanical and Aerospace Engineering is conducting research in all of the areas of specialization listed above. Departmental research projects are funded by both government agencies and private industry. Current research topics include analytical and experimental structural dynamics, computational and experimental fluid dynamics, aerodynamics, plastics and composite materials, numerical modeling and design of composite structures, buried structures, thermodynamics, heat transfer, cryogenics, intelligent control systems, manufacturing automation, spacecraft control, design and analysis of space systems, orbital mechanics, remote sensing, robotics, life-cycle engineering, design theory and methodology, and production modeling and simulation.

## Financial Assistance

A number of teaching and research assistantships are available to graduate students through the department, and are awarded on a competitive basis each year. In addition, scholarships covering the nonresident portion of tuition are available each semester, on a competitive basis, to nonresident students who hold a graduate assistantship paying at least \$250 per month. Students interested

in working part time as teaching or research assistants should apply to the department by March 31 for the coming academic year.

Acceptance to pursue graduate studies in the Department of Mechanical and Aerospace Engineering does not imply a commitment to any type of financial aid. All awards for financial aid are made on a competitive basis after applicants are admitted to graduate school. All students who receive any type of financial support from the University or who are supplied University space for study or research must carry a minimum of 9 credits of approved coursework each semester while receiving such support.

# Mechanical and Aerospace Engineering Courses (MAE)

**MAE 1200. Engineering Graphics.** Introduction to technical sketching, solid modeling, and engineering graphics. Concurrent engineering design process applied to a project. Students start with hand sketches, then move through variational geometry solid models, with tolerance analysis and control, until they have produced a complete set of manufacturing drawings conforming to the ASME standard. Prerequisite: Math 1060. (2 cr) (F,Sp)

**MAE 2060. Material Science.** Study of atomic and microscopic structures of metals, polymers, ceramics, and composite materials, and how these structures affect material properties. Prerequisite: Chem 1210. (3 cr) (F,Sp)

**MAE 2200. Engineering Numerical Methods I.** Introduction to computational methods, emphasizing software development using FORTRAN 95. Prerequisite: Math 1220. (2 cr) (F)

**MAE 2210. Engineering Numerical Methods II.** Explores basic tools of numerical analysis, solution to ordinary and partial differential equations, software development using FORTRAN 95, and applications using computer algebra packages. Prerequisites: MAE 2200; Math 2210, 2250 (may be taken concurrently). (3 cr) (Sp)

**MAE 2250. Cooperative Practice.** Planned work experience in industry. Detailed program must have prior approval. Written report required. (3 cr) (F,Sp,Su)

**MAE 2400. Thermodynamics I.** First and second laws of thermodynamics; analysis of open and closed systems; equations of state; power and refrigeration cycles; and problem solving methodology. Prerequisites: Math 1220; Math 2210 (may be taken concurrently). (3 cr) (F,Sp,Su)

**MAE 2600. Manufacturing Processes.** Introduction to manufacturing processes and CAD/CAM. Material forming, machining, finishing, and joining. Integration of manufacturing and CAD, plus the fundamentals and application of statistical process control. Prerequisite: MAE 2060 (may be taken concurrently). (3 cr) (Sp)

**MAE 3040. Mechanics of Solids.** Stress, strain, and deflection due to flexure and shear. Combined stresses, instability, nonsymmetric bending, torsion, and energy methods. Prerequisite: Engr 2040. (3 cr) (F)

**MAE 3320. Advanced Dynamics.** Particle and rigid body dynamics. Work and kinetic energy, conservation of energy, impulse-momentum, conservation of linear and angular momentum. Kinematics and kinetics in 2-D and 3-D. Newtonian and Lagrangian Mechanics. Prerequisites: Engr 2020; MAE 2200 (may be taken concurrently). (3 cr) (F)

**MAE 3340. Instrumentation and Measurements.** Principles and application of mechanical instrumentation and experimentation. Sensing elements, signal conditioning, data acquisition, statistical analysis of data, and instrumentation system design. Prerequisites: Engr 2040 and ECE 2200. (3 cr) (Sp)

**MAE 3400. Thermodynamics II.** Second law analysis, power and refrigeration cycles, property relations, gas mixtures, psychrometrics, chemical reactions, chemical equilibrium, introduction to heat transfer, steady state and transient conduction. Prerequisites: MAE 2400; MAE 2200 (may be taken concurrently). (3 cr) (F)

**MAE 3420. Fluid Dynamics.** Application of fluid dynamic theory to inviscid and viscous, incompressible and compressible, and external and internal fluid flows, with emphasis on laminar and turbulent boundary layers. Must be taken concurrently with MAE 2200. Prerequisites: Engr 2020, MAE 2400. (3 cr) (F)

**MAE 3440 (QI). Heat and Mass Transfer.** Introduction to convection, external flow, internal flow, free convection, boiling and condensation, heat exchangers, radiation and diffusion mass transfer. Includes design project. Prerequisites: MAE 3400, 3420; MAE 2210 (may be taken concurrently). (3 cr) (Sp)

**MAE 3800. Design I.** First course in senior design sequence. Design process, teaming skills, engineering economics, project selection and management, proposal writing, technical writing, and technical presentations. Prerequisite: Engr 2040. (2 cr) (Sp)

**MAE 4300. Machine Design.** Computer-aided design and synthesis of mechanisms, mechanical linkages, cams, fasteners, welds, gears, bearings, power transmission components, and lubrication. Component failure analysis based on metal fatigue related to dynamic loading. Prerequisite: MAE 3040. (4 cr) (Sp)

**MAE 4400 (CI). Fluids/Thermal Laboratory.** Laboratory experiences in observation and measurement of fundamental fluid and thermal phenomena. Prerequisites: MAE 3340, 3440. (1 cr) (F)

**MAE 4800 (CI). Design II.** Senior design project, including a technical presentation and a critical design review. Prerequisites: MAE 3440, 3800, 4300. (3 cr) (F)

**MAE 5020. Finite Element Methods in Solid Mechanics I.** Introduction to finite element methods and their application to the analysis and design of mechanical engineering systems. Prerequisite: MAE 3040. Also taught as CEE 5020. (3 cr) (F)

**MAE 5060. Mechanics of Composite Materials I.** Stress-strain relations for nonisotropic composites, such as fiber-reinforced plastic laminates, properties and their uses, strength and life determination, and methods for design using composite materials. Prerequisite: MAE 3040 or CEE 3010. Also taught as CEE 5060. (3 cr) (Sp)

**MAE 5300. Vibrations.** Vibration of single and multiple degree of freedom, and discrete mass systems. Natural frequencies and mode shapes for free, damped, and undamped systems. Forcing functions and transient responses. Matrix methods, numerical solution, and random vibrations. Applications and design. Prerequisites: Engr 2020, 2040. (3 cr) (F)

**MAE 5310. Dynamic Systems and Controls.** Study of continuous-time systems, classical and modern systems design methods, transfer function models, state space, dynamics of linear systems, and frequency domain analysis and design techniques. Introduction to controllability and observability, and full-state pole placement controller design. Laboratory work required. Prerequisite: MAE 3340. (3 cr) (F)

**MAE 5400. Heating and Air Conditioning.** Air conditioning and heating, solar utilization, thermal environmental control, computational methods, and design project. Prerequisites: MAE 3400, 3420. (3 cr) (F)

**MAE 5420. Compressible Fluid Flow.** Application of conservation of mass, momentum, and energy to the design and analysis of compressible fluid systems. Prerequisites: MAE 3400, 3420. (3 cr) (Sp)

**MAE 5440. Computational Fluid Dynamics I.** Introduction to computational fluid dynamics and heat transfer using the finite-volume method. Extensive code development. Application of a commercial CFD solver to a problem of interest. Prerequisites: MAE 3420 and 3440. (3 cr) (Sp)

**MAE 5500. Aerodynamics.** Fundamentals of incompressible, inviscid flow; aerodynamic forces and moments; airfoil characteristics; incompressible flow around two-dimensional airfoils and finite wings; three-dimensional incompressible flow; and introduction to aircraft performance. Prerequisite: MAE 3420. (3 cr) (F)

**MAE 5510. Dynamics of Atmospheric Flight.** Aircraft equations of motion; aerodynamic forces and moments; aircraft stability and control in roll, pitch, and yaw; aircraft motion with six degrees of freedom; aircraft performance and design; and design project. Prerequisite: MAE 5500. (3 cr) (Sp)

**MAE 5520. Dynamics of Space Flight.** Classical astrodynamics, including orbital mechanics, orbit determination, orbital maneuvers, earth-orbiting and interplanetary trajectories; spacecraft attitude motion and control, gyroscopic instruments; introduction to spacecraft propulsion. Prerequisite: MAE 3320. (3 cr) (F)

**MAE 5600. Manufacturing Process Planning and Statistical Quality Control.** Explores how to produce products in today's manufacturing environment. Topics include forecasting, planning, facility layout, job design, planning, scheduling, total quality management, and statistical process control as they relate to manufacturing firms. Prerequisite: MAE 2600. (3 cr) (F)

**MAE 5610. Hydraulics and Pneumatics.** Hydraulic and pneumatic circuit theory, components, and systems analysis and design. Efficiency and performance evaluation, based on steady and transient flow principles and force and energy transfer concepts. Introduction to electrohydraulic control systems. Prerequisite: MAE 3420. (3 cr) (Sp)

**MAE 5620. Manufacturing Automation.** Principles of automation technology as applied to manufacturing systems. Topics include motion control, PLC, robotics, CNC, and system integration. Prerequisite: MAE 2600. (3 cr) (F)

**MAE 5630. Machining Theory and Applications.** Introduces fundamental metal cutting theory (such as chip formation, cutting forces and temperatures, and tool wear) and its applications, including high-speed machining of aerospace and other difficult-to-machine alloys. Prerequisites: MAE 2600 and 3040. (3 cr) (Sp)

**MAE 5640. Design for Manufacturability.** Product design for economic production. Manufacturing processes (especially primary processes), associated tooling cost and design, and resultant product design requirements. Prerequisites: MAE 2600 and 3800. (3 cr) (Sp)

**MAE 5680. Manufacturing Planning and Simulation.** Explores planning and simulation methods for process design issues in electronics manufacturing (EM) and discrete parts manufacturing. Students learn planning, modeling, and simulation methods at the process and system level. Prerequisite: MAE 5600. (3 cr) (Sp)

**MAE 5900. Cooperative Practice.** Planned work experience in industry. Detailed program must have prior approval. Written report required. Student must be in professional program. (3 cr) (F,Sp,Su)

**MAE 5930. Special Problems.** Formulation and solution of practical or theoretical problems. Prerequisite: Permission of department head. (1-3 cr) (F,Sp,Su) ®

**\*\*\*MAE 6010. Finite Element Methods in Solid Mechanics II.** Advanced theory and applications of finite element methods to both static and dynamic solid mechanics problems. Prerequisite: MAE 5020. Also taught as CEE 6010. (3 cr) (Sp)

**MAE 6040. Continuum Mechanics and Elasticity.** Mechanics of continuous media; tensors, stress, strain, deformation, rate equations, and constitutive equations. Plane stress, plane strain, torsion, and bending theories, as well as problem solutions, investigated for linear elastic materials. Prerequisite: MAE 3040 or CEE 3010. (3 cr) (F)

**MAE 6050. Experimental Methods in Structural Engineering.** Experimental techniques used in research and design in structural engineering and mechanics. Structural models. Theory and practical applications. Development of principles used

to design research projects. Prerequisite: Instructor's consent. Also taught as CEE 6050. (3 cr) (Sp)

\*\*\*MAE 6070. **Mechanics of Composite Materials II.** Second course in composite materials. Stress-strain states of laminated composite structures, including interlaminar stresses, failure criteria, and hygrothermal stresses. Prerequisite: MAE 5060. Also taught as CEE 6070. (3 cr) (Sp)

MAE 6090. **Theory of Plates and Shells.** Introduction to plate and shell theories. Development of bending and buckling of plates and shells through classical theory. Prerequisite: MAE 3040 or CEE 3010. Also taught as CEE 6090. (3 cr) (Su)

MAE 6130. **Structural Dynamics and Seismic Design.** Development and solutions for equations of motion for single- and multi-degree of freedom systems. Dynamic analysis by Modal Superposition and Response Spectra. Design of structures for seismically active areas. Also taught as CEE 6130. (3 cr) (Sp)

\*\*\*MAE 6180. **Dynamics and Vibrations.** Fundamentals of two-dimensional and three-dimensional rigid body dynamics, including Newtonian, Lagrangian, and Leavit Energy Methods. Equations of motion, mode shapes, and natural frequencies for continuous media and multi degree-of-freedom systems. Prerequisite: MAE 5300 or CEE/MAE 6130. Also taught as CEE 6180. (3 cr) (F)

MAE 6320. **Linear Multivariable Control.** Modeling, analysis, and design of multi-input, multi-output control systems, including both state space and transfer matrix approaches, with an emphasis on stability. Prerequisite: ECE 4310, MAE 5310, or equivalent. Also taught as ECE 6320. (3 cr) (F)

MAE 6330. **Nonlinear and Adaptive Control.** Methods of nonlinear and adaptive control system design and analysis. Includes qualitative and quantitative theories, graphical methods, frequency domain methods, sliding surface design, linear parameter estimation methods, and direct and indirect adaptive control techniques. Prerequisite: ECE/MAE 6320. Also taught as ECE 6330. (3 cr) (Sp)

\*\*\*MAE 6340. **Spacecraft Attitude Control.** Spacecraft attitude dynamics and controls. Spin stabilized, three axis, and dual spin modes. Attitude determination techniques. Prerequisite: ECE 5320. Also taught as ECE 6340. (3 cr) (F)

\*\*\*MAE 6350. **Robotics.** Fundamentals of robotic systems, including kinetics, kinematics, sensors, actuators, control algorithms, motion planning, and computer systems. Integration of critical design components to develop complete systems. Robotic manipulator analysis and design. Applications in manufacturing. Mobile rockets, including wheeled, legged, and alternative locomotion robots. Prerequisite: ECE/MAE 6320 or instructor approval. Also taught as ECE 6350. (3 cr) (Sp)

MAE 6410. **Fluid Dynamics.** Basic laws of fluid motion, Navier Stokes equations, kinematics of the flow field, fundamental exact solutions of viscous flow, and elements of turbulence. Prerequisite: MAE 3420 or CEE 3500. (3 cr) (F)

\*\*\*MAE 6420. **Experimental Methods in Fluid Mechanics.** Explores process and techniques involved in acquisition, analysis, and presentation of experimental data, with particular emphasis on aerodynamic applications. Topics include digital signal processing, statistics, uncertainty analysis, hot wire anemometry, and wind tunnel testing. Prerequisite: MAE 3420. (3 cr) (Sp)

\*\*\*MAE 6430. **Boundary Layer Theory.** Topics include derivation of the boundary layer equations; exact, approximate, and numerical solution techniques; quasi-cylindrical swirling flows; boundary layers in compressible flow; separation; nonsteady boundary layers; stability and transition; and turbulent boundary layers. Prerequisite: MAE 6410. (3 cr) (Sp)

MAE 6440. **Computational Fluid Dynamics II.** Advanced topics in computational fluid dynamics using the finite-volume method, including body-fitted nonorthogonal grids and grid generation, efficient linear solvers, and turbulence modeling. Extensive code development. Prerequisite: MAE 5440. (3 cr) (Su)

\*\*\*MAE 6450. **Thermodynamics.** Topics in classical and statistical thermodynamics, including distribution functions, free molecular flow, electron and photon gas modeling, derived properties of solids, and thermodynamic applications in areas of current research interest. Prerequisite: MAE 3400. (3 cr) (F)

\*\*\*MAE 6460. **Conduction Heat Transfer.** Integral, differential, and numerical methods for solving engineering problems associated with the diffusion of heat in a rigid solid. Prerequisite: MAE 3440. (3 cr) (Sp)

\*\*\*MAE 6470. **Convection Heat Transfer.** Integral, differential, and numerical methods for solving engineering problems associated with transfer of heat in a viscous fluid. Prerequisites: MAE 3420, 3440. (3 cr) (Sp)

\*\*\*MAE 6480. **Radiation Heat Transfer.** Radiation theory and applications. Includes utilization of computer software. Prerequisite: MAE 3440. (3 cr) (F)

\*\*\*MAE 6490. **Turbulence.** Fundamentals of turbulent fluid flow, with emphasis on providing student with sufficient physical and mathematical background to critically evaluate current literature and make original research contributions. Topics include stochastic tools, the governing equations, transition to turbulence, isotropic turbulence, measurement techniques, and free and wall bounded turbulent shear flows. Prerequisite: MAE 6410 or instructor's consent. (3 cr) (Sp)

MAE 6530. **Propulsion Systems.** Fundamentals of turbine and rocket propulsion, including nozzle theory and thermodynamic relations, combustion processes, and flight performance. Rocket propulsion topics, including solid, liquid, and hybrid rocket engines; and advanced engine concepts. Turbine engine propulsion systems, including turbojets, turbofans, afterburners, and advanced unducted fan concepts. Prerequisite: MAE 5420. (3 cr) (Sp)

\*\*\*MAE 6540. **Astrodynamics.** Advanced topics in astrodynamics to include: general and special perturbations, universal variable, methods of orbit determination, Lambert's theorem, the restricted three-body problem, and space mission planning. Prerequisite: MAE 5520. (3 cr) (Sp)

\*MAE 6570. **Potential Fluid Flow.** Application of the principles and methods of classical hydrodynamics to the solution of problems. Closed form solution to inviscid fluid flows obtained using complex variables and conformal mappings. Prerequisite: CEE 3510 or MAE 3420. Also taught as CEE 6570. (2 cr) (F)

MAE 6640. **Life Cycle Engineering.** Familiarizes students with re-engineering, cost/benefit analysis, value engineering, and life cycle design. Students will analyze costs and benefits of design decisions over the product life (needs, market, use, service, reliability, retirement, etc.) while improving the life cycle design of industrial products. Prerequisite: Graduate standing or permission of instructor. (3 cr) (F)

\*\*\*MAE 6800. **Advanced Machine Design.** Advanced topics in fluid film and boundary lubrication. Dynamics and vibration consideration in design of machine systems and fatigue failure theories. Prerequisite: MAE 4300. (3 cr) (Sp)

MAE 6900. **Seminar.** Overview of graduate program requirements, current research, and research opportunities. Presentations from graduate students, faculty, and outside speakers. Master's degree candidates must include 1 credit and doctoral degree candidates must include 2 credits of MAE 6900 in an approved program of study. Prerequisite: Graduate standing or approval of department head. (0.5 cr) (F,Sp) ®

MAE 6930. **Special Problems.** Independent or group study of engineering problems not covered in regular course offerings. (1-3 cr) (F,Sp,Su) ®

MAE 6950. **Design Project.** Individual projects involving the design, development, and/or testing of components, devices, or systems. Formal report required. (3 cr) (F,Sp,Su)

MAE 6970. **Thesis Research.** (1-9 cr) (F,Sp,Su) ®

MAE 6990. **Continuing Graduate Advisement.** (1-12 cr) (F,Sp,Su) ®

\*\*\***MAE 7040. Elasticity.** Energy theorems, variational techniques, complex variable solutions, and three-dimensional solutions for linear elastic materials. Prerequisite: MAE 6040 or instructor's consent. (3 cr) (Sp)

\*\*\***MAE 7050. Plasticity.** Analysis of stresses, deformation, and collapse in devices constructed of plastic material. Prerequisite: MAE 6040 or CEE 6080/5080 or instructor's consent. Also taught as CEE 7050. (3 cr) (Sp)

**MAE 7080. Advanced Plate and Shell Theory.** Analysis of plate and shell structures by classical and numerical methods. Emphasis on numerical solutions. Prerequisite: Instructor's consent. Also taught as CEE 7080. (3 cr) (F)

\*\*\***MAE 7350. Intelligent Control Systems.** Intelligent control strategies, including neural network, fuzzy logic, associated memory networks, and rule-based control systems. Prerequisite: ECE/MAE 6320 or instructor approval. Also taught as ECE 7350. (3 cr) (F)

\*\*\***MAE 7360. Optimal and Robust Control.** Advanced methods of control system analysis and design. Operator approaches to optimal control, including LQR, LQG, and L1 optimization techniques. Robust control theory, including QRT, H-infinity, and interval polynomial approaches. Prerequisite: ECE/MAE 6320 or instructor approval. Also taught as ECE 7360. (3 cr) (Sp)

\*\*\***MAE 7380. Advanced Dynamics and Vibrations.** Advanced techniques in dynamics and vibrations. Prerequisite: CEE/MAE 6180. (3 cr) (F)

**MAE 7580. Advanced Finite Element Analysis in Fluid Mechanics.** Application of the finite element method of analysis to problems in fluid mechanics. Use of higher order element to two- and three-dimensional flows. Prerequisites: CEE 3510, CEE/MAE 6570; or MAE 3420, CEE/MAE 5020. Also taught as CEE 7580. (3 cr) (Sp)

**MAE 7930. Special Problems.** Independent or group study of engineering problems not covered in regular course offerings. (1-3 cr) (F,Sp,Su) ®

**MAE 7970. Dissertation Research.** (1-12 cr) (F,Sp,Su) ®

**MAE 7990. Continuing Graduate Advisement.** (1-12 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

\*\*\*Taught alternate years. For further information, consult department.

Department of  
**Military Science**  
 College of Humanities, Arts and Social Sciences

**Head:** Major S. Rand Curtis  
 Office in Military Science 205, (435) 797-0949

**Assistant Professor** Captain Ronald N. Jonas; **Personnel Specialist** Marie Behling

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**E-mail** armyrotc@hass.usu.edu  
**WWW** <http://www.hass.usu.edu/~armyrotc>

## Undergraduate Programs

### Objectives

Military Science (Army ROTC) focuses on leadership development. Students pursue the major of their choice while studying Military Science, and graduate with the ability to function effectively as leaders. Upon completion of Army ROTC and graduation from college, students become commissioned officers in the active Army, Army Reserve, or National Guard.

Instructors, textbooks, uniforms, and equipment are provided at no cost to the student or the University. All contracted students receive between \$250-400 per month (up to 10 months per academic year). Army ROTC also covers the cost of tuition and fees for Army ROTC scholarship students and provides a \$800-per-year book allowance.

### The Margin of Difference

Army ROTC cadets learn to be leaders and receive hands-on experience in managing physical, financial, and human resources. They develop self-confidence and superior decision-making skills. Employers value these leadership qualities and recognize associated potential.

### Four-Year Program

The traditional Army ROTC program covers four years consistent with normal undergraduate progression (freshman-senior). The four-year program is divided into two parts: the **basic course** and the **advanced course**. The **basic course** is usually taken during the first two years of college. It covers subjects such as mountaineering, land navigation, wilderness survival, leadership development, small unit tactics, weapons marksmanship, and military history. This program is designed for high-performing students who wish to try Military Science without obligation, while enhancing their leadership skills and self-confidence. Upon successful completion of the basic course, students are eligible to enter the advanced course.

**Advanced course** requirements are normally completed during the junior and senior years. The advanced course further develops and refines leadership competencies, and qualifies the student for a commission in the United States Army. Advanced course students receive a \$300-400 per month tax-free subsistence allowance (up to \$3,000-4,000 per year), and attend a paid five-week leader development camp between their junior and senior years.

### Two-Year Program

This is a special program for junior and community college transfer students or for students who did not take Army ROTC during their first two years of college. To enter the two-year program, a student must have completed Basic Training in a military service or participate in five weeks of basic leadership instruction. This instruction usually takes place between the sophomore and junior year. Students are paid for attending this instruction, have the opportunity to compete for two-year scholarships, and may receive academic credit. Students who qualify for the two-year program are enrolled directly in the **advanced course**.

### Scholarships

Army ROTC provides numerous scholarship opportunities. About 55 percent of USU Army ROTC students generally receive scholarships. High school seniors may qualify for the **four-year Army ROTC scholarship**. College students may qualify for three- or two-year scholarships. These scholarships pay the cost of tuition and fees, a flat rate for textbooks and classroom supplies, and a monthly cash stipend between \$2,500-4,000 per year. The **Green to Gold scholarship** allows soldiers serving on active duty to leave the Army early and attend college/ROTC full time while receiving scholarship benefits. Other scholarship opportunities include: **room and book grants** and the **Western Undergraduate Exchange (WUE) program**. Call or visit the Department of Military Science for details.

### **Placement Credit For Veterans**

Veterans may qualify for advanced course placement based on prior military experience. They can take full advantage of veteran's benefits and receive financial aid from Army ROTC concurrently.

### **Simultaneous Membership Program (SMP)**

This program is available to advanced course cadets who wish to serve in the Army Reserve or National Guard while attending college and pursuing a commission through Army ROTC. SMP students are eligible to receive reserve drill pay, tuition assistance, other monetary incentives, and \$300-400 per month (up to \$3,000-4,000 per academic year) from Army ROTC. Call or visit the Department of Military Science for details.

### **Leave of Absence**

If students (including scholarship recipients) wish to take a leave of absence to serve a mission for their church, they can do so conveniently between their freshman and sophomore years.

### **Commission Requirements**

In order to qualify for a commission as a Second Lieutenant in the United States Army, each student must:

1. Complete all required Military Science instruction while attending college as a full-time student, and obtain a baccalaureate or higher degree prior to age 27 (age waiver can be granted for prior military service or other extenuating circumstances).
2. Meet medical and physical fitness standards.
3. Be a U.S. citizen.
4. Successfully complete the advanced summer camp.
5. Be recommended by a professor of Military Science.

### **Service Obligation**

There is no military service obligation for basic course students, unless they have received an Army ROTC scholarship. Advanced course and scholarship (contracted) students incur an obligation to serve in the active Army, Army Reserve, or National Guard.

### **Minor in Military Science**

**Grade Requirements.** Students must obtain a grade of C or better in all courses used toward the minor, as well as maintain a cumulative GPA of 2.5 for these courses.

**Credit Requirements.** A minimum of 21 credits must be earned in Military Science and related courses, as follows:

**Required Courses (15 credits).** MS 3010, 3020, 4010, and 4020; Hist 4810.

**Elective Courses (6 credits).** These courses must be coordinated with and approved by the department head of the Military Science Department.

## **Military Science Courses (MS)**

### **Basic Course**

**MS 1010. Adventure Training I.** Establishes a foundation for self and team development through participation in adventure training and team-building activities. Among the subjects presented are: land navigation, leader behavior and unit effectiveness, and effective time management. A two-hour weekly leadership lab is required, as well as one weekend field training exercise. (2 cr) (F,Sp)

**MS 1020. Adventure Training II.** Emphasizes self and team development through participation in classroom and leadership lab. Subject matter includes small unit operations, branches of the Army, troop leading procedures, communications skills, and the organization of company-sized Army units. A two-hour weekly leadership lab is required, as well as one weekend field training exercise. (2 cr) (F,Sp)

**MS 2010. Leadership Development I.** Builds on previous leadership instruction, enhancing student skills in land navigation, small unit tactics, written and oral communication, event planning, group coordination and effectiveness, and first aid. During this course, students develop basic skills for leading others in a tactical environment. A two-hour weekly leadership lab is required, as well as one weekend field training exercise. (2 cr) (F,Sp)

**MS 2020. Leadership Development II.** Focuses on leader effectiveness. Analyzes selected historical leaders and battles, using the principles of war and other tenets. Student-led discussions highlight lessons learned relative to leadership and organizational success. Oral communication skills are central to this course. A two-hour weekly leadership lab is required, as well as one weekend field training exercise. (2 cr) (F,Sp)

**MS 2400. Physical Readiness.** Physical conditioning course employing U.S. Army principles of fitness. Subjects include: body composition, nutrition, cardiorespiratory fitness, muscle endurance and strength, circuit training, and drills. (1 cr) (F,Sp,Su) ®

### **Advanced Course**

**MS 3010. Organizational Leadership and Small Unit Tactics.** Develops leadership skills within the framework of the U.S. Army. Focuses on theory and application of decision making, planning, organizing, management control, and communications. Also emphasizes small unit tactics and advanced land navigation skills. A two-hour weekly leadership lab is required, as well as three one-hour physical fitness sessions per week and one weekend field training exercise. (3 cr) (F,Sp)

**MS 3020. Advanced Tactics and Operations.** Focuses on theory and application of small unit tactics, leadership, and land warfare. Subjects include preparing and issuing combat orders, organizing for combat, unit and individual movement techniques, communications, and security. A two-hour weekly leadership lab is required, as well as three one-hour physical fitness sessions per week and two weekend field training exercises. (3 cr) (F,Sp)

**MS 4010. Command and Staff Functions.** Addresses functions/roles of the commander/leader and the staff. Explores organizational planning and problem solving, written and oral communications, training management, and evaluation systems. A two-hour weekly leadership lab is required, as well as three one-hour physical fitness sessions per week and one weekend field training exercise. (3 cr) (F,Sp)

**MS 4020. Officer Perspectives.** Conference course addressing roles and responsibilities of junior Army officers. Examines environmental stewardship, threats to U.S. security, Army modernization initiatives, the military justice system, and the law of war. A two-hour weekly leadership lab is required, as well as three one-hour physical fitness sessions per week and one weekend field training exercise. (3 cr) (F,Sp)

## ***Additional Credit***

In addition to credit for the Military Science courses with an MS prefix, students may earn credit for the following courses through the College of Humanities, Arts and Social Sciences. These courses will be taught under various course numbers having a HASS prefix. For further information about course numbers and when these courses will be offered, contact the Military Science Department.

**Directed Readings, Projects, and Research.** Independent reading/research on topic(s) of military interest, under the supervision of a Military Science faculty member. (1-3 cr) (F,Sp,Su)

**ROTC National Leaders Training.** Five-week leadership camp conducted at Fort Knox, Kentucky. Proves an introduction to the military profession. Training includes military customs and courtesies, drill and ceremonies, rappelling, marksmanship, small unit tactics, physical fitness, and leadership. Students must contract to complete the ROTC program and pass a physical exam. Graduates will be given credit for the ROTC Basic Course and be eligible for a two-year, merit-based scholarship and an ROTC stipend. (6 cr) (Su)

**Northern Warfare Training.** Two-week course conducted in Alaska. Provides training in cold weather survival, climbing techniques, and small unit tactics. Prerequisites include completion of the ROTC basic course, excellent physical conditioning, and the recommendation of the Professor of Military Science. (2 cr) (Su)

**Mountain Warfare Training.** Two-week course conducted in Tennessee. Provides training in mountain operations, climbing/rappelling techniques, and small unit tactics. Prerequisites include the completion of the ROTC basic course, excellent physical conditioning, and the recommendation of the Professor of Military Science. (2 cr) (Su)

**Air Assault.** Two-week course normally conducted at Fort Campbell, Kentucky. Provides students with training in helicopter operations, including sling-load procedures and rappelling. Prerequisites include the completion of the ROTC basic course, excellent physical conditioning, a physical examination, and the recommendation of the Professor of Military Science. (2 cr) (Su)

**National Advanced Leadership Camp (NALC).** Five-week leadership camp conducted at Fort Lewis, Washington. NALC provides students with an opportunity to lead their peers from across the country. Cadets are trained, mentored, and evaluated using the Cadet Evaluation System. NALC activities include a leadership reaction course, rifle marksmanship, land navigation, rappelling, small unit tactics, and patrolling. Open only to contracted students who have successfully completed the basic course, MS 3010, and MS 3020. NALC is the capstone event of the ROTC program. Requires excellent physical conditioning, a physical examination, and the recommendation of the Professor of Military Science. (6 cr) (Su)

**Basic Airborne Course.** Three-week course conducted at Fort Benning, Georgia. Provides students with training in airborne operations. Those completing the course are "Airborne" qualified military parachutists. Prerequisites include the completion of the ROTC basic course, excellent physical conditioning, a physical examination, and the recommendation of the Professor of Military Science. (2 cr) (Su)

**Cadet Troop Leader Training (CTLT).** Two- or three-week internship conducted at an Army installation in the U.S. or overseas. Working with an active duty officer, students gain firsthand experience in leading and directing the activities of an Army unit. Provides valuable insights into the military lifestyle and the duties of an Army officer. Prerequisites include successful completion of the National Advanced Leadership Camp and the recommendation of the Professor of Military Science. (3 cr) (Su)

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

## Department of *Music*

### *College of Humanities, Arts and Social Sciences*

**Head: Associate Professor Bruce M. Saperston**, music therapy  
Office in Fine Arts 107, (435) 797-3036

**Assistant Heads: Professor Gary Amano**, piano; **Associate Professor Cindy J. Dewey**, voice, opera, pedagogy

FAX (435) 797-1862

E-mail musicdep@cc.usu.edu

WWW <http://www.usu.edu/music/>

**Professors** *Michael L. Ballam*, opera, Utah Festival Opera Company; *Michael K. Christiansen*, guitar program; *James M. Drake*, organ program; *Willard R. Kesling*, choral activities, chamber singers, Northern Utah Choral Society; *F. Dean Madsen*, music theory, twentieth century music, composition; *Larry G. Smith*, jazz program, musicianship program, staff arranger, saxophone, jazz piano; **Adjunct Professor** *Michael Martin Murphey*, songwriting, American studies; **Professors Emeriti** *Warren L. Burton*, introduction to music; *Max F. Dalby*, bands, woodwind, conducting; *Glen A. Fifield*, elementary music, cornet and trumpet; *Alvin Wardle*, music education, low brass; **Associate Professors** *Mark A. Emile*, string performance and pedagogy, violin/viola; *Todd L. Fallis*, instrumental music education, student advising, low brass; *Dennis D. Griffin*, percussion, electronic music, composition; *Nicholas E. Morrison*, clarinet, associate director of bands; *Elizabeth York*, director of music therapy; **Associate Professor Emeritus** *Mildred Johnson*, music history and literature, musicianship program, viola; **Assistant Professors** *Brian Abrams*, music therapy; *Sergio Bernal*, orchestra conductor, string program; *R. Dennis Hirst*, piano, Youth Conservatory; *Thomas Rohrer*, director of bands; *Leslie Timmons*, elementary music education, flute; *Ralph van der Beek*, piano instruction, Youth Conservatory; **Assistant Professor Emeritus** *Betty Beecher*, piano; **Instructor** *Lane Cheney*, choral music education

**Degrees offered:** Bachelor of Arts (BA) and Bachelor of Music (BM) in Music; Bachelor of Science (BS) and BA in Music Therapy. The Master of Education (MEd) in Secondary Education includes a specialization in Music Education.

**Undergraduate emphases:** *BM degree in Music*—Music Education, Performance, Piano Pedagogy

**Two-year Certificate Programs:** Piano, Organ, Guitar, Music Therapy Equivalency

**Two-year Diploma Programs:** Organ and Church Music, Piano Pedagogy, Guitar

(Certificates and diplomas are issued *directly* through the Music Department.)

## *Undergraduate Programs*

### *Objectives*

The Department of Music provides instruction in music by: (1) offering service courses which contribute to the Liberal Arts and Sciences major in the College of Humanities, Arts and Social Sciences and the College of Science, and to the University Studies Program of the University; (2) offering specific sequences of courses leading to professional preparation in music education, music therapy, and performance/pedagogy; and (3) providing public musical service to the University and the community.

The specific objectives of the programs in music for the music major are fourfold: (1) to prepare licensed music teachers to serve effectively in elementary and secondary schools; (2) to prepare musically talented students for careers as professional performers and/or studio teachers; (3) to prepare board-licensed music therapists to serve in educational and therapeutic settings; and (4) to prepare music students for graduate study in their areas of specialization.

### *Requirements*

**Admission Requirements.** Admission requirements for the Department of Music include those described for the University in this catalog (see pages 48-51). In addition, transfer students must have a minimum 3.00 GPA in music courses and a minimum 2.75 GPA overall. All students interested in majoring in Music or Music Therapy will be given pre-music major status until they have completed the required audition/interview process, as verified by their area advisor through the *Change of Major Form*. It is strongly recommended that prospective majors complete their audition/interview during the department's scholarship auditions in February preceding matriculation at USU. To schedule an audition/interview, contact the department at (435) 797-3730.

Prospective majors in Music Therapy should complete the audition/interview prior to May 1 of the year of admission.

**GPA Requirement.** Students majoring in music, music education, or music therapy must maintain a minimum GPA of 3.00 in music courses and a minimum 2.75 GPA overall. All core curricu-

lum classes must be completed with a C- or higher in order to progress to the next courses in sequence. A student receiving a grade lower than C- is placed on probation, and may repeat the course once to raise the grade to C- or higher. If the grade received on the repeat is lower than C-, the student is no longer a music, music education, or music therapy major.

**Degree Requirements.** All majors in the department must complete the music core curriculum. Although it is possible to complete the degree if these courses are begun after the first year of study, the department strongly recommends that students begin the core curriculum during the first year, completing the courses in the following recommended sequence. **Freshman Year:** *fall semester*—Musc 1110, 1130, 1150; *spring semester*—Musc 1120, 1140, 1160. **Sophomore Year:** *fall semester*—Musc 2130, 2150, 2170, 2180<sup>1</sup>; *spring semester*—Musc 2160<sup>2</sup>, 3110, 3140; **Junior Year:** *fall semester*—Musc 3120, 3150, 3170<sup>1</sup>; *spring semester*—Musc 3130, 3180<sup>1</sup>. Additional requirements for specific emphasis areas are available from the Music Department Student Services Office, Fine Arts 102.

**Recital and Concert Attendance.** Recital and concert attendance is required and will be monitored. Students should turn in programs after attending concerts and recitals. A summary of attendance will be kept in the student's file. To graduate, students are required to attend a minimum of 10 concerts and 10 recitals each year.

**Individual Performance and Jury Requirements.** Music majors enroll in individual instruction each semester and practice regularly outside of lessons. Jury exams are held at the end of each semester to assess individual progress. To determine specific jury requirements for their area, students should contact their advisor.

**Recital Participation.** Each music education, performance, and pedagogy major is encouraged to appear in a departmental recital each semester. Four such appearances are required for graduation. Since junior and senior recital requirements vary, students should consult program advisors and degree requirement sheets for specific information.

**Piano Proficiency Requirements.** Music, Music Education, and Music Therapy majors must meet a minimum standard of piano proficiency before graduation. The specific requirements are detailed in the department's *Student Handbook*.

**Placement Tests.** In order to ensure smooth articulation, transfer students take placement tests and are placed appropriately within the core course sequences. These tests are administered before fall semester classes begin and may be given periodically throughout the year. For details, contact the Music Department Student Services Office, (435) 797-3015, Fine Arts 102.

**Music Certificates, Diplomas, and Minors.** Requirements for two-year certificate programs in piano, organ, guitar, and music therapy equivalency; for two-year diploma programs in organ and church music, piano pedagogy, and guitar; and for minors in music are available in the Music Department Student Services Office, Fine Arts 102. Certificates and diplomas are issued *directly* through the Music Department.

<sup>1</sup>May be taken during a different semester, if necessary.

<sup>2</sup>Not required for all music areas. For more information, contact advisor.

## Additional Information and Updates

Degree requirements not listed above are listed on the Music Major Requirement Sheet and the Music Therapy Major Requirement Sheet. Additional requirements, including appropriate sequencing of courses, are listed in the *Department of Music Student Handbook*. For the most recent information regarding degree requirements and course sequencing, contact advisors over specific programs. Further information can also be obtained by contacting the Music Department Office, Fine Arts 102, or by visiting the department's web site.

## Financial Support

Scholarships, grants, and work-study programs are available through the University. Information about these programs can be obtained by calling Recruitment/Enrollment Services, (435) 797-1129 or 1-800-488-8108. In addition, the Department of Music offers talent-based scholarships to undergraduate students and employs students as part-time workers. For scholarship information or to arrange an audition, contact the department at (435) 797-3730 or visit the department's website.

## Music Courses (Musc)

**Musc 1010 (BCA). Introduction to Music.** Nontechnical course to develop understanding and enjoyment of music. Through study of musical elements, as well as historical, cultural, and social influences, an awareness of the relationship between techniques and aesthetic values in world music can be developed. (3 cr) (F,Sp,Su) ©

**Musc 1020 (BCA). Fundamentals of Music.** In-depth look at the basic elements of music. Notes, rhythm, scales, intervals, key signatures, chords, and composing a simple piece. (3 cr) (F,Sp) ©

**Musc 1110. Music Theory I.** Fundamentals of music. Traditional diatonic harmony in four parts, using triads in root position, first inversion, and second inversion. Prerequisite: Knowledge of music notation. (3 cr) (F)

**Musc 1120. Music Theory II.** Traditional harmony in four parts, using nonchord tones, seventh chords, and secondary dominant functions. Prerequisite: Musc 1110. (3 cr) (Sp)

**Musc 1130. Aural Skills I.** First in a four-semester sequence of aural skills (ear training) courses which develop the skills of sight singing, dictation, and the composite skill of critical listening. (1 cr) (F)

**Musc 1140. Aural Skills II.** Second in a four-semester sequence of aural skills (ear training) courses which develop the skills of sight singing, dictation, and the composite skill of critical listening. Prerequisite: Musc 1130. (1 cr) (Sp)

**Musc 1150. Keyboard Harmony I.** Development of keyboard skills, in conjunction with Musc 1110, for music majors and minors. (1 cr) (F)

**Musc 1160. Keyboard Harmony II.** Development of keyboard skills, in conjunction with Musc 1120, for music majors and minors. Prerequisite: Completion of Musc 1150 with a C- or better, or faculty authorization. (1 cr) (F)

**Musc 1310. Introduction to Music Therapy.** Introduces students to the field of music therapy through lectures, readings, and experiential work. For music therapy majors only. (2 cr) (F)

**Musc 1320. Music Therapy Ensemble.** Intended for music therapy majors. Designed to help students increase their performance skills in the areas of accompanying, improvisation, and popular music styles. (1 cr) (F,Sp) ®

**Musc 1400. Beginning Group Piano.** Group piano instruction for nonmusic majors. (1 cr) (F)

**Musc 1410. Intermediate Group Piano.** Group piano instruction for nonmusic majors. (1 cr) (Sp)

**Musc 1420. Pedagogy Practicum.** Provides piano students with actual teaching situations for the practical application of principles studied in piano pedagogy. Supervised planning, presentation, and evaluation of lessons. (3 cr) (F,Sp) ®

**Musc 1430. Piano Pedagogy I.** Designed to prepare qualified pianists to teach piano effectively and to acquaint them with new materials and techniques from the beginning to intermediate levels. (3 cr) (F)

**Musc 1440. Piano Pedagogy II.** Designed to prepare qualified pianists to teach piano effectively and to acquaint them with new materials and techniques from the intermediate to early advanced levels. (3 cr) (Sp)

**Musc 1450. Group Organ.** Acquaints students with basic techniques of organ playing. Concentrates on hymn playing, and music for preludes and postludes. (1 cr) (F,Sp) ®

**\*\*Musc 1460 (CI). Organ Literature I.** First course in sequence acquainting students with the history of the development of the organ and the literature and composers associated with its history. (2 cr) (F)

**\*\*Musc 1470 (CI). Organ Literature II.** Second course in sequence acquainting students with the history of the development of the organ and the literature and composers associated with its history. (2 cr) (Sp)

**Musc 1480. Individual Piano Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private piano instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1490. Individual Organ Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private organ instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1500. String Techniques I.** Designed to give prospective music teachers a basic playing experience and theoretical understanding of the string instruments. (1 cr) (F,Sp)

**Musc 1520. Individual Viola Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private viola instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1530. Individual Violin Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private violin instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1540. Individual String Bass Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private string bass instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1550. Beginning Group Guitar.** Fundamentals of guitar; basic chords, note reading, tablature reading, and accompaniment styles, including strumming and fingerpicking. (1 cr) (F,Sp)

**Musc 1560. Intermediate Group Guitar.** Intermediate-level strumming and fingerpicking techniques, barre chords, and solos written in standard notation and tablature will be presented. (1 cr) (F,Sp)

**Musc 1580. Individual Guitar Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private guitar instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1600. Voice Techniques.** Acquaints the nonvocal major with the vocal instrument; its mechanism, terminology, and techniques. (1 cr) (F,Sp)

**Musc 1610. Introduction to Musical Theatre.** Survey course dealing with history, evolution, influence, practice, and production of the American Musical Theatre. (2 cr) (Sp)

**Musc 1620. Introduction to Opera.** Survey course tracing history and style of opera from Peri and Caccini's "Eurdice" of 1594 to contemporary works of John Eaton and Phillip Glass. (2 cr) (F)

**Musc 1630. Individual Vocal Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private vocal instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1700. Individual Flute Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private flute instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1710. Individual Oboe Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private oboe instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1720. Individual Clarinet Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private clarinet instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1730. Individual Bassoon Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private bassoon instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1740. Individual Saxophone Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private saxophone instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1800. Percussion Techniques.** Provides basic playing experience and theoretical understanding of percussion instruments. Designed for music majors. (1 cr) (F)

**Musc 1810. Individual Trumpet Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private trumpet instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1820. Individual Trombone Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private trombone instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1830. Individual French Horn Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private French horn instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1840. Individual Tuba/Euphonium Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). De-

signed to give nonmusic majors private tuba/euphonium instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 1850. Individual Percussion Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private percussion instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 2130. Music Theory III.** Traditional chromatic harmony in four parts, using modulation, mode mixture, and neapolitan and augmented sixth chords. Prerequisites: Musc 1110 and 1120. (3 cr) (F)

**Musc 2150. Aural Skills III.** Third in a four-semester sequence of aural skills (ear training) courses which develop the skills of sight singing, dictation, and the composite skill of critical listening. Prerequisites: Musc 1130 and 1140. (1 cr) (F)

**Musc 2160. Aural Skills IV.** Fourth in a four-semester sequence of aural skills (ear training) courses which develop the skills of sight singing, dictation, and the composite skill of critical listening. Prerequisites: Musc 1130, 1140, and 2150. (1 cr) (Sp)

**Musc 2170. Keyboard Harmony III.** Development of keyboard skills, in conjunction with Musc 2130, for music majors. Prerequisite: Completion of Musc 1160 with a C- or better, or faculty authorization. (1 cr) (F)

**Musc 2180. Computer Applications in Music.** Presents operational knowledge of computer hardware and music software. Students use M101 work station to learn music notation, sequencing, and other select applications. (2 cr) (F,Sp,Su)

**Musc 2310. Introduction to Observational and Behavioral Methods in Music Therapy.** Basic behavioral terminology and methods, including systematic observations and recording methods for use in music therapy. Students conduct observations in clinical settings in the community. (2 cr) (F)

**Musc 2320. Music Therapy Methods and Materials.** Music interventions and techniques appropriate for a wide range of patient populations, including hospitalized children, older adults, and individuals with orthopedic handicaps. Prerequisites: Musc 1310 and 2310. (2 cr) (Sp)

**Musc 2410. Individual Organ Instruction (Second Instrument) for Music Majors.** Designed to give music majors private organ instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**\*\*Musc 2420. Piano Literature I.** Acquaints pianists with the standard piano composers and keyboard literature from the 14th Century to the Classical Period. (3 cr) (F)

**\*\*Musc 2430. Piano Literature II.** Acquaints pianists with the standard piano composers and keyboard literature from the Classical Period to the Romantic Period. (3 cr) (Sp)

**\*Musc 2440. Piano Literature III.** Acquaints pianists with the standard piano composers and keyboard literature from the Romantic Period to Impressionism. (3 cr) (F)

**\*Musc 2450. Piano Literature IV.** Acquaints pianists with the standard piano composers and keyboard literature from the Impressionist Period to the present day. (3 cr) (Sp)

**Musc 2460. Individual Jazz Piano Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private jazz piano instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 2470. Individual Jazz Piano Instruction (Second Instrument) for Music Majors.** Designed to give music majors private jazz piano instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2490. Individual Piano Instruction (Second Instrument) for Music Majors.** Designed to give music majors private piano instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2500. Individual String Bass Instruction (Second Instrument) for Music Majors.** Designed to give music majors private string bass instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2510. Individual Cello Instruction for Nonmusic Majors.** Variable credit offered, depending upon lesson time (1 credit equals 30 minutes). Designed to give nonmusic majors private cello instruction at any and all stages of advancement. (1-2 cr) (F,Sp,Su) ®

**Musc 2520. Individual Cello Instruction (Second Instrument) for Music Majors.** Designed to give music majors private cello instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2530. Individual Viola Instruction (Second Instrument) for Music Majors.** Designed to give music majors private viola instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2540. Individual Violin Instruction (Second Instrument) for Music Majors.** Designed to give music majors private violin instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**\*Musc 2550. Guitar Styles (Blues/Bluegrass).** Designed to teach students to play blues and bluegrass guitar styles. Presentation of musical form and repertoire. Prerequisite: Knowledge of basic chords and some standard notation and/or tablature reading. (2 cr) (F)

**\*Musc 2560. Guitar Styles (Jazz/Classical).** Designed to teach students to play jazz and classical guitar styles. Presentation and analysis of pieces which have become "standard" repertoire. Prerequisite: Knowledge of basic chords and some experience reading standard notation and/or tablature. (2 cr) (Sp)

**Musc 2570. Fingerboard Theory I.** Basic music theory course in which students use the guitar as a tool for learning the fundamentals of music. (2 cr) (F)

**Musc 2580. Fingerboard Theory II.** Follow-up to Musc 2570. Examination of theoretical concepts of music and how they can be visualized and played on the guitar. (2 cr) (Sp)

**Musc 2590. Individual Guitar Instruction (Second Instrument) for Music Majors.** Designed to give music majors private guitar instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2600. Women's Choir.** Performance of choral works in a large choral organization open to all women without auditions. (1 cr) (F,Sp) ®

**Musc 2610. Choral Society.** Large select mixed choir performing major works for chorus and orchestra. Admission by audition only. (1 cr) (F,Sp) ®

**Musc 2640. Individual Vocal Instruction (Second Instrument) for Music Majors.** Designed to give music majors private vocal instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2660. Italian Diction for Singers.** Study of singing diction in Italian using International Phonetic Alphabet in spoken, sung, and written drills. (2 cr) (F)

**Musc 2670. German Diction for Singers.** Study of singing diction in German using International Phonetic Alphabet in spoken, sung, and written drills. (2 cr) (Sp)

**Musc 2680. French Diction for Singers.** Study of singing diction in French using International Phonetic Alphabet in spoken, sung, and written drills. (2 cr) (Sp)

**Musc 2700. Woodwind Techniques I: Flute, Clarinet.** Provides music education major with an introduction to performance and pedagogy of the flute and clarinet. Enrollment limited to majors, or with permission of instructor. (1 cr) (F)

**Musc 2710. Woodwind Techniques II: Saxophone, Oboe, Bassoon.** Provides music education major with an introduction to performance and pedagogy for the saxophone, oboe, and bassoon. Enrollment limited to majors or with permission of instructor. Prerequisite: Musc 2700. (1 cr) (Sp)

**Musc 2720. Marching Band.** Preparation of musical entertainment and marching drills for football games. Prerequisite: Consent of director. (2 cr) (F) ®

**Musc 2730. Basketball Band.** Preparation of “pops” type music for basketball games. Audition necessary. Prerequisite: Musc 2720. (1 cr) (Sp) ®

**Musc 2740. Recorder Techniques.** Provides music majors with introduction to performance and pedagogy of the recorder, including solo repertoire and ensembles. (1 cr) (Sp)

**Musc 2750. Individual Flute Instruction (Second Instrument) for Music Majors.** Designed to give music majors private flute instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2760. Individual Oboe Instruction (Second Instrument) for Music Majors.** Designed to give music majors private oboe instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2770. Individual Clarinet Instruction (Second Instrument) for Music Majors.** Designed to give music majors private clarinet instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2780. Individual Bassoon Instruction (Second Instrument) for Music Majors.** Designed to give music majors private bassoon instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2790. Individual Saxophone Instruction (Second Instrument) for Music Majors.** Designed to give music majors private saxophone instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2800. Brass Techniques I: Trumpet, French Horn.** Designed to give prospective music teachers a basic playing experience and theoretical understanding of the high brass instruments. (1 cr) (F)

**Musc 2810. Brass Techniques II: Trombone, Tuba, Euphonium.** Designed to give prospective music teachers a basic playing experience and theoretical understanding of the low brass instruments. (1 cr) (Sp)

**Musc 2850. Individual Trumpet Instruction (Second Instrument) for Music Majors.** Designed to give music majors private trumpet instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2860. Individual Trombone Instruction (Second Instrument) for Music Majors.** Designed to give music majors private trombone instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2870. Individual French Horn Instruction (Second Instrument) for Music Majors.** Designed to give music majors private French horn instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2880. Individual Tuba/Euphonium Instruction (Second Instrument) for Music Majors.** Designed to give music majors private tuba/euphonium instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 2890. Individual Percussion Instruction (Second Instrument) for Music Majors.** Designed to give music majors private percussion instruction at any and all stages of advancement. One credit given for 30-minute lessons. Must be a pre-music major, music major, music education major, or music therapy major. (1 cr) (F,Sp,Su) ®

**Musc 3010 (DHA). Masterpieces of Music.** Acquaints students with great masterpieces of music representing all periods of music history. Examines lives and times of various composers. (3 cr) (F,Sp)

**Musc 3020 (DHA). History of Jazz.** Designed to give students an understanding of the development of jazz, popular music, and contemporary idioms, and their contributions to music and culture. (3 cr) (Sp)

**Musc 3100. Motivation and Classroom Management Strategies in Secondary Classroom Music.** Provides experience in current materials, methods, and management of general music education program in secondary (grades 6-12) public schools. Designed for music education majors. (3 cr) (Sp)

**Musc 3110. Music History I: Origins through Baroque.** History and literature of early, Renaissance, and Baroque periods. Prerequisite: Musc 2130. (3 cr) (Sp)

**Musc 3120. Music History II: Classical and Romantic Periods.** History and literature of the music of the classical and romantic periods. Prerequisite: Musc 3110. (3 cr) (F)

**Musc 3130 (CI). Music History III/Theory IV: The Twentieth Century.** Study of Twentieth Century music history and literature. Includes Twentieth Century tonal, atonal, and avant garde harmonies and compositional techniques. Prerequisites: Musc 3110, 3120, 3140, 3150. (3 cr) (Sp)

**Musc 3140. Musical Form I: Polyphonic Procedures.** Study of imitative, cantus firmus, ostinato, and free contrapuntal procedures of Western music. Explores techniques of Sixteenth Century counterpoint in two voices. Prerequisites: Musc 1110, 1120, 2130. (2 cr) (Sp)

**Musc 3150. Musical Form II: Sectional Form.** Study of phrase and period structure, small part forms, theme and variations, rondo and sonata forms, and vocal forms in Western music. Prerequisites: Musc 1110, 1120, 2130, 3140. (2 cr) (F)

**Musc 3160. World Music.** Explores music traditions of non-Western cultures throughout the world. Prerequisites: Musc 2130. (2 cr) (Sp)

**Musc 3170. Conducting.** Designed to provide students with basic conducting techniques. Prerequisite: Must be a music major, or must have faculty authorization. (2 cr) (F)

**Musc 3180. Scoring and Arranging.** Theoretical and practical study of scoring for orchestral instruments in various combinations, ranging from small ensembles to full orchestra. Prerequisites: Musc 2180, 3150; and Musc 2160 or 3900; *or* permission of instructor. (2 cr) (F,Sp)

**Musc 3220. Choral Methods and Materials.** Investigates factors relating to administration and teaching of choral music in middle and secondary schools. (2 cr) (F)

**Musc 3230. Choral Literature.** Survey of choral music from the Renaissance, Baroque, Classical, Romantic, and Twentieth Century suitable for middle and secondary school choirs. (2 cr) (Sp)

**Musc 3240. Instrumental Methods and Materials.** Examination of teaching methods and materials related to wind and percussion pedagogy. Study of literature, organization and administration, and teaching techniques. (2 cr) (Sp)

**Musc 3260. Elementary School Music.** Methods and materials in singing, rhythms, creating music, listening, using classroom instruments, fundamentals of music, and movement skills, with emphasis on contemporary approaches to music education. Recommended: Musc 1010. (2 cr) (F,Sp,Su)

**Musc 3270. Teaching Strategies and Practicum in Elementary Music.** In-depth applications of Orff, Kodaly, Dalcrose, and other current methodologies in music education. Includes curriculum design, assessment, and instructional and performance skill development. Students complete a K-6 music teaching practicum experience. Prerequisites: Musc 1110, 3260. (3 cr) (Sp)

**Musc 3310. Music Therapy and the Exceptional Child.** Effects of music on physical, social, cognitive, and communication skills of children with disabilities. Prerequisite: Musc 2320. (3 cr) (F)

**\*\*Musc 3320. Psychology of Music I.** Psychological foundations of musical behavior, including psychoacoustics, rhythmic, melodic, and harmonic foundations; affective behaviors and music; musical preferences; functional music; musical ability; and music learning. Prerequisite: ECE 3260 or permission of instructor. (2 cr) (Sp)

**Musc 3330. Music Therapy Practicum.** Supervised practicum experience in a community setting with disabled adults, children, older adults, or individuals in a medical setting. Prerequisite: Musc 2320. (1-3 cr) (F,Sp,Su) ®

**Musc 3360. MIDI Studio Techniques.** Elements of synthesizer sound production and basic studio techniques. (2 cr) (Sp)

**Musc 3370. Sound Recording and Reinforcement Techniques.** Explores techniques of studio recording, including microphones, mixing, and signal processing. (2 cr) (Sp) ®

**Musc 3400. Individual Piano Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private piano instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 3410. Ensemble and Accompanying.** Accompanying vocal and instrumental works. Ensemble music for two pianos and four hands. Sight reading and repertoire development. Admission by audition only, with 16 students per section. (1-2 cr) (F,Sp) ®

**Musc 3420. Keyboard Skills I.** Study of sightreading, transposing, improvising, figured bass, scales, chords, and score rendering. (3 cr) (F)

**Musc 3430. Keyboard Skills II.** Continuation of Musc 3420, with further study of sightreading, transposing, improvising, figured bass, scales, chords, and score reading. (3 cr) (Sp)

**Musc 3440. Individual Jazz Piano Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private jazz piano instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**\*Musc 3460. Church Music for Organists I.** Designed to teach organists the fundamentals of organ playing. Emphasizes development of manual and pedal skills enabling organ students to master hymn playing, preludes, and postludes in church service playing. (2 cr) (F)

**\*Musc 3470. Church Music for Organists II.** Continuation of Musc 3460. (2 cr) (Sp)

**Musc 3480. Individual Organ Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits. Number of credits granted depends upon practice time and extent of literature required. Flexible course of study leading to enhanced musical and technical skills on the instrument. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 3500. Symphony Orchestra.** Provides experience in performing standard orchestral literature. Admission by audition only. (1 cr) (F,Sp) ®

**Musc 3510. Orchestra Literature.** Survey of materials, methods, and literature appropriate for elementary school, junior high/middle school, or high school level orchestra programs. (2 cr) (Sp)

**\*\*Musc 3520. String Pedagogy and Solo Literature.** For qualified string players whose interest is primarily in teaching stringed instruments. Materials and teaching techniques via actual teaching experience. Prerequisite: Permission of instructor. (2 cr) (F,Sp) ®

**Musc 3550. Individual Guitar Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private guitar instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**\*\*Musc 3560. Guitar History and Literature.** Development of guitar from its earliest ancestors to the present, including study of composers of music for guitar, guitarists, and changes to the instrument itself. (3 cr) (Sp)

**\*\*Musc 3570. Guitar Pedagogy I.** Prepares qualified guitarists to teach beginning and intermediate level students. Familiarizes participants with "business" aspects of teaching, how to set up a private studio, available materials, and teaching techniques. (2 cr) (F)

**\*\*Musc 3580. Guitar Pedagogy II.** Instruction in teaching various guitar styles. Experience in teaching class guitar and in private instruction. Review of available methods and materials. (2 cr) (Sp)

**Musc 3590. Electric Guitar Ensemble.** Offers opportunity for guitarists to rehearse and perform ensemble music written for electric guitar. Ensemble includes bass and drums. (1 cr) (F,Sp) ®

**Musc 3600. Opera Workshop.** Techniques of musical theater, including participation as cast or crew in musical or operatic stage productions or excerpts. (1-3 cr) (F,Sp) ®

**\*Musc 3610. Vocal Repertory I.** Survey of German Lieder and French Melodie, including styles, history, and performance practice. (2 cr) (F)

**\*Musc 3620. Vocal Repertory II.** Survey of Italian, American, and British song, including styles, history, and performance practice. (2 cr) (Sp)

**\*\*Musc 3630. Vocal Pedagogy I.** Theoretical course studying anatomy and function of the voice, methods for teaching techniques, respiration, phonation, articulation, and support and health of the voice. (2 cr) (F)

**\*\*Musc 3640. Vocal Pedagogy II.** Application of vocal theory to teaching of young, post-pubescent, and mature male and female voices, including challenges of teaching each particular type. Includes practicum in which students teach individual vocal lessons under instructor's supervision. (2 cr) (Sp)

**Musc 3670. Individual Vocal Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private vocal instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 3700. Woodwind Ensemble.** Helps students gain knowledge and understanding of literature for woodwind ensemble, to gain knowledge of rehearsal techniques for perfecting chamber music, and to demonstrate mastery of these skills through performance. Prerequisite: Permission of instructor. (1-2 cr) (F,Sp) ®

**Musc 3710. Individual Flute Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private flute instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 3720. Individual Oboe Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private oboe instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 3730. Individual Clarinet Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private clarinet instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 3740. Individual Bassoon Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private bassoon instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 3750. Individual Saxophone Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private saxophone instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 3760. Jazz Ensemble.** Select ensemble performing big band jazz music. Admission by audition only. (1 cr) (F,Sp) ®

**Musc 3770. Jazz Orchestra.** Preparation and performance of big band jazz music. Admission by audition only. (1 cr) (F,Sp) ®

**Musc 3780. Flute Ensemble.** Helps students gain knowledge and understanding of flute ensemble, to gain knowledge of rehearsal techniques for perfecting chamber

music, and to demonstrate mastery of these skills through performance. (1 cr) (F,Sp) ®

**Musc 3790. Symphonic Band.** Performance of significant works from symphonic band repertoire. Admission by audition or consent of instructor. (1 cr) (F,Sp) ®

**Musc 3800. Trombone Ensemble.** Intended for trombone majors and nonmajors interested in performing music specifically written and/or arranged for four to twelve trombones. (1 cr) (F,Sp) ®

**Musc 3810. Individual Trumpet Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private trumpet instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp) ®

**Musc 3820. Individual Trombone Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private trombone instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp) ®

**Musc 3830. Individual French Horn Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private French horn instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp) ®

**Musc 3840. Individual Tuba/Euphonium Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private tuba/euphonium instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp) ®

**Musc 3850. Brass Ensemble.** Helps students gain knowledge and understanding of brass ensemble, gain knowledge of rehearsal techniques for perfecting chamber music, and demonstrate mastery of these skills through performance. Prerequisite: Permission of instructor. (1 cr) (F,Sp) ®

**Musc 3860. Individual Percussion Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private percussion instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 3870. Percussion Ensemble.** Provides opportunity for percussionists to perform select percussion literature in a chamber music setting. (1 cr) (F,Sp) ®

**Musc 3900. Jazz Improvisation.** Study of techniques of jazz improvisation applicable to all instruments. (2 cr) (F,Sp)

**Musc 3910. Individual Composition Instruction.** Individual study of techniques and procedures of music composition, emphasizing assistance in completing individual compositional projects, building composition portfolio, and preparing for composition recitals. Prerequisite: Permission of instructor. (1-2 cr) (F,Sp) ®

**Musc 3920. Marching Band Techniques.** Reviews methods and materials necessary for directing high school marching bands, including administration, music selection, drill design, and computer-assisted instruction. Prerequisite: Instructor's permission. (2 cr) (F)

**Musc 3930. Band Literature.** Study of literature appropriate for beginning, intermediate, and advanced level band programs. Prerequisite: Instructor's permission. (2 cr) (F)

**Musc 3950. Jazz Choir.** Emphasizes vocal ability, harmonic ear training, and rhythmic understanding. Ability to vocally improvise is helpful, though not a necessary prerequisite. Auditions held during the first week of fall semester. (1 cr) (F,Sp) ®

**Musc 4310. Music Therapy with Adult Populations.** Music therapy methods for adults with major mental illness. Overview of DSM-IV criteria. Psychotherapy models, including cognitive-behavioral and person-centered approaches to treatment. (3 cr) (F)

**\*Musc 4320 (CI). Psychology of Music II.** Research and laboratory course, emphasizing design, methods, and statistical procedures appropriate to research in music education and music therapy. Prerequisites: Musc 3320, ECE 3260, Stat 1040, and permission of instructor. (2 cr) (Sp)

**Musc 4330. Clinical and Professional Issues in Music Therapy.** Ethical considerations and issues related to private practice, marketing, and reimbursement, as well as continued exploration of psychotherapeutic models and MT methods with adults, specifically anxiety disorders and personality disorders. Prerequisite: Musc 4320. (2 cr) (Sp)

**Musc 4340. Internship in Music Therapy.** Six-month resident internship in affiliated, approved clinical setting. Prerequisite: Successful completion of senior year in music therapy. (2 cr) (F,Sp)

**Musc 4360. MIDI Studio Practicum.** Students sharpen their MIDI studio skills by working on an individual MIDI musical production. Prerequisite: ECE 3260. (1-3 cr) (F,Sp) ®

**Musc 4370. Sound Recording and Reinforcement Practicum.** Students sharpen their recording studio skills by working on an individual musical production. (1-3 cr) (F,Sp) ®

**Musc 4410. Advanced Piano Pedagogy I.** Continuation of Musc 1430 and 1440, with analysis, performance, and teaching of basic repertoire at intermediate to advanced levels. Prerequisites: Musc 1430, 1440. (1-2 cr) (F) ®

**Musc 4420. Advanced Piano Pedagogy II.** Continuation of Musc 4410, with analysis, performance, and teaching of basic repertoire at intermediate to advanced levels. Prerequisite: Musc 4410. (1-2 cr) (Sp) ®

**Musc 4500. String Ensemble.** Offers opportunity for capable string players to study and perform music written for variety of small ensemble combinations. (1 cr) (F,Sp) ®

**Musc 4510. Individual Violin Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private violin instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 4520. Individual Viola Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private viola instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 4530. Individual Cello Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private cello instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 4540. Individual String Bass Instruction for Music Majors.** Provides 60-minute lessons, for either 1 or 2 credits, for music majors only. Number of credits granted depends upon practice time and extent of literature required. Designed to give music majors private string bass instruction at any and all stages of advancement. Must be a pre-music major, music major, music education major, or music therapy major. (1-2 cr) (F,Sp,Su) ®

**Musc 4550. Acoustic Guitar Ensemble.** Offers opportunity for guitarists to rehearse and perform intermediate and advanced music written for acoustic guitar. (1 cr) (F,Sp) ®

**Musc 4600. University Chorale.** Select mixed choir performing a wide range of choral literature. Admission by audition only. (1 cr) (F,Sp) ®

**Musc 4610. National Standards Choir.** Choral ensemble focusing on music education through choral performance. Explores methods for teaching music through performance to middle and high school students. Special attention paid to National Standards in Music. (1 cr) (F,Sp) ®

**Musc 4620. Choral Conducting Practicum.** Application of principles of choral music education in public school setting. (1 cr) (F,Sp) ®

**Musc 4650. Chamber Singers.** Select small ensemble performing a wide range of choral literature. Admission by audition only. (1 cr) (F,Sp) ®

**Musc 4700. Wind Orchestra.** Highly-selective group, performing important traditional and contemporary works from the wind band repertoire. Entrance by audition only. (1 cr) (F,Sp) ®

**Musc 4900. Baroque Counterpoint.** Writing and analysis of tonal counterpoint in two, three, and four parts. Prerequisites: Musc 1110, 1120, 2130, 3140. (2 cr) (F)

**Musc 4910. Music Composition.** Instruction in principles of music composition, and guidance in completing individual composition projects. Also, analysis of selected Twentieth Century masterworks. Prerequisites: Musc 1110, 1120, 2130, 3140. (2 cr) (Sp) ®

**Musc 4920. Individual Recital.** Performance of pieces selected by the student and approved by the instructor, for performance in accordance with specific music area requirements. (1-6 cr) (F,Sp,Su) ®

**Musc 4930. Readings and Conference.** Undergraduate course designed to provide special interest study. (1-6 cr) (F,Sp,Su) ®

**Musc 4940H. Senior Thesis.** As partial fulfillment of Honors Program requirements, students design and complete a major paper/project. Examples of projects include performance, composition, and musical analysis. (1-6 cr) (F,Sp,Su) ®

**Musc 6100. Graduate Performance Ensemble.** Designed to give students opportunity for a high-level music experience in choral and instrumental performance ensembles. (1-2 cr) (F,Sp) ®

**Musc 6110. Advanced Conducting.** Students master manual technique of conducting and improve score study procedures, resulting in analysis and communication of musical ideas. (2 cr) (F,Su)

**Musc 6120. Advanced Rehearsal Techniques.** Provides students with conducting experience within their major performance areas; i.e., chorale, band, orchestra. This is accomplished through observation of rehearsal techniques and procedures, and by conducting rehearsals at the instructor's discretion. (2 cr) (F,Sp) ®

**Musc 6130. Seminar in Music: Philosophy, Aesthetics, and Trends.** Study of philosophical bases for human responses to music and resulting musical behaviors. (2 cr) (F,Su)

**Musc 6610. Practicum in Choral Performance.** Provides the graduate student with insight into advanced choral techniques and methods of preparing choirs for performance by rehearsing one of the University choirs on assigned choral selections while being critiqued by the ensemble director. (1-4 cr) (F,Sp) ®

**Musc 6620. Seminar in Choral Literature.** Designed to study and internalize principal forms of choral music through discussion of historical evolution and stylistic characteristics of the periods of music. Embraces significant choral functions of every style period. (2 cr) (Sp,Su)

**Musc 6630. Individual Instruction for Graduates.** Includes 60-minute lessons for either 1 or 2 credits. Number of credits granted depends upon practice time and ex-

tent of literature required. Designed to give graduate students private instruction at any and all stages of advancement. Prerequisite: Instructor's permission. (1-2 cr) (F,Sp) ®

**Musc 6900. Independent Study.** Advanced course designed to meet specific problems of the music educator and the applied music specialist. (1-6 cr) (F,Sp,Su) ®

**Musc 6910. Individual Recital.** Preparation and presentation of graduate recital, under supervision of major professor. (1-3 cr) (F,Sp,Su) ®

**Musc 6970. Research and Thesis.** Individual work in thesis writing with guidance and criticism. (2-6 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

## *Interdisciplinary Certificate Program in*

# *Natural Resource and Environmental Policy*

**Director: Associate Professor Joanna L. Endter-Wada**, Department of Environment and Society  
Office in Natural Resources 355B, (435) 797-2487

**Program Office:** Natural Resources 355, (435) 797-2797  
**WWW** <http://www.cnr.usu.edu/policy>

**Affiliated Faculty: Professors** *Stan L. Albrecht*, Provost of Utah State University; *Loren R. Anderson*, Civil and Environmental Engineering; *Caryn Beck-Dudley*, Management and Human Resources; *David S. Bowles*, Civil and Environmental Engineering; *F. E. "Fee" Busby*, Dean of College of Natural Resources; *Anne M. Butler*, History; *Keith R. Criddle*, Economics; *William J. Doucette*, Civil and Environmental Engineering; *R. Ryan Dupont*, Civil and Environmental Engineering; *Christopher Fawson*, Economics; *Terrence F. Glover*, Economics; *E. Bruce Godfrey*, Economics; *James W. Haefner*, Biology; *Craig W. Johnson*, Landscape Architecture and Environmental Planning; *John E. Keith*, Economics; *James J. Kennedy*, Environment and Society; *Richard S. Krannich*, Sociology, Social Work and Anthropology; *Kenneth S. Lyon*, Economics; *Glenn M. McEvoy*, Management and Human Resources; *Clyde A. Milner II*, History; *Jon R. Moris*, Sociology, Social Work and Anthropology; *Carol A. O'Connor*, History; *Gary R. Oddou*, Management and Human Resources; *V. Phillip Rasmussen*, Plants, Soils, and Biometeorology; *David L. Rogers*, Sociology, Social Work and Anthropology; *Randy T. Simmons*, Political Science; *Donald L. Snyder*, Economics; *David K. Stevens*, Civil and Environmental Engineering; *Richard E. Toth*, Landscape Architecture and Environmental Planning; *Wynn R. Walker*, Biological and Irrigation Engineering; **Professors Emeriti** *Herbert H. Fullerton*, Economics; *Ronald L. Little*, Sociology, Social Work and Anthropology; *Joan R. McFadden*, Human Environments; *F. Ross Peterson*, History; *Frederic H. Wagner*, Forest, Range, and Wildlife Sciences; **Associate Professors** *Dale J. Blahna*, Environment and Society; *Mark W. Brunson*, Environment and Society; *Steven W. Burr*, Environment and Society; *D. Layne Coppock*, Environment and Society; *Steven E. Daniels*, Director of the Western Rural Development Center; *Susan E. Dawson*, Sociology, Social Work and Anthropology; *Edward W. Evans*, Biology; *David B. Goetze*, Political Science; *Thomas B. Hardy*, Civil and Environmental Engineering; *Cathy L. Hartman*, Business Administration; *Paul M. Jakus*, Economics; *Arthur R. Jones*, Health, Physical Education and Recreation; *Michael R. Kuhns*, Forest, Range, and Wildlife Sciences; *David R. Lewis*, History; *Robert J. Lilieholm*, Environment and Society; *Michael S. Lyons*, Political Science; *Gary E. Madsen*, Sociology, Social Work and Anthropology; *Terry A. Messmer*, Forest, Range, and Wildlife Sciences; *Bruce E. Miller*, Agricultural Systems Technology and Education; *Dennis A. Nelson*, Health, Physical Education and Recreation; *John K. Nicholson*, Landscape Architecture and Environmental Planning; *Peter C. Ruben*, Biology; *John C. Schmidt*, Aquatic, Watershed, and Earth Resources; *Robert H. Schmidt*, Environment and Society; *Edwin R. Stafford*, Business Administration; *David G. Tarboton*, Utah Water Research Laboratory, Civil and Environmental Engineering; *Veronica Ward*, Political Science; **Research Associate Professor** *Darwin L. Sorensen*, Biology, Civil and Environmental Engineering, Utah Water Research Laboratory; **Assistant Professors** *Paul W. Box*, Aquatic, Watershed, and Earth Resources; *Ronda R. Callister*, Management and Human Resources; *Arthur J. Caplan*, Economics; *Christopher A. Conte*, History; *Douglas B. Jackson-Smith*, Sociology, Social Work and Anthropology; *Nicole L. McCoy*, Environment and Society; *Jennifer A. Peeples*, Speech, Languages and Philosophy; *Peggy Petrzalka*, Sociology, Social Work and Anthropology; **Science and Reference Associate Librarian** *Anne E. Hedrich*, Sci-Tech Library; **Special Collections Assistant Librarian** *Stephen C. Sturgeon*, Merrill Library

### **Graduate Program Description**

The Natural Resource and Environmental Policy Certificate is designed to prepare resource and environmental professionals to meet current public policy challenges. Many of the problems confronting natural resource and environmental managers are social, as well as technical, in nature. Public involvement in decision making, equity concerns, and conflict management is becoming a critical issue. Resource professionals are increasingly challenged to design management strategies and public policies that maximize human well-being, environmental quality, and ecological integrity. The policy certificate is an interdisciplinary program to train students for careers in government, education, consulting, and conservation.

The Certificate Program provides students with a comprehensive educational framework for understanding complex natural re-

source and environmental concerns and to develop the critical thinking and analytical skills needed to address these issues. Students develop familiarity with both disciplinary and interdisciplinary concepts and principles of the social, natural, and physical science approaches to natural resource policy. Students engage in educational activities and thesis projects designed to apply this training to current policy issues. The primary objective is to prepare students to develop innovative, creative, and feasible natural resource and environmental policies and management strategies.

All eight colleges, as well as sixteen departments, at Utah State University participate in the Natural Resource and Environmental Policy Program and are represented on the Policy Program Advisory Committee.

## **Certificate**

Students who complete the Policy Program receive a certificate in Natural Resource and Environmental Policy. Notification of this certificate appears on the student's transcript.

## **Admission Requirements**

Admission to the Certificate Program is open to students accepted into a Plan A (thesis) master's degree program or a doctoral degree program at Utah State University who have satisfied the prerequisites outlined in the next paragraph. Admission is also available for students accepted into Plan B or Plan C master's degree programs, provided their degree program requirements include development of a written research paper or project report that will be presented to and defended before the student's graduate committee. In all cases, the thesis, research report, or dissertation must contain a significant component addressing natural resource or environmental policy dimensions of the research.

Prerequisites for acceptance into the Natural Resource and Environmental Policy Graduate Certificate Program are (1) undergraduate or other experience in the natural and social sciences; and/or (2) demonstrated understanding of general ecological principles, earth processes, and social systems. A standing Admissions Subcommittee of the Policy Program Advisory Committee reviews graduate student requests for admission to the program to determine whether prerequisites have been met.

To meet the natural sciences prerequisite, students must have taken an upper-division course focusing on the operation of natural systems, such as a course in ecology, biological systems, ecosystem management, or earth processes. Professional experience equivalent to such a course is also considered as having met the natural sciences prerequisite. Students without sufficient natural science backgrounds are required to take an equivalent course at USU to fulfill the prerequisites prior to certificate coursework. Students should contact the Natural Resource and Environmental Policy Program office for a current list of suggested courses.

To meet the social sciences prerequisite, students must have taken an upper-division course focusing on the operation of social systems, such as a course from the fields of economics, political science, sociology, or anthropology. Professional experience equivalent to such a course may also be considered as having met the social sciences prerequisite. Students should contact the Natural Resource and Environmental Policy Program office for a current list of suggested courses.

## **Graduate Committee**

The student's graduate committee must include one faculty member affiliated with the Policy Program to advise the student on meeting the program requirements and in selecting core courses.

## **Course Requirements**

The Graduate Certificate Program draws on a variety of courses to provide an integrated, interdisciplinary program. An integrative cornerstone seminar offered every other year as a team-taught course (NR 6430, Natural Resource and Environmental Policy Cornerstone Seminar), is normally taken in the student's first year. Students are expected to take at least nine credits from the core policy courses listed below to gain perspective on different disciplinary approaches to natural resource policy. Another program activity is the Natural Resource and Environmental Policy Seminar, NR 6440, which features invited speakers and must be attended by students for credit. In another required seminar, NR 6450, graduating students make a presentation on the policy dimensions of their thesis or dissertation.

The following are the Natural Resource and Environmental Policy Certificate core courses: ASTE 6260, Environmental Impacts of Agricultural Systems; BA 6540, ST: Sustainable Marketing; Econ 6500, Introduction to Natural Resource and Environmental Economics; Econ 6510, Applied Resource and Environmental Economics; EnvS 5300, Natural Resources Law and Policy; EnvS 6000, Human Dimensions in Natural Resources Graduate Seminar; EnvS 6530, Natural Resources Administration; NR 6420, Stegner Center Annual Symposium; EnvS 6110, Fisheries and Wildlife Policy and Administration; EnvS 6350, Wildlife Damage Management Policy; EnvS 6900, ST: Natural Resources Partnerships; AWER 6330, Large River Management; EnvS 6550, Environment, Resources, and Development Policy; Hist 6460, Seminar in Environmental History; LAEP 6900, Special Problems: NEPA Course; PolS 5180, Natural Resource Policy; PolS 5200, Global Environment; EnvS 6130, Policy Aspects of Wildland Recreation; FRWS 5150, Conflict Management in Natural Resources; FRWS 6900, ST: Restoration and Rehabilitation Economics; Soc 6620, Environment, Technology, and Social Change; Soc 6630, Natural Resources and Social Development; Soc 7620, Sociology of Environmental Hazards and Risks; Spch 5000, Studies in Speech Communication: Protest and the Environment; EnvS 5320, Water Law and Policy in the United States. Other courses may be included in the list of core courses by action of the Policy Program Faculty Advisory Committee.

Approved core courses may be part of a student's departmental requirements; however, only one core course taught in the student's home department may be applied toward the certificate.

*Interdepartmental Curriculum for*  
***Master of Natural Resources (MNR)***

**Degree Coordinator:** Associate Dean *Raymond D. Dueser*, College of Natural Resources  
Office in Natural Resources 108, (435) 797-2445  
WWW <http://www.cnr.usu.edu>

**Degree offered:** Master of Natural Resources (MNR)

***Objectives***

The Master of Natural Resources (MNR) is a professional degree designed to prepare students to work in the interdisciplinary context of the 21st Century. It is a nonthesis program, intended for students and practicing professionals with a career orientation in natural resource management.

***Admission Requirements***

All MNR students are admitted through one of the three College of Natural Resources departments, following School of Graduate Studies standard procedures and policies (see pages 72-73). As with other USU master's degrees, each student must be accepted by a faculty member (major professor) who agrees to guide the student in the MNR program.

Undergraduate prerequisites include courses in chemistry, physics, botany, zoology, ecology, economics, political science, algebra, and statistics; and at least three courses in natural resources disciplines. Students without undergraduate degrees in natural resources or similar majors will be required to make up deficiencies in undergraduate preparation prior to beginning MNR degree coursework.

***Course Requirements***

The degree program includes two required core courses, courses in specified topic areas, and elective courses. The specific coursework required for each student will be determined by the major professor and the two other members of the student's graduate supervisory committee.

## Cooperative

# Nursing Program

## College of Science

# Weber State University/Utah State University

**Coordinator: Assistant Professor Joanne Duke**  
Office in Lundberg Building 201, (435) 797-1515

**Assistant Professors** Debra Haas, Lori Hart, Jonny Kelly, Joyce Murray, Kelly Shoell, Carol Whitesides

## Undergraduate Programs

### Associate Degree Program Objectives

Weber State University and Utah State University jointly offer an Associate of Science degree or an Associate of Applied Science degree in Nursing at Logan.

All nursing theory, University Studies, and laboratory practice classes are offered on the Utah State University campus and in health service agencies within Box Elder and Cache Counties.

Weber State University admits the prospective student and grants the Associate of Science degree or the Associate of Applied Science degree upon the student's completion of the course. The student participates in pinning ceremonies held on the Utah State University Campus and graduation ceremonies held on the Weber State University campus.

### Departmental Admission Requirements for Associate Degree Program

Students apply for admission to the Cooperative Nursing Program by contacting the coordinator of the program, Lundberg Building, Room 201, 3250 Old Main Hill, Utah State University, Logan UT 84322-3250.

The student's application is handled through the Office of Nursing Admissions, Weber State University, Ogden UT 84408. Applicants have until February 1 to complete their application process. All application forms must be completed and sent to the Nursing Program admissions advisor at Weber State University. Notifications of status are sent to applicants around April 15.

A graduate of this program is eligible to write the State Board licensing examination to become a registered nurse. The program is accredited by the Utah State Board of Nursing and the National League of Nursing Accrediting Commission.

Students admitted to the program have the prerogative of taking the licensing examination for Practical Nursing upon an equivalency basis with the completion of the first year's course of studies.

### Curriculum for Associate Degree Program

The curriculum for the associate degree is planned over a six-semester period, using two academic years plus two summer semesters. It is planned to include a broad University Studies program concurrently with courses in Nursing. A grade of *B* or higher is required for all lower-division nursing courses, and a grade of *C* or higher is required for all support classes.

## Nursing Courses (Nurs)

**Nurs 1030. Foundations of Nursing Practice.** Nursing concepts introduced which are built upon throughout the nursing curriculum as students care for clients. (4 cr) (F)

**Nurs 1031. Foundations of Nursing Practice Clinical.** Companion course taught in concert with Nurs 1030. Clinical experience running concurrently with Nurs 1030. (3 cr) (F)

**Nurs 1040. Women's Health and the Childbearing Family.** Theory focuses on meeting basic human needs of the family and newborn throughout the childbearing cycle. (2 cr) (Sp)

**Nurs 1041. Women's Health and the Childbearing Family Clinical.** Companion course taught in concert with Nurs 1040. (1 cr) (Sp)

**Nurs 1045. Nursing Care of Adults and Children.** Focused theory with emphasis on physiological and psychosocial needs of clients across the lifespan. (3 cr) (Sp)

**Nurs 1046. Nursing Care of Adults and Children Clinical.** Companion course taught in concert with Nurs 1045. (2 cr) (Sp)

**Nurs 1050. Treatment Modalities.** Basic treatments and pharmacological agents used by nurses to promote health across the lifespan. (2 cr) (F)

**Nurs 1124. Transition into Associate Degree Nursing.** Socialization from practical nursing to the associate degree, registered nurse level. (2 cr) (F)

**Nurs 2050. Treatment Modalities.** Advanced treatments and pharmacological agents used by nurses to promote health across the lifespan. (2 cr) (F)

**Nurs 2060. Psychiatric/Mental Health Nursing.** Students explore caring strategies for promoting mental health and preventing illness across the lifespan. (2 cr) (Sp)

**Nurs 2061. Psychiatric/Mental Health Nursing Clinical.** Companion course taught in concert with Nurs 2060. Clinical application of psychiatric/mental health nursing taught in Nurs 2060. (1 cr) (Sp)

**Nurs 2070. Nursing Care of Adults and Children II.** Theory with emphasis on more complex physiological and psychosocial needs of clients across the lifespan. (3 cr) (F)

**Nurs 2071. Nursing Care of Adults and Children II Clinical.** Companion course taught in concert with Nurs 2070. Clinical application of medical-surgical concepts learned in Nurs 2070. (4 cr) (F)

**Nurs 2080. Patient Care Management.** Theory focuses on the synthesis of nursing knowledge and skills necessary for entrance into registered nursing practice. (2 cr) (Sp)

**Nurs 2081. Patient Care Management Clinical.** Companion course taught in concert with Nurs 2080. Clinical synthesis of nursing knowledge and skills necessary for entrance into registered nursing practice. (3 cr) (Sp)

**Nurs 2283. Directed Readings and Projects.** Prerequisite: Instructor's approval. (1-3 cr) (F,Sp)

**Nurs 2289. Cooperative Education.** Open to all students who meet the minimum co-op requirements of this department. Provides academic credit for on-the-job experience. (1-3 cr) (F,Sp)

**HS 2230. Introductory Pathophysiology.** An introduction to the nature of disease and its effect on body systems. (3 cr) (Su)

# Department of *Nutrition and Food Sciences*

## *College of Agriculture and College of Family Life*

**Head: Professor** *Von T. Mendenhall*, food science, meat technology, culinary arts/food service management  
Office in Nutrition and Food Sciences 213, (435) 797-2126

**FAX** (435) 797-2379

**E-mail:** [nfs@cc.usu.edu](mailto:nfs@cc.usu.edu)

**WWW** <http://www.usu.edu/famlife/nfs>

**Professors** *Daren P. Cornforth*, food science, meat and muscle chemistry; *Conly L. Hansen*, food science, food engineering; *Deloy G. Hendricks*, nutrition, food storage; *Georgia C. Lauritzen*, nutrition education, dietetics; *Donald J. McMahon*, food science, dairy chemistry and technology; *Ronald G. Munger*, nutrition, epidemiology, and public health; *Ann W. Sorenson*, nutrition; **Adjunct Professors** *Gary M. Chan*, pediatrics; *Michael J. Glass*, microbial detection; **Distinguished Professor Emeritus** *R. Gaurth Hansen*; **Professors Emeritus** *Gary H. Richardson*, *D. K. Salunkhe*, *Bonita W. Wyse*; **Associate Professors** *Charlotte P. Brennand*, food science, food flavor and sensory evaluation; *Jeffery R. Broadbent*, food science, microbial genetics; *Charles E. Carpenter*, food science, muscle biochemistry and physiology, meat processing; *Ilka Nemere*, nutrition, molecular nutrition; *Marie K. Walsh*, food science, dairy chemistry; *Bart C. Weimer*, food science, microbial physiology; **Clinical Associate Professors** *Janet B. Anderson*, dietetics, food science management, food safety; *Noreen B. Schvaneveldt*, dietetics, clinical nutrition; **Adjunct Associate Professor** *Paul A. Savello*, dairy processing and food science, food laws and regulations, milk ultra high temperature and whitening; **Assistant Professors** *Nedra K. Christensen*, nutrition, dietetics; *Deborah R. Gustafson*, nutrition, molecular epidemiology; **Research Assistant Professor** *Heidi J. Wengreen*, nutrition, clinical dietetics, epidemiology; **Clinical Assistant Professors** *Ann M. Mildenhall*, dietetics; *Tamara S. Vitale*, dietetics, community nutrition; **Assistant Professor Emeritus** *Frances G. Taylor*; **Adjunct Assistant Professors** *Bradley J. Haack*, molecular pathogenesis; *Robert Miceli*, molecular assay development, biosensor development, infectious disease, antibody engineering, immune regulation; **Adjunct Clinical Assistant Professor** *W. Daniel Jackson*, pediatrics; **Lecturers** *Virginia C. Bragg*, culinary arts; *Erik T. Burlile*, culinary arts/food service management, chef; *Rebecca S. Cole*, dietetics/food service management; *Grace B. Harvell*, culinary arts; *Stephen L. Larsen*, dairy technology; *John L. Simpson*, culinary arts/food service management, chef

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), and Doctor of Philosophy (PhD) in Nutrition and Food Sciences; Master of Food Microbiology and Safety (MFMS); Master of Dietetics Administration (MDA)

**Undergraduate emphases:** BS, BA—Nutrition Science, Dietetics, Culinary Arts/Food Service Management, Food Science, and Food Technology Management; **Graduate specializations:** MS, PhD—Dietetics, Food Biotechnology, Food Chemistry, Food Engineering, Food Microbiology, Food Processing, Human Nutrition, Molecular Biology, and Nutrient Metabolism

## *Undergraduate Programs*

### *Objectives*

The Department of Nutrition and Food Sciences has the following three objectives:

1. To provide students with the scientific/academic background necessary to function well in further academic pursuits or future work environments.
2. To provide students with the critical thinking and problem solving skills necessary to enhance further academic pursuits or future work environments.
3. To provide students with practical application and work experience credentials to provide personal and employment satisfaction.

**Dietetics.** The Dietetics emphases prepare students to become registered dietitians. To become a registered dietitian, a student must complete a bachelor's degree program, complete a supervised internship, and pass a national registration exam. Registered dietitians, who have professional skills in clinical nutrition, community/public health nutrition, and food service management, are in great demand in the job market.

USU offers two programs in dietetics: the **Coordinated Program in Dietetics (CPD)** and the **Didactic Program in Dietetics (DPD)**. The CPD and the DPD are both accredited by the Commission on Accreditation/Approval for Dietetics Education of The American Dietetic Association, 216 West Jackson Blvd, Chicago IL 60606-6995, (312) 899-4876.

**Coordinated Program in Dietetics (CPD).** The CPD program includes coursework *and* supervised internship experience. The graduate is eligible to take the national registration exam

upon completion of the BS degree. Students must complete prerequisites and make application to the CPD by March 15 of the sophomore year. Ten students are accepted annually into the junior-level coursework and clinical work. Students are required to complete 1,000 hours of internship experience during their junior and senior years. Senior students must relocate to Salt Lake City during fall semester, in order to obtain extensive internship experiences in clinical and community settings.

**Didactic Program in Dietetics (DPD).** The DPD program is a four-year academic program meeting all requirements enabling the graduate to apply for a supervised internship following graduation. Internships are located throughout the USA. USU Extension also sponsors an internship in conjunction with Davis County School Food and Nutrition Services.

**Food Science.** Students receive an excellent background in chemistry, engineering, food processing, statistics, sensory evaluation, and microbiology. The Food Science program is approved by the Institute of Food Technologists. Graduates are in demand by industry for positions in research, quality control/assurance, product development, and processing. Government laboratories and regulatory agencies also hire food science graduates. With a food science degree, students can also qualify to enter graduate school.

**Food Technology Management.** The Food Technology Management program gives students a broad background in basic food science and in business administration to be applied to the business-oriented aspects of the food industry. Students also qualify for a Business Production Minor. Graduates are sought by private food industry and public institutions in management positions.

**Culinary Arts/Food Service Management.** This emphasis prepares students in the art and science of culinary arts, and provides the management principles needed to effectively manage a food service operation, including human resource management, financial management, time management, communications, etc. Students are required to obtain a minor in BA Marketing, MHR Management, or MHR Human Resource Management.

**Nutrition Science.** The Nutrition Science emphasis is for students who are interested in studying the molecular and cellular bases of human health and disease. This is a multi-disciplinary program in which students learn to apply techniques from the fields of molecular and cellular biology, physiology, genetics, and biochemistry to issues in nutrition. Students will gain experience in laboratory, clinical, and epidemiological methods, and may have the opportunity to gain laboratory research experience in nutrition studies being conducted by faculty members. The undergraduate Bachelor of Science degree qualifies a student with the Nutrition Science emphasis to find employment in industry or academic laboratories, as well as in government agencies. It can also be used as preparation for medical or graduate school.

**Completion of courses required for the Nutrition Science emphasis or the Dietetics emphasis is suitable preparation for students planning to apply to medical school.**

For more emphasis information about course sequences and requirements for admission, see major requirement sheet, available from the Department of Nutrition and Food Sciences, or visit the departmental home page at:

<http://www.usu.edu/famlife/nfs>.

## **Requirements**

**Departmental Admission Requirements.** Admission requirements for the Department of Nutrition and Food Sciences are the same as those described for the University on pages 48-51. Students in good standing may apply for admission to the department. Students planning to major in Nutrition and Food Sciences should take algebra, chemistry, and biology in high school.

**Graduation Requirements.** Students graduating in the Department of Nutrition and Food Sciences graduate in the College of Agriculture and the College of Family Life. All graduates from the department must have completed one of the six emphasis areas in the department and must meet the following minimum requirements:

1. Grade point average (GPA) must be 2.5 or higher in all courses required for the major.
2. A grade of C or better must be received in all courses required for the major.
3. Courses required for the major may be repeated only once to improve a grade.
4. Courses required for the major may not be taken as *Pass-D-Fail* credits.

**Minor in Food Sciences.** Students with majors outside of the Nutrition and Food Sciences Department may graduate with a minor in Food Sciences by completing NFS 1020, 3110, 4070, 5020 or 5030, and 5510.

## **Bachelor of Science Requirements**

Specific requirements for each emphasis are listed below. Requirements change periodically, and sequence of courses is important. Current course requirements and the order in which they should be taken can be obtained from the Department of Nutrition and Food Sciences.

**Food Science Emphasis.** The following courses are required: Biol 1210, 3300; Chem 1210, 1220, 1230, 1240, 2300, 2330, 3700, 3710; Math 1050, 1060, 1210; NFS 1000, 1020, 1250, 3100, 3110, 3250, 4070, 4440, 4990, 5020, 5030, 5110, 5500, 5510, 5560, 5920; Phyx 2110; PISc 4600; Spch 2600; Stat 3000, 5300.

**Food Technology Management Emphasis.** The following courses are required: Acct 2010; BA 3500, 3700, 4720, 4790, 5730; Biol 1110; Chem 1110, 1120, 1130; Math 1050, 1100; MHR 3110; NFS 1000, 1020, 1240, 1250, 3100, 3110, 3250, 4070, 4990, 5020, 5030, 5110, 5500, 5510, 5560, 5920; Phyx 1200; Spch 2600; Stat 3000, 5300.

**Culinary Arts/Food Service Management.** The following courses are required: Acct 2010; BA 3500; Chem 1010; Econ 1500; FL 1100; HEnv 1750; Math 1030, 1050; MHR 2350, 2990, 3110, 3710; NFS 1000, 1020, 1240, 1250, 2030, 2050, 3000, 3030, 3060, 3110, 3500, 3510, 4250, 4810, 4990; Spch 2600. Students are required to choose a minor in BA Marketing, MHR Management, or MHR Human Resource Management.

**Nutrition Science.** The following courses are required: Biol 1210, 1220, 2000; Chem 1210, 1220, 1230, 1240, 2300, 2330, 3700, 3710; Econ 1500; Engl 1010, 2010; FL 1100; Math 1050, 1060, 1210; NFS 1000, 1020, 2020, 3110, 3250, 4020, 4070, 4540, 4990, 5210, 5220, 5310; Stat 2000; USU 1320, 1330, 1340; 20 elective credits (see Nutrition and Food Sciences Department for list of approved electives).

**Dietetics (Coordinated Program).** The following courses are required: Biol 2000, Chem 1210, 1220, 2300, 3700, 3710; Econ 1500; FL 1100; Math 1050; NFS 1020, 1240, 1250, 2020, 3020, 4020, 4050, 4060, 4070, 4420, 4480, 4540, 4550, 4560, 4570, 4580, 4660, 4710, 4720, 4730, 4740, 4750, 4780, 4990, 5210, 5300, 5750; Stat 1040.

**Dietetics (Didactic Program).** The following courses are required: Acct 2010; BA 3500; Biol 2000; Chem 1210, 1220, 2300, 3700, 3710; Econ 1500; FL 1100; Math 1050; MHR 3110; NFS 1020, 1240, 1250, 2020, 3020, 3510, 4020, 4050, 4060, 4070, 4480, 4540, 4550, 4560, 4710, 4720, 4750, 4900, 4990, 5120, 5200, 5210, 5300; Stat 1040.

### **Financial Support**

The Department of Nutrition and Food Sciences, the College of Agriculture, and the College of Family Life award scholarships in addition to those available through the University Financial Aid Office. Information and application forms may be obtained from the department office. Students may also contact the department for assistance in finding employment that will enhance their academic studies. Many students are employed by the department and by private firms near the University.

## **Graduate Programs**

### **Master of Food Microbiology and Safety (MFMS)**

The MFMS degree is a professional degree designed to provide students with depth training in food safety assurance and the use of management systems such as HACCP. The degree is primarily intended for individuals planning careers in food quality assurance or other food safety-related positions in the food industry.

### **MFMS Admission Requirements**

Students seeking entry into the MFMS program must satisfy the minimum admission requirements of the USU School of Graduate Studies and the NFS Department, and must also achieve a score of 3 (equivalent to the 40th percentile) or higher on the newly administered GRE Written Examination. Applications will be reviewed by the MFMS Advisory Committee, which is responsible for accepting students into the MFMS program and assigning them an advisor. The advisor will then consult with the student to select two additional graduate committee members.

### **MFMS Program of Study**

The MFMS program of study has been tailored for students with undergraduate training in (1) food science or (2) microbiology or biology. Students who lack prerequisite competencies in food science, microbiology, or biology will be required to address

those deficiencies during the MFMS program of study. Course requirements to meet specific deficiencies will be designated by the student's advisory committee and, in accordance with School of Graduate Studies policy, may or may not count toward course requirements for the MFMS program of study.

The MFMS program of study, outlined below, requires a minimum of 32 semester credits, including (1) 10 semester credits of core coursework in food safety assurance, microbiology, and epidemiology; (2) at least 19 semester credits of coursework based on the student's career goals and undergraduate competencies; and (3) the written preparation and oral presentation of a substantive literature review on a food safety topic.

**MFMS Program Requirements (32 credits minimum).** Students must complete all of the following courses (15 credits): NFS 6150, 6170, 6200, 6900 (2 credits), 7800 (2 credits); Biol 6810 or 6890; and PubH 5010. During NFS 6900 (Special Problems), students will prepare a substantive written literature review of a food safety topic. NFS 7800 (Seminar) must be taken during two semesters; during the final seminar, students must make an oral presentation on the food safety topic used for their literature review.

Students with a **BS degree in Food Sciences** must demonstrate competency equivalent to a USU BS degree in Nutrition and Food Sciences with a Food Science emphasis. These students must also select a minimum of 10 credits from the following: ADVS 6400; Biol 5150 (offered biennially), 5300, 5330. The remaining credits should generally be selected from the following, although additional course substitutions may be made with approval of the student's advisory committee: NFS 6020, 6030, 6120, 6140 (offered biennially), 6210, 6500, 6510, 6600 (offered biennially), 6610; ASTE 6260; Chem 6730.

Minimum program prerequisites for students with a **BS in biology, microbiology, or an equivalent degree** include the following (the USU equivalent course is listed in parentheses): biochemistry (Chem 3700), general microbiology (Biol 3300), microbial physiology (Biol 5300), and statistics (Stat 3000). In addition, these students must complete *both* NFS 6110 and 6500, and must take *at least one* of NFS 6020 and 6030. The remaining credits should generally be selected from the following, although additional course substitutions may be made with approval of the student's advisory committee: NFS 6120, 6140 (offered biennially), 6210, 6510, 6600 (offered biennially), 6610; ADVS 6400; ASTE 6260; Biol 5150 (offered biennially); Chem 6730.

### **Master of Dietetics Administration (MDA)**

The MDA degree is a professional degree designed to provide dietitians with in-depth training in management and leadership in food and nutrition program administration. The skills emphasized in the MDA program will enhance career options and pathways for graduates. Nationwide, there is a need for professionally trained managers at local, district, state, and federal levels in food and nutrition programs, including school, university, and hospital food services; public health programs; and clinical management. This program provides expertise in financial management, human resource management, marketing, entrepreneurship, employment laws, and more.

### **MDA Admission Requirements**

Candidates for the MDA program must qualify for one of the following categories: *Option 1:* Must have completed the USU Extension Dietetics Internship; **or** *Option 2:* Must be currently registered as a dietitian with at least two years of work experi-

ence. Students seeking entry must also satisfy: (1) admission requirements of the USU School of Graduate Studies; and (2) admission requirements of the NFS Department.

The MDA Advisory Committee is responsible for reviewing applications, accepting students into the MDA program, and assigning students to an advisor.

### **MDA Program of Study**

**Option 1** is tailored for applicants who have completed the USU Extension Dietetics Internship. Students must complete a minimum of 41 credits and a Plan B thesis. The completed USU Extension Dietetics Internship provides 26 of the 41 credits. Following the internship, 15 additional credits are required including: NFS 6780, 6900 (3 credits), 6970 (2 credits), 7800 (1 credit), and two elective courses to be determined by the MDA candidate and the Advisory Committee.

**Option 2** is tailored to the registered dietitian with at least two years of work experience. A minimum of 30 credits is required for this Plan B option. Students must complete 18 credits from the NFS Department and a minimum of 6 credits each in two of the three related disciplines. These disciplines include overall management, financial management, and human resource management. Coursework will be based on the student's career goals and competencies. The following courses are required: NFS 4750, 5200, 5210, 5510, 6750, 6780, 6900 (3 credits), 6970 (2 credits), and 7800 (1 credit). The remaining courses must be selected from the following: Acct 6010; BA 3400, 6350, 6440, 6520; InsT 6490; MHR 6350, 6370, 6410, 6500, 6510, 6550, 6630, 6760.

### **MS and PhD Admission Requirements**

Candidates for graduate study in the Department of Nutrition and Food Sciences need a background in chemistry, physics, mathematics, bacteriology, and physiology. Prior coursework in food science or nutrition is desirable. If deficient in these areas, a student may be accepted with the understanding that the supervisory committee will require competence equivalent to a BS degree in nutrition and food sciences in the preliminary (MS) or comprehensive (PhD) examination.

Students must meet some departmental requirements in addition to requirements of the School of Graduate Studies. The following minimum Graduate Record Examination scores are required for admission: Verbal, 470; Quantitative, 530; Analytical, 500; and Verbal, Quantitative, and Analytical combined, 1,500.

One year of general chemistry, two semesters of organic chemistry, and math at least equivalent to college algebra must be completed before matriculation. If taken as a graduate student, these courses will not be counted as graduate credit.

Before being accepted to work toward a PhD degree, a student must have obtained an MS degree or have a manuscript reporting original research accepted for publication in a refereed journal.

Before being accepted into the department, potential graduate students must be accepted by a faculty member who is willing to add them to his or her research team.

### **MS and PhD Procedures**

Progress toward an advanced degree is outlined in the School of Graduate Studies section (pages 76-79). Students are responsible to see that all requirements are fulfilled, and should read these procedures *carefully*.

Graduate students in the Department of Nutrition and Food Sciences should complete the following steps:

**1. Choose Major Professor.** Students are accepted into the department with a temporary advisor. Although this person must guarantee, at the time of acceptance, that the student may work in his or her research program, students may choose as their major professor any faculty member who can and is willing to accommodate them.

**2. Establish Supervisory Committee.** Faculty members who may serve on the student's supervisory committee should be considered in consultation with the major professor. A minimum of three members (at least two from the department), including the major professor, must be suggested for the MS program. At least five (three or more from the department and one or more from outside the department) must be suggested for a PhD program.

When the student and major professor have agreed on the committee members, a *Supervisory Committee Assignment* form must be prepared. The department head must approve the committee and may add members. It is the student's responsibility to meet with proposed committee members to make certain they are able and willing to serve. The *Supervisory Committee Assignment* form is then forwarded to the dean of the School of Graduate Studies for final approval.

The committee should be selected and the *Supervisory Committee Assignment* form submitted to the School of Graduate Studies no later than the second semester of an MS program or the third semester of a PhD program.

**3. Select and Define Research Program.** In consultation with the major professor, the student must choose a research area suitable for the MS thesis or PhD dissertation and prepare a Thesis or Dissertation Proposal. The proposal should include the following:

- a. Title
- b. Description of the problem based on the most current literature
- c. Statement of the purpose of the intended research
- d. Research plan
- e. List of the references cited in a form acceptable for publication in a scientific journal in the student's field

**4. Define Course Schedule.** Students must decide, in consultation with their major professor, the courses they will take that will be on their Program of Study. They must fulfill the following minimum requirements for all graduate students in Nutrition and Food Sciences and take other courses to provide the background necessary to conduct their research.

- a. **Biochemistry (Chem 5700, 5710)**—3 credits required for MS; 6 credits required for PhD.
- b. **Statistics (Stat 5100, 5120, 5200, 5600)**—3 credits required for MS; 6 credits required for PhD.
- c. **Graduate-level NFS courses**—PhD students must include 3 credits from NFS 6200, 6210, 6220, 6300, 6310, 6630; and 3 credits from NFS 6020, 6030, 6110, 6560.
- d. **Additional graduate-level courses (from NFS or elsewhere)**—3 credits required for MS; 10 credits required for PhD.
- e. **Graduate Seminar (NFS 7800)**—2 credits required for MS; 4 credits required for PhD.
- f. **Graduate seminars in other departments**—1 credit required for MS; 2 credits required for PhD.

g. **Teaching experience (NFS 6900)**—2 credits required for PhD.

h. **Research (NFS 6970, 7970; assigned at discretion of the major professor)**—6-12 credits required for MS; approximately 30 credits required for PhD.

The PhD program includes 30 Master of Science credits. For more information, see the School of Graduate Studies requirements in this catalog.

**5. Meet with Supervisory Committee.** Before the first meeting of the supervisory committee, the student must complete the *Program of Study* form. A copy of the form and the research proposal should be given to each committee member several days before the meeting. The purpose of this meeting is to:

a. Secure the committee's approval of the Program of Study. Deficiencies in academic background will be discussed and plans made to resolve them.

b. Obtain the committee's approval of the research plan.

c. Discuss regulated aspects of the research (hazardous materials, experimental animals, or human subjects).

d. Allow the committee to determine the topic areas listed on the *Program of Study* form as other requirements of the program. All members of the committee and the department head must sign the *Program of Study* form before it is sent to the School of Graduate Studies.

**6. Begin Research and Continue Courses.** Students must take the approved courses and conduct the research as outlined in the approved research proposal.

**7. Take Oral Preliminary (MS) or Comprehensive (PhD) Examination.** The oral examination tests general knowledge that the student should have at this stage of academic training, as well as the student's ability to synthesize information in relation to nutrition and food science. Material to be included is determined by the committee, but emphasis is on knowledge applicable to the research.

**8. Complete Application for Candidacy Forms.** PhD candidates must submit the *Application for Candidacy* form to the School of Graduate Studies. It must be signed by all members of the committee at the end of the comprehensive examination, and then signed by the department head. This form must be received by the School of Graduate Studies at least three months before the dissertation defense.

**9. Complete Research and Write Thesis or Dissertation.**

**10. Departmental Seminar.** Each student must present a seminar in the department to report the results of his or her research. This must be done before the defense, and is typically given on the day of the defense.

**11. Final Examination (Thesis or Dissertation Defense).** When both the student and the major professor are satisfied that the thesis is editorially correct, copies are given to the members of the committee. This should be done several weeks before the examination. Students must realize that committee members will review the thesis only as their schedules permit. Students should plan adequate time for thesis review and revision before their defense, so as to meet the deadlines. The final examination is scheduled with the School of Graduate Studies. The signed appointment form must be submitted to the School of Graduate Studies at least

five days before the defense, by all committee members, verifying that they have read the thesis or dissertation and it is ready to be defended at the scheduled day and time.

The dean of the School of Graduate Studies will appoint one committee member, usually from outside the department, to serve as chair of the final examination. The School of Graduate Studies will also provide forms to be signed by the committee and returned to the School of Graduate Studies at the end of the defense.

**12. Submit Thesis or Dissertation.** After all changes suggested during the defense have been made, the thesis or dissertation is submitted to the departmental thesis reviewer, who will check to ensure that the thesis is in the correct format. The thesis or dissertation is submitted to the School of Graduate Studies for review by the thesis coordinator only after all corrections suggested by the departmental reviewer have been made.

### ***Registration Requirements for Graduate Students***

Once admitted, students are required to maintain enrollment as follows: at least 3 credits to use University facilities and receive direction (including thesis or dissertation direction) from their major professor; at least 6 credits if on a Graduate Teaching or Research Assistantship (9 credits if employed less than 15 hours per week); at least 9 credits if on a Research Fellowship or unsupported; at least 6 credits if receiving tuition waivers, student loans, or other University-administered financial aid; and no more than 6 credits if employed full time by the University.

### ***Financial Assistance***

Some teaching assistantships and research fellowships and many research assistantships are available to graduate students in the Department of Nutrition and Food Sciences. Teaching assistantships are used to cover the teaching needs of the department. Research fellowships and research assistantships are available through individual faculty members. Most research assistantships are tied to specific research projects.

The Gandhi Scholarship is available, on a competitive basis, to support outstanding students during their graduate education in food science. Each incoming student may select any advisor who fits his or her area of interest in food science. Awards are available for entering master's degree students, as well as for PhD candidates. Applications are due February 1. To obtain an application, visit the Department of Nutrition and Food Sciences website or contact the departmental staff.

### ***Career Opportunities***

There is a continuing shortage of MS and PhD graduates in nutrition and food sciences. Many MS graduates go on to obtain a PhD, but all graduates have a wide choice of career opportunities.

### ***Additional Information***

Additional information and updates may be obtained by writing or telephoning the Department of Nutrition and Food Sciences directly or by checking out the departmental website at: <http://www.usu.edu/famlife/nfs/index.html>.

Graduation requirements described in this catalog are subject to change. Students should check with the Department of Nutrition and Food Sciences concerning possible changes.

## *Nutrition and Food Sciences Courses (NFS)*

**NFS 1000. World of Food and Nutrition.** Weekly seminars present and discuss current issues in food, diet, and health. Presentations about food safety and regulations, food processing, and food technologies, with orientation to programs in the Department of Nutrition and Food Sciences. (1 cr) (F)

**NFS 1020 (BLS). Science and Application of Human Nutrition.** Role of dietary choices in providing nutrients and their relationship to the social, mental, and physical well-being of people. How to evaluate nutritional status. Influences on nutrient needs throughout life. (3 cr) (F,Sp,Su)

**NFS 1050. Food Safety Manager Certification.** Covers food safety information required by the Utah Food Safety Manager Certification Act. Includes role of food handlers in controlling food-borne disease, time-temperature, employee hygiene, sanitation methods, preventing contamination from time of purchase to time of serving, food service facilities/equipment, and HACCP. (0.5 cr) (F,Sp,Su)

**NFS 1240. Culinary Basics.** Develops fundamental skills specific to culinary arts. Investigates principles of ingredients and preparation methods. Practice provided in knife skills and cooking methods. Explores the effects of cooking on food quality. (3 cr) (F,Sp,Su)

**NFS 1250. Sanitation and Safety.** Principles of sanitation and safety applied to food operations. Emphasizes personal hygiene habits and food handling practices that protect the health and safety of employees and consumers. (3 cr) (Sp,Su)

**NFS 2020. Nutrition Throughout the Life Cycle.** Application of nutrition principles to the human life cycle: nutrient functions, needs, sources, and alterations during pregnancy, lactation, growth, development, maturation, and aging. Prerequisite: NFS 1020. (3 cr) (Sp)

**NFS 2030. Catering.** Provides skills and knowledge needed for preparing food. Analysis of the preparation of food and beverages for banquet and catering functions. Prerequisites: NFS 1240 and 1250. (3 cr) (F)

**NFS 2050. Ala Carte.** Provides skills and knowledge necessary to apply principles of basic food preparation and service in a restaurant setting. Prerequisites: NFS 1240, 1250, and 2030. (3 cr) (Sp)

**NFS 3000. Beginning Baking.** Introduction to theories and techniques of baking. Focuses on yeast dough production and basic desserts. Prerequisites: NFS 1240, 2030, 2050. (4 cr) (Sp)

**NFS 3020. Nutrition Related to Fitness and Sport.** Includes information on macro/micronutrient metabolism during exercise, specific problems experienced by athletes or highly active persons, myths, ergogenic aids, and current interests. Prerequisite: NFS 1020. (2 cr) (F)

**NFS 3030. Advanced Baking.** Focuses on pastry, advanced dessert preparation and presentation, and related topics. Prerequisite: NFS 3000. (4 cr) (Sp)

**NFS 3060. Garde-Manger.** Emphasizes cold food preparation, presentation techniques, food displays, and meat fabrication. Prerequisite: NFS 2050. (4 cr) (F)

**NFS 3100 (QI). Sensory Evaluation of Food.** Design and implementation of sensory testing of foods. Emphasizes physiology of senses, testing methods, statistical analysis, and taste panel experience. Prerequisite: Stat 3000. (3 cr) (Sp)

**NFS 3110 (DSC). Food, Technology, and Health.** Impact of food technology on food spoilage, food preservation, food quality, and foodborne diseases. Basic processing operations and regulations ensuring a safe food supply. Prerequisite: NFS 1020. (3 cr) (F)

**NFS 3250. Occupational Experience in Nutrition and Food Sciences.** On-the-job training. (1-3 cr) (F,Sp,Su) ®

**NFS 3500. Beverage Management.** Studies in selection and service of beverages for the food service industry. Issues addressed include equipping, staffing, operating, marketing, and purchasing beverages. Addresses issues of responsible alcohol service. (2 cr) (F)

**NFS 3510. The Business of Feeding.** Covers menu design, procurement, and starting the business. (3 cr) (Sp)

**NFS 4020. Advanced Nutrition.** Structures, properties, and metabolism of protein, lipids, carbohydrates, vitamins, and minerals. Includes digestion, absorption, hormonal control, cellular biochemistry, metabolic interrelationships, excretion, etc. Prerequisites: NFS 1020, Chem 3700, Biol 2000. (3 cr) (F)

**NFS 4030. Advanced Nutrition Applications.** Applications of metabolism of protein, lipids, carbohydrates, vitamins, and minerals. Must be taken concurrently with NFS 4020. (1 cr) (F)

**NFS 4050 (CI). Education and Counseling Methods in Dietetics I.** Principles of education, counseling, and communication as applied to the field of nutrition education and clinical dietetics practice. Prerequisite: Junior level in Coordinated or Didactic Program in Dietetics. (2 cr) (F)

**NFS 4060 (CI). Education and Counseling Methods in Dietetics II.** Continuation of NFS 4050. Prerequisite: NFS 4050. (2 cr) (Sp)

**NFS 4070. Experimental Foods.** Science principles underlying modern food theory and practice. Relation of physical and chemical properties of food components and their systems to food preparation. Prerequisite: Chem 1120 or 2300. (4 cr) (Sp)

**NFS 4250. Culinary Skills and Management Rotation.** Internship experience in various food service settings. Specific locations and durations to be arranged by instructor. Prerequisite: Junior standing. (3-6 cr) (F,Sp,Su)

**NFS 4420. Nutrition Research Methodology.** Development of experimental design, data collection, statistical analysis, interpretation, and presentation of results. Clinical, community, and management data analysis. Interpretation and presentation, including bench marking, cost/benefit analysis, and continuous quality improvement projects. Enrollment limited to seniors within the Nutrition and Food Sciences major. Prerequisites: Stat 1040, Math 1050. (2 cr) (Sp)

**NFS 4440 (QI). Fundamentals of Food Engineering.** Engineering concepts taught in a fundamental sense and applied to food processing. Concepts include: general problem solving techniques, material and energy balances, fluid dynamics, heat transfer, refrigeration, and kinetics of common biological processes used in food preparation. Prerequisite: Phys 2110. (4 cr) (F)

**NFS 4480. Community Nutrition.** Introduction to public health nutrition, food programs, and national nutrition monitoring. (3 cr) (F)

**NFS 4540. Nutrition Assessment.** Introduction to the profession of dietetics, assessment of nutritional status, and provision of nutritional care. Prerequisite: Acceptance into dietetics program or junior standing in nutrition science. (3 cr) (F)

**NFS 4550. Clinical Nutrition I.** Biochemical and physiological abnormalities in disease. Medical treatment of disease. Role of medical nutrition therapy. Prerequisites: Acceptance into Coordinated Program in Dietetics or junior standing in Didactic Program, nutrition science, or public health nutrition; Chem 3700. (2 cr) (F)

**NFS 4560 (CI). Clinical Nutrition II.** Continuation of NFS 4550. Prerequisite: NFS 4550. (4 cr) (Sp)

**NFS 4570. Clinical Nutrition Experience I.** Practical experience in health care facilities. Integration and application of material learned in NFS 4550. To be taken

concurrently with NFS 4550. Prerequisite: Acceptance into Coordinated Program in Dietetics. (1 cr) (F)

**NFS 4580. Clinical Nutrition Experience II.** Continuation of NFS 4570. To be taken concurrently with NFS 4560. Prerequisite: NFS 4570. (2 cr) (Sp)

**NFS 4660 (CI). Medical Dietetics.** In-depth study of nutrition relationships in disease development and treatment with clinical experience in medical facilities in Salt Lake City. Prerequisites: NFS 4540, 4550, 4560, 4570, 4580. (12 cr) (F)

**NFS 4710. Quantity Food Preparation.** Principles of food preparation applied to large quantity production, menu planning, food selection, storage, and equipment. Prerequisite: NFS 4070 or consent of instructor. (2 cr) (F)

**NFS 4720. Food Service Organization and Management.** Principles of organization, management theory, financial controls, human and labor relations, employee training, layout, and sanitation. Prerequisite: NFS 4710 or senior-level standing in CA/FSM Program. (2 cr) (Sp)

**NFS 4730. Quantity Food Preparation Lab.** Practical experience in quantity food preparation. Integration and application of NFS 4710. To be taken concurrently with NFS 4710. Prerequisites: NFS 1240 and acceptance into Coordinated Program in Dietetics. (2 cr) (F)

**NFS 4740. Food Service Organization and Management Lab.** Practical experience in food service management. Integration and application of NFS 4720. To be taken concurrently with NFS 4720. Prerequisite: Acceptance into Coordinated Program in Dietetics. (2 cr) (Sp)

**NFS 4750. Management of Dietetics.** Principles of management in dietetics and current practice issues. Prerequisite: NFS 4660. (3 cr) (Sp)

**NFS 4780 (CI). Maternal and Child Nutrition.** Normal and clinical nutritional requirements in pregnancy, lactation, and pediatrics. To be taken in Salt Lake City in conjunction with NFS 4660. (3-4 cr) (F)

**NFS 4810. History and Practices in World Cuisines.** Preparation of foods from around the world, incorporating historical and current food trends. Prerequisites: NFS 3030 and 3060. (4 cr) (Sp)

**NFS 4900. Special Problems.** Individual problems and research problems for upper-division students in Nutrition and Food Sciences. (1-4 cr) (F,Sp,Su)

**NFS 4990. Nutrition and Food Sciences Seminar.** Senior student paper and presentation on current topics in nutrition and food sciences. Prerequisite: Senior in NFS. (1 cr) (Sp)

**NFS 5020 (d6020).<sup>1</sup> Meat Technology and Processing.** Emphasizes understanding the conversion of muscle to meat, fabrication of carcasses into primal and retail cuts, and principles underlying manufacture of processed meats. (4 cr) (F)

**NFS 5030 (d6030). Dairy Technology and Processing.** Processing milk into fluid milk products, cheeses, ice cream, yogurt, concentrated milks, and powders. Identity standards of regulated dairy products. Physical, chemical, and biochemical changes that occur during manufacture and storage. Microbiological, chemical, and physical deterioration and control. (4 cr) (F)

**NFS 5110 (CI) (d6110). Food Microbiology.** Microorganisms in food spoilage, poisoning, preservation, and sanitation. Prerequisite: Biol 3300. (4 cr) (Sp)

**NFS 5120 (QI) (d6120). Biologic Markers of Diet and Disease Risk Lab.** Measurement and interpretation of biologic markers of nutritional status and disease risk. Markers measured in a variety of human tissues. Prerequisites: NFS 1020, Biol 2000, Chem 3700, Math 1210, and Stat 2000. (2 cr) (Sp)

**NFS 5160. Methods in Biotechnology: Cell Culture.** Techniques and fundamental knowledge for culturing mammalian and insect cells. Students will learn maintenance, growing, genetic engineering of cells, cytotoxicity, hybridoma creation, cloning, etc. Extensive laboratory experience is provided. Also taught as ADVS 5160, Biol 5160, Chem 5160, and PSB 5160. (3 cr) (Sp)

**NFS 5200 (d6200). Nutritional Epidemiology.** Introduction to epidemiologic methods and their application to the study of nutrition, human health, and disease. Useful for students with career interests in nutrition, food sciences, dietetics, human health sciences, veterinary sciences, biology, public health, anthropology, social work, and public policy. Prerequisites: Stat 1040, NFS 1020. (2 cr) (Sp)

**NFS 5210 (d6210). Public Health Nutrition.** Effects of diet on development and prevention of disease. Conditions of public health significance, including birth defects, coronary heart disease, hypertension, stroke, Alzheimer's disease and other causes of dementia, cancer, osteoporosis, diabetes, and international health problems. Discussion of health concerns of minority populations, cross-cultural studies, government policy, and establishment of dietary recommendations. Prerequisites: Stat 1040, NFS 1020. (2 cr) (Sp)

**NFS 5220 (d6220). Endocrine Aspects of Nutrition.** Provides physiological background into hormones involved in nutrient regulation, as well as mechanisms of hormone action at the cellular and molecular levels. Includes action of steroids in the nucleus and membrane-based signal transduction pathways. Course includes lectures and literature reviews/presentations. Prerequisites: Chem 3700 and NFS 4020, or consent of instructor. (2 cr) (F)

**NFS 5240. Methods in Biotechnology: Protein Purification Techniques.** Reviews basic methods of protein purification, including scaled-up use of 100L fermenter, large-scale centrifugation, diafiltration, chromatography, and use of BioCAD. Prerequisite: Chem 3700. Also taught as ADVS 5240, Biol 5240, Chem 5240, and PSB 5240. (3 cr) (Sp)

**NFS 5250. Occupational Experiences in Nutrition and Food Sciences.** On-the-job training. (1-3 cr) (F,Sp,Su) ®

**NFS 5260. Methods in Biotechnology: Molecular Cloning.** Laboratory-oriented course designed to teach molecular biology techniques such as DNA cloning, genetic probes, polymerase chain reaction, and DNA sequencing. Prerequisite: Chem 3700 or 5710; or Biol 3200; or permission of instructor. Also taught as ADVS 5260, Biol 5260, Chem 5260, and PSB 5260. (3 cr)

**NFS 5300 (d6300). Advanced Micronutrient Nutrition.** Evolution of micronutrient and application in human health and disease. Prerequisite: NFS 4020. (3 cr) (Sp)

**NFS 5310 (d6310). Molecular Methods in Nutrition Science.** Theory of modern techniques used to study macromolecules and ions. Prerequisite: Chem 3700. (2 cr) (Sp)

**\*\*NFS 5400. Nutrition Update: Present Knowledge.** Enriches and updates knowledge of nutrition, as well as implications for well-being of people, through presentation of recent advances in nutrition accomplished by worldwide research efforts of scientists from academia, government, and industry. Available only through Continuing Education Independent Study Division. (2 cr) ©

**NFS 5500 (QI) (d6500). Food Analysis.** Application and theory of physical, chemical, and instrumental techniques for determination of composition and quality of food. Prerequisite: NFS 5560/6560. (4 cr) (Sp)

**NFS 5510 (d6510). Food Laws and Regulations.** Provides background of federal/state laws and regulations and case law history affecting food production, processing, packaging, marketing, and distribution of food products. (2 cr) (Sp)

**NFS 5560 (d6560). Food Chemistry.** Chemical structure, properties, and reactions and interactions of the important chemical constituents of food. Prerequisites: Chem 3700 and 3710. (4 cr) (F)

**NFS 5610 (d6610). Food and Bioprocess Engineering.** Standardization and compounding of biomaterials and food products; preservation processing using heat, refrigeration, concentration, and dehydration. Basic unit operations in the bioprocessing industry. Prerequisite: BIE 3200. Also taught as BIE 5610/6610. (3 cr) (F)

**\*\*NFS 5630 (d6630). Nutrition in Aging.** Theories of aging and nutrition, as affected by physiologic and metabolic changes. Nutritional requirements and assessment of elderly persons. Implications for nutritional programs, policies, research, and education. Prerequisites: NFS 1020, 2020, Chem 3700. (2 cr) (Sp)

**NFS 5750 (d6750). Advanced Dietetics Practicum.** Advanced dietetics practicum in clinical nutrition, community nutrition, food service management, or research. Prerequisite: NFS 4660 or RD. (1-6 cr) (F,Sp,Su)

**NFS 5760. Senior Practicum in Culinary Arts/Food Service Management.** Practical experience in food service settings, integrating and applying material learned in lectures and laboratories. (2 cr) (F,Sp) ©

**NFS 5920 (CI). Food Product Development.** Capstone course that incorporates and unifies the principles of food chemistry, microbiology, engineering, processing, nutrition, sensory analysis, and statistics. Prerequisite: Senior standing. (3 cr) (F)

**NFS 6020 (d5020). Meat Technology and Processing.** Emphasizes understanding the conversion of muscle to meat, fabrication of carcasses into primal and retail cuts, and principles underlying manufacture of processed meats. (4 cr) (F)

**NFS 6030 (d5030). Dairy Technology and Processing.** Processing milk into fluid milk products, cheeses, ice cream, yogurt, concentrated milks, and powders. Identity standards of regulated dairy products. Physical, chemical, and biochemical changes that occur during manufacture and storage. Microbiological, chemical, and physical deterioration and control. (4 cr) (F)

**NFS 6050. Community Public Health Internship I.** Supervised school nutrition education internship in elementary and secondary public schools developing child nutrition programs. Prerequisite: Acceptance into USU Extension Dietetic Internship Program. (3 cr) (F,Sp,Su)

**NFS 6060. Community Public Health Internship II.** Supervised public health nutrition internship with state and district supplemental food program for women, infants, and children. Prerequisite: Acceptance into USU Extension Dietetic Internship Program. (3 cr) (F,Sp,Su)

**NFS 6100. Sensory Evaluation of Foods.** Methods and practice in the sensory evaluation of foods. Testing facilities/environment, statistical design, testing method selection, and data interpretation. Prerequisite: Stat 3000 or permission of instructor. (3 cr) (Sp)

**NFS 6110 (d5110). Food Microbiology.** Microorganisms in food spoilage, poisoning, preservation, and sanitation. Prerequisite: Biol 3300. (4 cr) (Sp)

**NFS 6120 (d5120). Biologic Markers of Diet and Disease Risk Lab.** Measurement and interpretation of biologic markers of nutritional status and disease risk. Markers measured in a variety of human tissues. Prerequisites: NFS 1020, Biol 2000, Chem 3700, Math 1210, and Stat 2000. (2 cr) (Sp)

**NFS 6140. Biotechnology of Lactic Starter Cultures.** Examination of genetics and microbiology of lactic starter cultures, emphasizing application of biotechnology in strain improvement and design. Prerequisites: Biol 3300, Chem 5700. (2 cr) (Sp)

**NFS 6150. Microbiology of Minimally Processed Foods.** Examines the microbiology of raw foods, rapid microbial detection procedures, and current methods for improving safety and shelf-life in minimally processed foods. Prerequisite: Biol 3300 or equivalent. (3 cr) (F)

**\*NFS 6170. Principles of Food Safety Assurance.** Explores prerequisite programs for HACCP, HACCP implementation, and food safety considerations in new product development. Prerequisite: Biol 3300 or equivalent. (2 cr) (F)

**NFS 6200 (d5200). Nutritional Epidemiology.** Introduction to epidemiologic methods and their application to the study of nutrition, human health, and disease. Useful for students with career interests in nutrition, food sciences, dietetics, human health sciences, veterinary sciences, biology, public health, anthropology, social work, and public policy. Prerequisites: Stat 1040, NFS 1020. (2 cr) (Sp)

**NFS 6210 (d5210). Public Health Nutrition.** Effects of diet on development and prevention of disease. Conditions of public health significance, including birth defects, coronary heart disease, hypertension, stroke, Alzheimer's disease and other causes of dementia, cancer, osteoporosis, diabetes, and international health problems. Discussion of health concerns of minority populations, cross-cultural studies, government policy, and establishment of dietary recommendations. Prerequisites: Stat 1040, NFS 1020. (2 cr) (Sp)

**NFS 6220 (d5220). Endocrine Aspects of Nutrition.** Provides physiological background into hormones involved in nutrient regulation, as well as mechanisms of hormone action at the cellular and molecular levels. Includes action of steroids in the nucleus and membrane-based signal transduction pathways. Course includes lectures and literature reviews/presentations. Prerequisites: Chem 3700 and NFS 4020, or consent of instructor. (2 cr) (F)

**NFS 6250. Clinical Nutrition Internship I.** Supervised clinical nutrition experience including medical, geriatric, long-term care, and oncology. Prerequisite: Acceptance into USU Extension Dietetic Internship Program. (4 cr) (F,Sp,Su)

**NFS 6260. Clinical Nutrition Internship II.** Supervised clinical nutrition experience including nutrition support, renal, pediatrics, intensive care units, outpatient care, and clinical staff experience. Prerequisite: Acceptance into USU Extension Dietetic Internship Program. (4 cr) (F,Sp,Su)

**NFS 6300 (d5300). Advanced Micronutrient Nutrition.** Evolution of micronutrient and application in human health and disease. Prerequisite: NFS 4020. (3 cr) (Sp)

**NFS 6310 (d5310). Molecular Methods in Nutrition Science.** Theory of modern techniques used to study macromolecules and ions. Prerequisite: Chem 3700. (2 cr) (Sp)

**NFS 6350. Food Service Systems Management Internship I.** Supervised school food service internship at Davis School District nutrition services central facility. Includes purchasing, inventory control, food service, and food production. Prerequisite: Acceptance into USU Extension Dietetic Internship Program. (6 cr) (F,Sp,Su)

**NFS 6360. Food Service Systems Management Internship II.** Supervised school food service internship at Davis School District nutrition services central facility. Includes administration and food service staff supervision experience. Prerequisite: Acceptance into USU Extension Dietetic Internship Program. (6 cr) (F,Sp,Su)

**NFS 6450. Meat Science.** Structure of muscle tissue, chemistry of contraction and relaxation, factors affecting meat tenderness, and postmortem changes and their effect on meat quality. Prerequisite: Chem 3700. (3 cr) (Su)

**NFS 6500 (d5500). Food Analysis.** Application and theory of physical, chemical, and instrumental techniques for determination of composition and quality of food. Prerequisite: NFS 6560/5560. (4 cr) (Sp)

**NFS 6510 (d5510). Food Laws and Regulations.** Provides background of federal/state laws and regulations and case law history affecting food production, processing, packaging, marketing, and distribution of food products. (2 cr) (Sp)

**NFS 6560 (d5560). Food Chemistry.** Chemical structure, properties, and reactions and interactions of the important chemical constituents of food. Prerequisites: Chem 3700 and 3710. (4 cr) (F)

**\*NFS 6600. Food Proteins and Enzymes.** Protein structure, folding, and purification; enzyme classification and nomenclature; reaction kinetics; and immobilization technology as applicable to food science. (3 cr) (F)

**NFS 6610 (d5610). Food and Bioprocess Engineering.** Standardization and compounding of biomaterials and food products; preservation processing using heat, refrigeration, concentration, and dehydration. Basic unit operations in the bioprocessing industry. Prerequisite: BIE 3200. Also taught as BIE 6610/5610. (3 cr) (F)

**\*\*NFS 6630 (d5630). Nutrition in Aging.** Theories of aging and nutrition, as affected by physiologic and metabolic changes. Nutritional requirements and assessment of elderly persons. Implications for nutritional programs, policies, research, and education. Prerequisites: NFS 1020, 2020, Chem 3700. (2 cr) (Sp)

**NFS 6750 (d5750). Advanced Dietetics Practicum.** Advanced dietetics practicum in clinical nutrition, community nutrition, food service management, or research. Prerequisite: NFS 4660 or RD. (1-6 cr) (F,Sp,Su)

**NFS 6760. Special Topics in Food Science.** Selected topics in food science, based on individual faculty interests. (1-3 cr) (F,Sp,Su)

**NFS 6770 (d7770). Special Topics in Nutrition.** Study of selected topics in nutrition, including reports on current advances and presentation of nutrition support topics (case studies) developed through research. (2 cr) (F,Sp)

**NFS 6780. Advanced Institutional Food Service Management.** Principles of management applied to institutional food services and advanced professional certification curriculum. To enroll, student must be an MS candidate in dietetics or be eligible to take the national SFNS (School Food and Nutrition Service) exam. (3 cr) (Sp)

**NFS 6900. Special Problems.** Individual problems and research problems for upper-division students in Nutrition and Food Sciences. (1-4 cr) (F,Sp,Su)

**NFS 6970. Thesis Research.** For students working on MS research. (1-12 cr) (F,Sp,Su) ®

**NFS 6990. Continuing Graduate Advisement.** (1-12 cr) (F,Sp,Su) ®

**\*\*NFS 7700. Dairy Chemistry.** Chemical structure, properties, biosynthesis, and reactions of the main constituents in milk. Application of this knowledge in the development and processing of foods. (2 cr) (F)

**NFS 7770 (d6770). Special Topics in Nutrition.** Study of selected topics in nutrition, including reports on current advances and presentation of nutrition support topics (case studies) developed through research. (2 cr) (F,Sp)

**NFS 7800. Seminar.** Reports and discussion on research and current literature. (1 cr) (F,Sp) ®

**NFS 7970. Dissertation Research.** For students working on PhD research. (1-12 cr) (F,Sp,Su) ®

**NFS 7990. Continuing Graduate Advisement.** (1-12 cr) (F,Sp,Su) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

## Department of *Physics*

### College of Science

**Head: Professor** *W. John Raitt*, space plasma physics  
Office in Science Engineering Research 250A, (435) 797-2848

**Assistant Head: Professor** *David Peak*, nonlinear dynamics, complex materials

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**Professors** *J. R. Dennison*, surface physics; *W. Farrell Edwards*, electrical and fundamental interactions; *Bela G. Fejer*, upper atmospheric physics; *Robert W. Schunk*, space plasma physics; *Jan J. Sojka*, atmospheric and space physics; *Vincent B. Wickwar*, atmospheric and space physics; **Research Professors** *F. Tom Berkey*, atmospheric and space physics; *Kent L. Miller*, atmospheric physics; *Thomas D. Wilkerson*, atmospheric and space physics; **Adjunct Professors** *Stephen E. Bialkowski*, nonlinear optics and laser spectroscopy; *Yeaton H. Clifton*, mathematical physics; *Allen Q. Howard*, electromagnetic theory; *R. Gilbert Moore*, space physics; *Linda S. Powers*, biophysics; *David Rees*, atmospheric physics; *Ray W. Russell*, astronomy; *Wolfgang Schmickler*, surface physics; *Neal D. Shinn*, surface interface physics; *John R. Tucker*, device physics and super conductivity; **Professors Emeriti** *Eastman N. Hatch*, nuclear physics; *Don L. Lind*, space physics; *V. Gordon Lind*, medium energy nuclear physics; *William R. Pendleton, Jr.*, atomic and molecular processes; *John K. Wood*, spectroscopy; **Research Professor Emeritus** *Wilford N. Hansen*, reflection spectroscopy, surface physics; **Associate Professors** *D. Mark Riffe*, surface physics; *Tsung-Cheng Shen*, surface physics; *Michael J. Taylor*, atmospheric and space physics; *Charles G. Torre*, mathematical physics and general relativity; *James T. Wheeler*, mathematical physics and general relativity; **Research Associate Professors** *Abdallah R. Barakat*, space plasma physics; *Howard G. Demars*, space physics; *J. Steven Hansen*, space physics; *Lie Zhu*, space physics; **Adjunct Associate Professors** *I. Lee Davis*, condensed matter physics; *James S. Dyer*, space contamination and outgassing; *Ti-Ze Ma*, space plasma physics; *Jill A. Marshall*, physics education; *Joseph W. Moody*, astronomy; *David J. Vieira*, nuclear physics; *Vladimir Zavyalov*, condensed matter physics; **Associate Professor Emeritus** *Robert E. McAdams*, medium energy nuclear physics; **Assistant Professor** *Eric D. Held*, plasma physics; **Adjunct Assistant Professor** *Greg M. Swain*, surface chemistry

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), and Doctor of Philosophy (PhD) in Physics; BS and BA in Physics Teaching; BS and BA in Composite Teaching—Physical Science (Physics)

**Undergraduate emphases:** *BS*—Professional Emphasis or Applied Emphasis; **Graduate specializations:** *MS*—Upper Atmospheric Physics; *PhD*—Electromagnetic and Plasma Theory, Space Science, Surface Physics, and Theoretical Physics

## Undergraduate Programs

### Objectives

The Physics Department embraces undergraduate students from all quarters of the University—in introductory courses required for majors by various departments, in courses for more general audiences that are part of the University Studies Program, and in upper-level courses designed primarily to fulfill bachelor's degree requirements in Physics. These courses, and the degree programs offered, are strongly impacted by the department's central goals:

1. to communicate the beauty and utility of the fundamental principles of the physical universe and the power of describing nature in quantitative terms,
2. to create new knowledge,
3. to foster critical and creative thinking,
4. to enhance the ability of citizens to participate in a technological democracy,
5. to assist in the preparation of elementary and secondary school teachers,

6. to provide opportunities for students to sharpen their communication and interpersonal skills, and

7. to develop new tools and texts to improve physics pedagogy.

The degree programs of the department are constructed to be rigorous, yet flexible, and are intended to help students prepare for careers in academia, government and industrial laboratories, medicine, law, teaching, and business. Required course and laboratory work in these programs carefully balances theory and experiment. Because the department believes that one must participate in discovery to understand science, undergraduates are encouraged to engage in departmental research early in their studies, and a formal research experience is integral to most departmental programs. The department's Get Away Special activities provide excellent opportunities for students of all backgrounds to participate in space related research.

### Requirements

**Departmental Admission and Graduation Requirements.** New freshmen admitted to USU in good standing qualify for admission to the degree programs in Physics. Admission in good standing for students transferring from another institution requires

a minimum transfer GPA of 2.2, while students transferring from another USU major are required to have a minimum total GPA of 2.0. Students wishing to complete the Teaching Major in Physics must apply for admission to the Secondary Education program as well. Requirements for admission to the **Secondary Teacher Education Program (STEP)** include a minimum GPA of 2.75 in either Phyx 2110 and 2120, or Phyx 2210 and 2220; and at least 60 total credits completed with a minimum GPA of 2.75. A Composite Teaching Major in Physical Science is available through either the Physics or the Chemistry and Biochemistry departments. Students applying for admission to the STEP with the Composite major must satisfy the latter requirements, plus a minimum GPA of 2.75 in Chem 1210, 1220, 1230, and 1240.

Students may use no more than one course with the *P-D-F* option to satisfy a major or minor requirement in Physics. All other courses used to satisfy major or minor requirements must be completed with at least a C- grade, and the total GPA in all required Physics courses must be at least 2.3. The Teaching Major and Teaching Minor in Physics and the Composite Teaching Major in Physical Science require a 2.75 minimum GPA in Physics courses and a minimum 2.75 overall GPA for graduation.

**College of Science Requirements.** The College of Science requires a year of mathematics (8 credits) and a year sequence in science (6-8 credits) for all of its majors. For Physics majors, the College of Science requirements are Math 1210 and 1220; and one of the following pairs of courses: Biol 1210 and 1220, Chem 1210 and 1220, or Geol 1150 and 3200.

**Bachelor's Degrees and Core Requirements.** The Physics Department awards the following degrees: BS in Physics, BA in Physics, BS in Physics with a Professional Emphasis, BS in Physics with an Applied Emphasis, BS in Mathematics and Physics Dual Major Option, BS in Physics Teaching, and BS in Composite Teaching—Physical Science.

Except for the two Teaching Majors, all degrees require a **common core**: College of Science requirements; Math 2210; Phyx 2210 and 2220 (preferred) or Phyx 2110 and 2120; Phyx 2500, 2710, 3550, 3600, 3870, and 4900. The specific requirements beyond this core for the various bachelor degrees are:

**1. Bachelor of Science in Physics:** Math 2250; Phyx 3650 or 3700; 8 credits in Physics at the 3500 level and above (excluding USU Depth courses).

**2. Bachelor of Arts in Physics:** University language requirements; Math 2250; 6 credits in Physics at the 3500 level and above (excluding USU Depth courses); Phil 4310, 4320.

**3. Bachelor of Science in Physics with a Professional Emphasis:** Math 2250; Phyx 3650, 3700, 3750, 3880, 4550, 4600, 4700, 4710, 4900.

**4. Bachelor of Science in Physics with an Applied Emphasis:** Math 2250; Phyx 3650, 3700, 3880; 12 credits in other technical departments at the 3000 level or above (excluding USU Depth courses). The latter courses must have a coherent theme and must be approved by the Physics advisor.

**5. Mathematics and Physics Dual Major Option:** Math 2270, 2280, 4200, 4310, 5210, 5710; 6 credits in Mathematics above the 4600 level, excluding Math 5570 and 5580 (Actuarial Math I and II); Phyx 3650 or 3700; 8 credits in Physics at the 3500 level and above (excluding USU Depth courses).

**Minor in Physics.** Majors in other departments may obtain a minor in Physics by successfully completing Phyx 2110 and 2120, or Phyx 2210 and 2220; plus 10 additional credits selected from Phyx courses at the 2500 level and above (not to include Phyx courses designated as USU Depth courses). Note that Math 1100 or 1210 is a prerequisite for Phyx 2110, Math 1210 is a prerequisite for Phyx 2210, and Math 1220 is a prerequisite for Phyx 2710.

**Bachelor of Science in Physics Teaching.** Courses required for the Bachelor of Science in Physics Teaching are: College of Science requirements; Math 1210, 1220, 2250; Stat 3000; Phyx 2210 and 2220 (preferred) or Phyx 2110 and 2120; Phyx 1000, 2500, 2710, 3550, 3870; 5 credits in Physics above the 3000 level (including USU Depth courses); Sci 4300; and 6 credits in science, with 3 in each of the two areas not covered by the College of Science science sequence requirement. Students seeking this degree must complete the requirements for the **Secondary Teacher Education Program (STEP)**.

**Teaching Minor in Physics.** Students who complete the Secondary Teacher Education Program (STEP) are eligible to obtain a Teaching Minor in Physics by successfully completing Phyx 2110 and 2120, or Phyx 2210 and 2220; Phyx 1000; 6 additional credits in Physics chosen from Phyx 2500 and/or courses above the 3000 level (including USU Depth courses); Sci 4300 or, if Sci 4300 is required by the student's major, 2 credits in science (not including Physics) not required by the major. Note that Math 1100 or 1210 is a prerequisite for Phyx 2110, Math 1210 is a prerequisite for Phyx 2210, and Math 1220 is a prerequisite for Phyx 2710.

**Bachelor of Science in Composite Teaching—Physical Science.** Courses required for the Bachelor of Science in Composite Teaching—Physical Science are: Math 1210, 1220; Stat 3000; Phyx 2210 and 2220 (preferred), or Phyx 2110 and 2120; Phyx 1000, 1030 or 3030; 5 credits in Physics from Phyx courses at the 2500 level and above (including USU Depth courses); Chem 1210, 1220, 1230, 1240, 2300 or 2310, 2330; Biol 1010; Geol 1150; Bmet 2000; and Sci 4300. Students seeking this degree must complete the requirements for the **Secondary Teacher Education Program (STEP)**.

### **Additional Information**

Information concerning degree programs, recommended schedules of courses, career opportunities, and opportunities to participate in the Get Away Special activities and in other areas of undergraduate research may be obtained by consulting the Physics advisor in SER 250. Also see the department's website at:

<http://www.physics.usu.edu/>

### **Financial Support**

The Physics Department has several small scholarship funds available for physics majors with excellent academic records. In addition, there are a number of Get Away Special (GAS) scholarships for students interested in designing and constructing experiments to be flown on the Space Shuttle and in participating in other GAS activities. Inquiries should be made with the Physics advisor in SER 250.

## Graduate Programs

### Admission Requirements

In addition to the general requirements for admission established by the School of Graduate Studies (see pages 72-73), the department admission committee bases its decisions for offering admission on the following criteria: review of applicants' undergraduate records, letters of recommendation, performance in graduate courses (if any), performance in research (if any), and scores on the General portion of the Graduate Record Examination. Students whose native language is not English are strongly encouraged to submit to the School of Graduate Studies results of the Test of Spoken English (TSE). Regardless, nonnative English speakers must submit a score for the Test of English as a Foreign Language (TOEFL). If a satisfactory score on the TSE is not provided, such students will be required to take a test given by the Intensive English Language Institute (IELI) at USU. The purpose of this test is to guide the selection of remedial language courses, if needed, to help with physics coursework comprehension. (See also *Financial Assistance*, page 389.)

### Placement

Prior to registering for graduate courses for the first time, each student will consult with the Graduate Student Tracking Committee and the departmental advisor. Based on these discussions, the student will be advised to register for courses in either the Physics Department standard curriculum or advanced curriculum. Continuing advisement concerning courses will be provided by the Graduate Student Tracking Committee, the departmental advisor, and the student's graduate supervisory committee.

### Qualification Requirements

Each student enrolled in the PhD program will be evaluated for qualification for PhD work. Consideration of qualification will occur no later than the end of the second semester after the student has been admitted for study in the PhD program and has taken a first graduate course in physics. Evaluation will be based on whatever relevant information the student wishes to have presented on his or her behalf (coursework, research, TA performance, subject GRE, etc.), but must include a faculty evaluation of coursework in physics for courses taken at USU. Normally, the student should present the results of at least four physics courses. Students admitted to the PhD program with considerable coursework from another institution, who have not taken at least four courses in physics at USU, must present a qualification seminar to the Department of Physics on research he or she has done during the preceding year at USU. Based on the various pieces of information presented on behalf of the student, the department will judge whether or not the student is qualified to continue in the PhD program. If not, a student already having an MS in physics from USU will be asked to leave. A student without an MS in physics from USU will be invited to finish his or her MS degree. Upon completion, the student can reapply to the PhD program, but acceptance will be contingent on the evaluation of the student's graduate work to that point.

### Degree Programs

**Master of Science.** In addition to the above general requirements, students completing a Plan A MS degree must complete

four of the ten required PhD courses listed below (see Doctor of Philosophy). Plan B MS students must complete five of the ten courses, and Plan C MS students must complete six of the ten courses. The student must also submit and orally defend either a thesis (Plan A) or a research report (Plan B) at the discretion of the student's supervisory committee. Plan A and Plan B MS candidates must present a colloquium to the department on the research topic during the time the thesis or research report is being written. The department also accepts Plan C, which has no research component. For Plan C, the student must complete 33 credits of graduate-level classwork, the composition of which shall include the required courses listed above. In addition, the student must present a seminar and a paper to his or her supervisory committee on a topic related to educational or managerial aspects of physics graduate education, which is chosen by his or her supervisory committee.

**Master of Science (Upper Atmospheric Physics Specialization).** The department offers a specialization in Upper Atmospheric Physics for MS students. This degree is a Plan A MS. In consultation with his or her advisor, the student selects a minimum of 18 credits of classwork from the following courses: Phyx 4600, 6240, 6310, 6320, 6330, 6340, 7210, 7500; 3 to 6 additional credits may be chosen from courses in electrical engineering, computer science, mathematics, and biometeorology. The student may gain from 6 to 12 credits by research, to be written up as a thesis that must be defended orally. In addition, the student must present a colloquium on the topic of his or her research.

**Doctor of Philosophy.** In addition to the general requirements, a total of 10 courses (30 credits) are required for all PhD students. The required courses are: Phyx 5340, 5350, 6010, 6110, 6210, and 6410; one State of Matter course; one Advanced Laboratory course; and two courses in Advanced Topics. The State of Matter requirement can be fulfilled by taking any one of Phyx 6330, 6530, or 6930. The Advanced Laboratory requirement can be fulfilled with either Phyx 5870 or 7210. This requirement may also be fulfilled with Phyx 7500, as long as Phyx 7500 consists of a hands-on experience with advanced instrumentation and with department head approval. These courses must be completed no more than one year after PhD qualification. The student must also take an oral candidacy examination, consisting of a presentation made by the student, then followed by questions from departmental faculty. The presentation and questions will be based upon a research topic set by the student's supervisory committee. The candidacy oral examination will normally occur no later than the fifth semester after the student begins graduate coursework. The student will have at least two months to prepare for the examination.

The student must also complete a research dissertation and give an oral defense of the dissertation. Furthermore, the PhD candidate is expected to give two colloquia to the department. The first of these will normally be given at the time of submission of the research proposal, with the other given at the time the dissertation is completed.

### Research

**Space Science.** The Physics Department is active in the field of atmospheric and space science, in close association with the interdisciplinary Center for Atmospheric and Space Sciences and the Space Dynamics Laboratory. Atmospheric and space science involves many areas of physics, in addition to such disciplines as engineering, chemistry, and meteorology. At USU, these groups enjoy a strong cooperative relationship and, as a result, the atmo-

spheric and space science program has flourished for many years. Once the departmental requirements have been met, students may select courses from the offerings of the associated departments suited for their particular interests and needs while they gain research experience on challenging problems in atmospheric and space science. Opportunities are available for students in both experimental and theoretical projects. These include participation in instrument development and data analysis related to rocket, satellite, and space shuttle projects and projects in experimental design and data analysis related to incoherent-scatter and coherent radars, ground-based magnetometer, and ground-based optical instruments including a LIDAR system. Opportunities also exist in theoretical modeling of physical processes occurring in both the neutral atmosphere and in the plasma in the solar-terrestrial environment.

**Electromagnetic and Plasma Theory.** The study of perfect conductors in the presence of magnetic fields has interesting applications to space plasmas, and illuminates certain properties of quantum fluids such as superconductors. Using minimum energy principles, researchers attempt to model magnetic structures such as flux ropes near Venus, filaments in the solar corona, and fluxoids in super conductors.

**Surface Physics.** The surface physics group has an active experimental research program studying the structure, growth, dynamics, electronic properties, and optical properties of surfaces, interfaces, and adsorbed layers. The group has expertise in the interactions of electrons, ions, and photons with materials. Experimental techniques used within the group include atomic force microscopy (AFM), Auger electron spectroscopy (AES), infrared spectroscopy, ion scattering spectroscopy, ion implantation, low-energy electron diffraction (LEED), photoemission spectroscopy, scanning electron microscopy (SEM), scanning tunneling microscopy (STM), secondary ion mass spectroscopy (SIMS), thermal deflection spectroscopy, ultrafast femtosecond laser spectroscopy, vapor pressure adsorption isotherms, and x-ray diffraction. This interdisciplinary research brings together the fields of solid-state physics, surface physics and chemistry, optics, physical chemistry, and electrochemistry through active collaborations between Physics, Chemistry and Biochemistry, Mechanical and Aerospace Engineering, and other departments. It includes both basic and applied research.

**Physics of Quantum Devices.** The rapid advance of technology has made quantum physics an indispensable foundation of the nanoscale devices. The Physics Department is positioned to explore this new field with two complementary research themes. The first theme is to study the growth of novel electronic/photonic materials involving group III-VII elements. Bulk and surface analytic tools will be used to characterize the materials. This part of the research is currently under development. The second theme is to use the most advanced surface science techniques to fabricate nanoscale structures on semiconductor surfaces. The interdisciplinary nature of this field provides a stimulating research environment for faculty and students with backgrounds in physics, electrical engineering, material sciences, and chemistry.

**Theoretical Physics.** The department maintains an active research program in theoretical physics via its Field Theory Group. The principal focus of this group is on unified field theories, gravitational theory, classical and quantum field theory, and geometric

methods in mathematical physics. Current research projects include: conformal and scale invariant gravity theories and unified field theories, Weyl-geometric quantization, exact solutions in Gauss-Bonnet extended gravity, classical and quantum dynamics of the gravitational field, symmetries and conservation laws in relativistic field theories, Lagrangian and Hamiltonian formulation of field theory, and application of geometrical methods in physics. Weekly seminars and ongoing collaborations with members of the USU Mathematics and Statistics Department and the University of Utah Physics Department provide an active research environment that allows for substantial interaction between students and faculty.

**Physics Education.** The USU Physics Department is engaged in the study of how to improve the teaching and learning of physics. The program currently emphasizes introductory and general education courses and involves development of hands-on, inquiry-based curricula for lecture and laboratory, development of associated laboratory and multimedia equipment and modules, preparation of new texts and workbooks, sponsorship of undergraduate research, and outreach to the pre-college community.

**Complex Materials and Dynamics.** Current work at USU in the interdisciplinary area of complex systems includes theoretical and experimental studies of the physical properties of granular materials, development of new data analysis techniques for uncovering evidence for determinism in erratic signals, and identification and implementation of perturbative methods for controlling complex behavior in electrical circuits, spatially extended systems (such as flames), and in wildlife populations.

### *Financial Assistance*

Financial assistance in the form of teaching assistantships and fellowships is awarded by the department. Research assistantships are available from research groups or individuals. Some support for teaching laboratory sections or grading papers is available. To be eligible for a teaching assistantship (TA), a student must successfully complete a graduate TA workshop. Nonnative English-speaking students must pass a test of spoken English (or submit a satisfactory TSE score) administered by the Intensive English Language Institute before being admitted to the TA workshop. The MS specialization in Upper Atmospheric Physics is a Western Regional Graduate Program (see page 71).

### *Career Opportunities*

Master's degree holders in physics are generally employed by industrial or government laboratories as either physicists or engineers. Some are hired as teachers by high schools and by two-year colleges. Holders of the PhD in physics will generally be hired as research and development physicists by industrial or government laboratories and as professors in universities (though usually only following an appointment as a postdoctoral fellow for one to three years).

### *Additional Information*

Regularly updated information about Physics Department activities and programs may be obtained via the Web at: <http://www.physics.usu.edu/>.

## Physics Courses (Phyx)

**Phyx 1000 (BPS). Introductory Astronomy.** Exploration of solar system and universe. Laws of motion, fundamental interactions, structure of matter, electromagnetic radiation, and conceptual models of celestial motions. Conceptual and quantitative homework problems and exams, along with writing assignments and observation reports, are required. Facility with high school mathematics is expected. (3 cr)

**Phyx 1020 (BPS). Energy.** Study of energy resources, utilization, conversion, and conservation, including energy balance and flow in biological and geological systems. Social impacts of energy resource development, including public policy and planning. Prerequisites: At least one university-level mathematics or statistics course, and completion of computer and information literacy examination. (3 cr)

**Phyx 1030 (BPS). Intelligent Life in the Universe.** Study of the likelihood of extraterrestrial intelligence and its probable locations. Nature and evolution of life on Earth, as well as stellar evolution and planetary environments. Discussion of psychology of UFO phenomena. Prerequisites: At least one university-level mathematics or statistics course, and completion of computer and information literacy examination. (3 cr)

**Phyx 1040. From Atoms to Ants.** Examines structure and organization of matter, from the small to the large, and inquires into how such seemingly nonphysical phenomena as living, social, and mental activity may be related to the behavior of the atom. Extensive use of computer simulations to explore aspects of the material. Knowledge of programming not required. Cannot be taken for University Studies credit. Prerequisites: At least one university-level mathematics or statistics course, and completion of computer and information literacy examination. (3 cr)

**Phyx 1100 (BPS). Great Ideas in Physics.** Descriptive introduction to the principles underlying contemporary physics. Great ideas will include relativity and quantum mechanics and such consequences and applications as the twin paradox, black holes, nuclear energy, magnetic imaging, lasers, superconductivity, and the paradox of Schrodinger's cat. Facility with high school algebra is expected. (3 cr)

**Phyx 1200 (BPS). Introduction to Physics by Hands-on Exploration.** Explores structure of matter, electricity and magnetism, light, and sound through hands-on, inquiry-based activities. Facility with high school algebra is expected. Required laboratory. (4 cr)

**Phyx 1800 (BPS). Physics of Technology.** Overview of the classical physics on which industrial technology is based. Elements of kinematics, forces, energy, momentum, thermodynamics, electric and magnetic fields, waves, and optics. Required laboratory. Prerequisites: Math 1050 and 1060. (4 cr)

**Phyx 2110. The Physics of Living Systems I.** Study of kinematics and dynamics of particles and systems of particles. Introduction to Newton's Laws of motion, momentum and energy conservation, rotations, and thermodynamics, with applications in biology and biotechnology. Required recitation and lab. Prerequisite: Math 1100 or 1210. (4 cr)

**Phyx 2120 (BPS). The Physics of Living Systems II.** Introduction to electromagnetism, optics, and quantum phenomena—including the microscopic structure of matter, with applications in biology and biotechnology. Required recitation and lab. Prerequisite: Math 1100 or 1210, Phyx 2110. (4 cr)

**Phyx 2200. Elements of Mechanics.** Calculus-based introduction to particle mechanics. Kinematics, Newton's laws of motion, momentum, work and energy, and angular momentum. Required recitation and lab. Prerequisite: Math 1210. (2 cr)

**Phyx 2210 (QI). General Physics—Science and Engineering I.** Calculus-based introduction to Newton's Laws of motion, momentum and energy conservation, rotations, oscillations, and thermodynamics, with applications in the physical sciences and technology. Required recitation and lab. Prerequisite: Math 1210. (4 cr)

**Phyx 2220 (QI). General Physics—Science and Engineering II.** Calculus-based introduction to electromagnetism, waves, optics, and modern physics, with applications in the physical sciences and technology. Required recitation and lab. Prerequisite:

sites: Math 1210; Phyx 2200 or 2210, *or* a minimum score of 4 on the AP B exam, *or* a minimum score of 3 on the AP C (mechanics) exam. (4 cr)

**Phyx 2500. Introduction to Computer Methods in Physics.** Introduction to computer assistance in physics. Topics include: (1) use of numerical, graphical, and symbolic manipulation software to solve physics problems; and (2) interfacing computers to instrumentation for control and data acquisition. Prerequisite: Phyx 2110 or 2210 or 2220. (2 cr)

**Phyx 2710. Introductory Modern Physics.** Overview of modern physics at the intermediate level. Focuses on principles and applications of relativity and quantum mechanics, including a discussion of atomic, solid state, and particle physics. Prerequisites: Math 1220, Phyx 2120 or 2220. (3 cr)

**Phyx 3010 (QI, DSC). Space Exploration from Earth to the Solar System.** Comparative introduction to the Earth and other planets in our solar system, including geological structure and atmosphere. Emphasis on space exploration methods, including spacecraft and detection instrumentation. Examines latest results of Mars missions, Jupiter and Saturn exploration, etc. Prerequisite: Completion of quantitative literacy and physical sciences breadth. (3 cr)

**Phyx 3020 (DSC). Great Scientists.** Lives and work of men and women responsible for scientific revolution: Maxwell (loved children), Einstein (despised authority), Curie (suffered discrimination against women), Schrodinger (fled from Hitler), Watson and Crick (the DNA story), Feynman (lock picker), Rubin (as a young girl built her own telescope), and others. Prerequisite: USU 1350. (3 cr)

**Phyx 3030 (QI, DSC). The Universe.** Study of properties and origin of the universe, based on Einstein's theory of gravity. Topics include curved space-time; black holes, white holes, and worm holes; the big bang; multiple universes; and the births of stars, galaxies, heavy atoms, and planets. Prerequisite: Completion of quantitative literacy and Phyx 1000. (3 cr)

**Phyx 3040 (QI). Space Weather—Dangers to the High-Tech World.** Space weather can be as destructive to high technology as ordinary weather is to property and crops. Examines increasing vulnerability of society to events in space resulting from changes on the Sun and from human activity. Explores how we learn about space weather with satellites, radars, lidars, and numerical models. Prerequisite: Completion of quantitative literacy and physical sciences breadth. (3 cr)

**Phyx 3500. Topics in Physics (Topic).** Introduces and explores issues in contemporary physics at intermediate undergraduate level. Focuses on phenomena and experimental methods. Prerequisite: Phyx 2710. (1-3 cr) ®

**Phyx 3550. Intermediate Classical Mechanics.** Newton's laws of motion, accelerated reference frames, work and energy, systems of particles, rigid body rotation, central force problem, and harmonic oscillations. Prerequisites: Phyx 2710, Math 2210; Math 2250 (may be taken concurrently). (3 cr)

**Phyx 3600. Intermediate Electromagnetism.** Electrostatics, electric potential, current, magnetostatics, induction, AC circuits, Maxwell's equations, and electromagnetic waves. Prerequisites: Phyx 2710, Math 2210; Math 2250 (may be taken concurrently). (3 cr)

**Phyx 3650. Optics.** Geometric optics, interference, diffraction, aberration, polarization, and topics in contemporary optics. Prerequisite: Phyx 2710. (3 cr)

**Phyx 3700. Thermal Physics.** Rigorous treatment of laws of thermodynamics and statistical mechanics. Concepts of work, temperature, heat, energy, and entropy; and their application to reversible and irreversible processes. Criteria for equilibrium. Prerequisite: Phyx 2710. (3 cr)

**Phyx 3750. Foundations of Wave Phenomena.** Survey of wave phenomena in physics, with emphasis on application of mathematical techniques to the wave equation, Schrodinger equation, and Maxwell equations. Prerequisites: Phyx 2710, Math 2210; Math 2250 (may be taken concurrently). (3 cr)

**Phyx 3870 (CI). Intermediate Laboratory I.** Modern experimental techniques, data and error analysis, experimental design, and communication skills. Exercises complement upper-level theory courses, and include some experiments of historical importance. Prerequisite: Phyx 2500. (2 cr)

**Phyx 3880 (CI). Intermediate Laboratory II.** Continuation of Phyx 3870. Prerequisite: Phyx 3870. (2 cr)

**Phyx 3900. Projects in Physics.** Individual study pursued under direction of staff member. Prior to registration, arrangements must be made by student with appropriate staff member. (1-3 cr) ®

**Phyx 4010 (QI, DSC). Chaos Under Control.** Introduction to principles and applications of new sciences of fractals, chaos, and complexity. Importance of describing physical, geological, biological, and natural resource structures with fractals. Practical benefits of understanding and controlling erratic behavior in physical and living systems. Technological consequences of self-organized, adaptive behavior. Prerequisite: Completion of quantitative literacy and physical sciences breadth. (3 cr)

**Phyx 4020 (QI, DSC). Nature, Art, and Music.** Explores how nature constrains production and appreciation of visual and auditory art. Relevance to art of: physics of sound and light, perspective and observer in relativity and quantum mechanics, symmetry, fractals, chaos, complex adaptive behavior, and self-organization. Prerequisites: Completion of computer and information literacy examination, quantitative literacy, and physical sciences breadth requirements. (3 cr)

**Phyx 4250 (CI). Cooperative Work Experience.** Planned work experience in industry or national laboratories. A detailed plan and the purpose of the experience must have prior approval. A written report is required. Prerequisite: Phyx 2710. (1-6 cr) ®

**Phyx 4550. Advanced Classical Mechanics.** Lagrange's equations, Liouville's theorem, continua, Euler's equations, small vibrations, and special relativity. Prerequisites: Phyx 3550, 3750. (3 cr)

**Phyx 4600. Advanced Electromagnetism.** Potential formulations of electrodynamics, energy and momentum, waves and boundary conditions, waves in dielectrics and conductors, guided waves, dipole radiation, and relativistic electrodynamics. Prerequisites: Phyx 3600, 4550. (3 cr)

**Phyx 4700. Quantum Mechanics I.** Principles of quantum mechanics, operators in Hilbert space, matrix mechanics, angular momentum, spin, perturbation theory, and applications. Prerequisites: Phyx 3550, 3600, 3750. (3 cr)

**Phyx 4710. Quantum Mechanics II.** Continuation of Phyx 4700. Prerequisite: Phyx 4700. (3 cr)

**Phyx 4900 (CI). Research in Physics.** Research experience pursued with faculty mentor. Prior to registration, student must make arrangements with the Physics Department's undergraduate research advisor. Prerequisite: Phyx 2710. (1-3 cr) ®

**Phyx 5050. Biophysics of Radiological Health.** Brings together sciences relating to nuclear biophysics. Prepares students to be aware of radiological hazards, to safely use radioactive materials, and to comply with relevant laws. Prerequisites: Biol 1210, 1220, Chem 1210, 1220, a physics course, and senior standing. Also taught as Biol 5050. (3 cr)

**Phyx 5340. Methods of Theoretical Physics I.** Physics applications of vector calculus and differential geometry, group theory, infinite series, complex analysis, differential equations, Sturm-Liouville theory, orthogonal functions, integral equations, and the calculus of variations. (3 cr)

**Phyx 5350. Methods of Theoretical Physics II.** Continuation of Phyx 5340. Prerequisite: Phyx 5340. (3 cr)

**Phyx 5500. Intermediate Topics in Physics (Topic).** Explores issues in contemporary physics at the advanced undergraduate and beginning graduate level. (1-3 cr) ®

**Phyx 5800. Physics Colloquium.** A series of invited lectures on specialized topics in physics and related subjects. (1 cr) ®

**Phyx 5870 (CI). Advanced Laboratory.** Experimental experience with such modern techniques as scanning tunneling microscopy, LEED, Auger spectroscopy, and Fourier transform infrared spectroscopy. Prerequisite: Phyx 2710. (3 cr)

**Phyx 6010. Classical Mechanics I.** Lagrange's equations, Hamilton's principle, Hamilton's equations, canonical transformations, Hamilton-Jacobi theory, central forces, noninertial reference frames, rigid body motion, small oscillations, relativistic mechanics, canonical perturbation theory, continuum mechanics. Prerequisite: Phyx 4550 or equivalent. (3 cr)

**Phyx 6020. Classical Mechanics II.** Continuation of Phyx 6010. Prerequisite: Phyx 6010. (3 cr)

**Phyx 6110. Electrodynamics I.** Fundamental laws of electrostatics and magnetostatics; dielectric media, Maxwell's equations, time varying fields, and electromagnetic waves. Waveguides and radiation by moving charges. Prerequisite: Phyx 4600 or equivalent. (3 cr)

**Phyx 6120. Electrodynamics II.** Continuation of Phyx 6110. Prerequisite: Phyx 6110. (3 cr)

**Phyx 6210. Quantum Mechanics I.** Advanced quantum mechanics stressing the formalism of states and operators in the study of quantum dynamics, angular momentum, symmetry and group theory, perturbation theory and scattering. Prerequisite: Phyx 4710 or equivalent. (3 cr)

**Phyx 6220. Quantum Mechanics II.** Continuation of Phyx 6210. Prerequisite: Phyx 6210. (3 cr)

**Phyx 6240. Space Environment and Engineering.** Study of space environment and models used for engineering analysis. Topics include considerations for engineering in the space environment such as plasma interactions, debris, chemical reactions, radiation effects, and thermal issues. Also taught as ECE 6240. (3 cr)

**Phyx 6310. Solar-terrestrial Physics I.** Study of solar-terrestrial physics, including planetary magnetic fields, the interaction of the sun with planetary properties (magnetic fields and atmospheres), and an overview of ionospheric measurement techniques. Study of the upper atmosphere and the physics occurring in each of the layers and zones, including the equatorial and polar ionosphere. Prerequisite: Phyx 4600 or equivalent. (3 cr)

**Phyx 6320. Solar-terrestrial Physics II.** Continuation of Phyx 6310. Prerequisite: Phyx 6310. (3 cr)

**Phyx 6330. Plasma Physics I.** Characteristics of the plasma state and plasma generation; velocity distribution functions, collisions and Boltzmann's equation; wave modes in a plasma; transport theory; plasma devices. Prerequisite: Phyx 4600 or equivalent. (3 cr)

**Phyx 6340. Plasma Physics II.** Continuation of Phyx 6330. Prerequisite: Phyx 6330. (3 cr)

**Phyx 6410. Statistical Mechanics I.** Review of thermodynamics. Discussion of foundation of statistical mechanics and applications to ideal classical and quantum gases, blackbody radiation, ideal crystals, interacting classical gases and liquids, phase transitions, and critical phenomena. (3 cr)

**Phyx 6420. Statistical Mechanics II.** Continuation of Phyx 6410. Prerequisite: Phyx 6410. (3 cr)

**Phyx 6530. Solid State Physics I.** Development of the modern theory of the solid state. Emphasis placed on understanding the bulk properties of the solids, including

crystal structure, cohesive properties, electronic structure, and lattice dynamics. Explores response to added stimuli, such as electric, magnetic, and optical fields. Prerequisites: Phyx 4600 and 4710; Phyx 6410 (can be taken concurrently). (3 cr)

**Phyx 6540. Solid State Physics II.** Continuation of Phyx 6530. Prerequisite: Phyx 6530. (3 cr)

**Phyx 6550. Physics of Materials I.** Application of microscopic (quantum) and macroscopic (classical) physics to study materials properties (e.g., bonding, structure, atomic dynamics, electrical, magnetic, thermal, optical), characterization methods, and a survey of materials. Prerequisites: Phyx 3700, 4710. (3 cr)

**Phyx 6560. Physics of Materials II.** Continuation of Phyx 6550. Prerequisite: Phyx 6550. (3 cr) (Sp)

**Phyx 6910. Relativity I.** Foundations of spacetime physics. Survey of the basics of special and general relativity, including kinematics, mechanics, and electrodynamics in flat spacetime, the description of curved spacetime, and the Einstein equations. Exact solutions, applications, tests, and the mathematical techniques of general relativity. Prerequisites: Phyx 6020, 6120. (3 cr)

**Phyx 6920. Relativity II.** Continuation of Phyx 6910. Prerequisite: Phyx 6910. (3 cr)

**Phyx 6930. Quantum Field Theory I.** Detailed study of the relativistic quantum description of scalar, spinor, and vector fields in spacetime. Topics include gauge theories, canonical and path integral quantization, and interactions. (3 cr)

**Phyx 6940. Quantum Field Theory II.** Continuation of Phyx 6930. Prerequisite: Phyx 6930. (3 cr)

**Phyx 6970. Thesis Research.** Advanced research under guidance of one or more faculty members. (1-10 cr) ®

**Phyx 6990. Continuing Graduate Advisement.** (1-3 cr) ®

**Phyx 7210. Spacecraft Instrumentation.** Theory, engineering, and data reduction techniques of spacecraft instrumentation for space science and spacecraft systems. Taught on demand. Also taught as ECE 7210. (3 cr)

**Phyx 7500. Advanced Topics in Physics (Topic).** Explores issues in contemporary physics at the advanced graduate level. (3 cr) ®

**Phyx 7510. Seminar.** (1-3 cr) ®

**Phyx 7970. Dissertation Research.** (1-15 cr) ®

**Phyx 7990. Continuing Graduate Advisement.** (1-9 cr) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

Department of  
***Plants, Soils, and Biometeorology***  
 College of Agriculture

**Head: Professor Larry A. Rupp**, ornamental horticulture  
 Office in Agricultural Science 322C, (435) 797-2233

**Undergraduate Advisor: Lecturer M. Cathryn Myers-Roche**  
**Undergraduate Off-Campus Advisor: Donna B. Minch**

**Graduate Program Coordinator: Professor John G. Carman**, plant reproduction and development

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**Professors** Bruce G. Bugbee, crop physiology; Steven A. Dewey, weed science; Lynn M. Dudley, soil physical chemistry; John O. Evans, weed science; Donald T. Jensen, climatology; Dani Or, soil physics; H. Paul Rasmussen, horticulture; V. Philip Rasmussen, sustainable agriculture; Schuyler D. Seeley, pomology; James H. Thomas, international agronomy; Ralph E. Whitesides, agronomy; **Research Professors** Gail E. Bingham, micrometeorology; Stanford A. Young, seed production; **Adjunct Professors** Michael C. Amacher, soil chemistry; Kay H. Asay, grass breeding; N. Jerry Chatterton, forage/range physiology/biochemistry; Wilford R. Gardner, soil physics; Henry F. Mayland, soil science; Charles W. Robbins, soil science; Dale R. Westermann, soil science; Raymond M. Wheeler, plant physiology; James L. Wright, soil science; **Associate Professors** Janis L. Boettinger, soil genesis, classification and mineralogy; Daniel T. Drost, vegetable production; Paul R. Grossl, biogeochemist; Lawrence E. Hips, biometeorology; David J. Hole, cereal breeding; Roger K. Kjølgren, urban horticulture; Richard T. Koenig, soil fertility; Jennifer W. MacAdam, forage production and physiology; Jeanette M. Norton, soil microbiology; **Research Associate Professor** Esmail Malek, biometeorology; **Adjunct Associate Professors** Kevin B. Jensen, forage breeding; John M. Stark, microbial ecology and biogeochemistry; Helga Van Miegruet, forest soils; **Assistant Professors** David G. Chandler, surface hydrology; Robert R. Gillies, biometeorology; Thomas C. Griggs, agronomy; Paul G. Johnson, turfgrass science; Kelly L. Kopp, water conservation/turfgrass science; Dominique J. P. Roche, small grains, breeding/genetics; **Research Assistant Professors** Raymond L. Cartee, soils and irrigation; Scott B. Jones, soil physics; Steven R. Larson, research geneticist; Blair L. Waldron, research geneticist; **Adjunct Assistant Professor** Richard T. Lamar, environmental microbiology; **Senior Lecturer** D. Craig Aston, ornamental horticulture; **Research Associates** Susan Buffler, irrigated pasture production; Shyrl M. Clawson, plant breeding; Robert L. Newhall, soil conservation and sustainable agriculture; **Director, Utah Botanical Gardens** William A. Varga, ornamental horticulture; **Assistant Director, Utah Botanical Gardens** Debbie Amundsen, horticulture; **Director, Soil Testing Lab** Janice Kotuby-Amacher, soil chemistry; **Professors Emeriti** Rulon S. Albrechtsen, plant breeding; Keith R. Allred, forage physiology; J. LaMar Anderson, pomology; Gaylen L. Ashcroft, biometeorology; William F. Campbell, crop stress physiology; Paul D. Christensen, soil science; Wade G. Dewey, plant breeding; Alvin R. Hamson, horticulture; R. John Hanks, soil physics; Anthony H. Hatch, horticulture; David W. James, soil fertility; Jerome J. Jurinak, soil chemistry; R. Paul Larsen, horticulture; DeVere McAllister, plant breeding; Frank B. Salisbury, plant physiology; John J. Skujins, soil microbiology; R. L. Smith, soil science; Alvin R. Southard, soil classification; H. Grant Vest, Jr., vegetable breeding; David R. Walker, pomology

**Degrees Offered:** Bachelor of Science (BS) and Bachelor of Arts (BA) in Crop Science, Horticulture, Environmental Soil/Water Science; Master of Science (MS), and Doctor of Philosophy (PhD) in Biometeorology, Plant Science, Soil Science, and Ecology; Master of Professional Studies in Horticulture (MPSH)

**Undergraduate emphases:** *Crop Science BS, BA*—Agronomy, Agronomic Research, Biotechnology/Research; *Horticulture BS, BA*—Ornamental Horticulture, Landscape Maintenance and Construction, Business, Science; *Environmental Soil/Water Science BS, BA*—Soil, Water, Plant

**Graduate specializations:** *Biometeorology MS, PhD*—Agricultural Meteorology, Climatology, Micrometeorology, Remote Sensing, Turbulence in Plant Canopies; *Plant Science MS, PhD*—Crop Physiology, Crop Production and Management, Plant Breeding and Cytology, Plant Biotechnology and Tissue Culture, Plant Nutrition, Space Biology, Weed Science; *Soil Science MS, PhD*—Molecular Biology, Soil and Water Chemistry, Soil Biochemistry and Ecology, Soil Conservation Systems, Soil Fertility and Plant Nutrition, Soil Physics, Soil-Plant-Water Relations, Soil Taxonomy and Genesis, Soils and Irrigation

**Certificate and Associate Degree Program:** Ornamental Horticulture

## Undergraduate Programs

### Objectives

The departmental curricula emphasize understanding basic plant functions and environmental impacts on the management of crops, greenhouses, irrigation regimes, and landscapes.

The purpose of the undergraduate teaching program is to train students in their chosen field of study. The program aims to prepare them to serve clientele needs, provide them with an understanding of and an appreciation for diversity, and teach them to be productive citizens of the world and professionals in their vocations.

The department also provides training of undergraduates for graduate school and maintains a strong graduate program in biometeorology, plant science, and soil science. The research that underlies the graduate program is conducted in biometeorology (micro- and meso-scale), crop biotechnology, crop ecology, crop physiology, crop science, horticulture (general and ornamental), plant breeding, soil microbiology, pedology, soil chemistry, soil physics, soil fertility, environmental soil and water science, and arid landscaping.

A major effort is directed at extending research and teaching programs to all citizens of the State of Utah.

### Departmental Facilities

To support these objectives, departmental facilities include well-equipped laboratories and greenhouses on campus. The University has significant acreage for field research at strategic locations throughout the state. In addition, the University is developing a botanical garden, which will offer opportunities to a broad spectra of clientele. The department maintains state-of-the-art analytical equipment for the measurement of critical soil, plant, and climatic variables.

### Requirements

**Departmental Admission Requirements.** Persons meeting the admission requirements for the University (see pages 48-51) are admitted to the Department of Plants, Soils, and Biometeorology by listing the department major code on the University admission application form. A change of major form is used when students in good standing wish to transfer from another department to the Department of Plants, Soils, and Biometeorology.

**ARCPACS Certification.** Students who meet specific requirements are eligible, after five years of work experience, for professional certification as an Agronomist, Crop Scientist, Crop Specialist, Horticulturist, Soil Scientist, Soil Specialist, Soil Classifier, or Weed Scientist through the American Registry of Certified Professionals in Agronomy, Crops, and Soils (ARCPACS). Course requirements for certification are listed below. Students interested in becoming certified should inform their advisor of their intent.

**Applied Ornamental Horticulture Certificates and AAS Degree.** This program provides practical training in greenhouse and nursery management, turf production, floral design, and maintenance of home and commercial grounds. Coursework encompasses pest control, plant identification, construction of landscapes, small business management, and the operation and maintenance of equipment, including small engines. As an inte-

gral part of their training, students are required to complete an internship in the industry. Students may work toward a **one-year certificate** or an **Associate of Applied Science Degree**.

**Bachelor of Science Degree.** The department offers the Bachelor of Science Degree in three areas: (1) **Crop Science**, which deals with agronomic (commonly called field) crops, such as forages, grains, corn, pasture, etc.; (2) **Horticulture**, which deals with tree fruits, berries, vine fruits, vegetables, and ornamental plants (**ornamental** includes all aspects of floriculture and landscape plant production and use); and (3) **Environmental Soil/Water Science**, which deals with soil and water in relation to plant growth and environmental quality. In all three majors, there are science-oriented emphases intended to prepare students for research or professional studies, and degree emphases that emphasize a practical, applied approach to application of information. All courses used to fill major requirements must be taken on an *A-B-C-D-F* basis. A minimum 2.5 GPA is required for courses used for the major. Transfer students are required to take at least 18 credits of major subject courses in residence at USU. A **minor** may be earned in Agronomy, Crop Biotechnology, Horticulture, Ornamental Horticulture, and Soil Science. A minimum of 16 approved credits are required (see lists below). All courses must be taken on an *A-B-C-D-F* basis and passed with a grade of *C-* or better.

The course requirements for the **Crop Science Major** are designed to prepare students for a career related to the production of agronomic crops. These courses allow students to function well in a rapidly changing technological environment and to acquire new skills and understanding as their career evolves. Each of the emphases within this major has been designed to allow students the flexibility to add courses or a minor to meet their own goals. The **Agronomy Emphasis** is designed for students interested in learning more about the applied aspects of crop production. Some courses emphasize production techniques and systems, while others provide the student with an understanding of the principles underlying crop production. The **Biotechnology/Research Emphasis** is designed for students who wish to participate in the development of plant-oriented technologies at any level of employment, and for those who intend to pursue a career in private or public research or to teach at the university level. The **Agronomic Research Emphasis** is designed for students planning careers in production-oriented agronomic research.

The **Horticulture Major** prepares students for production of fruits, vegetables, turf, or ornamentals and for landscape construction and maintenance. Course topics include biology, chemistry, and control of insects, diseases, and weeds. The **Ornamental Emphasis** adds courses in production management techniques, such as pruning, spraying, and landscaping (materials, design, and maintenance); and greenhouse management. In the **Landscape Maintenance and Construction Emphasis**, students learn design, construction, and maintenance through a joint program with the Landscape Architecture and Environmental Planning Department. The **Science Emphasis** prepares students for graduate study and for employment in technical occupations. The **Business Emphasis** joins courses necessary for a minor in Business with those necessary for obtaining expertise in horticulture.

The **Environmental Soil/Water Science Major** is intended to provide each student with a fundamental understanding of the basic sciences and mathematics, as well as a strong background in both soil and water sciences. Preparatory requirements include chemistry, physics, mathematics, biology, geology, and statistics. The core courses for Environmental Soil/Water Science empha-

size the interactive soil/water processes in the soil's plant-rooting zone—from the microscopic to the landscape perspective. From this base, each student can design his or her own program of specialization in one of the many aspects of soil science, water science, or the integration of both soil and water sciences. Students may choose complementary classes in the **Soil Emphasis**, **Water Emphasis**, **Plant Emphasis**, or a combined emphasis in preparation for a variety of career opportunities. The Environmental Soil/Water Science Major is complementary to existing undergraduate programs at Utah State University in Geology, Environmental Studies, Watershed Science, and Environmental Engineering.

## Course Requirements

### Crop Science Major

**Agronomy Emphasis.** Students must complete the following courses: Biol 1210, 1220, 4400, Chem 1110, 1120, 1130, Econ 1500, Math 1050, Phyx 1200, PISc 2000, PSB 1050, 4890 (two semesters), Soil 3000. Additional plant science requirements include at least 28 credits selected from the following, including at least 6 credits selected from courses identified with an asterisk (\*): Biol 4410, 4500\*, 5410\*, FRWS 5100\*, PISc 2650, 3500, 3700, 3800, 4280, 4300, 4320, 4600, 5200, 5210, 5550\*, 5700, 5750, PSB 4250. Additional soil science requirements include at least 11 credits selected from the following: Soil 4000, 4700, 5050, 5130, 5310, 5320, 5550, 5560, 5650.

Students wishing to accumulate the minimum core requirements for **ARCPACS certification** should *replace* the additional plant science requirements (28 credits, listed above) and soil science requirements (11 credits, listed above) as follows. For **Certified Agronomist** or **Certified Weed Scientist** status, take 9 credits from the following: PISc 3800, 4280, 4300, 4320, 4600, 5200, 5210, 5700; for **Certified Crop Scientist** or **Crop Specialist** status, take 12 credits from the following: PISc 3800, 4280, 4300, 4320, 4600, 5200, 5210, 5700; for **Certified Agronomist**, **Certified Crop Scientist**, or **Crop Specialist** status, take two of the following four courses: Biol 4500, 5410, FRWS 5100, PISc 5550; for **Certified Agronomist**, **Certified Crop Scientist**, or **Crop Specialist** status, take ASTE 3050, Spch 3050, CS 1010, Econ 2010, and Stat 1040; for **Certified Weed Scientist** status, take 22 credits from the following, ensuring courses marked with an asterisk are taken: Biol 3400\*, 3050, 4410\*, 4500, 5410, FRWS 5100, PISc 2200\*, 5550\*; for **Certified Agronomist**, **Certified Crop Scientist**, **Crop Specialist**, or **Certified Weed Scientist** status (all ARCPAC categories), take Chem 1210, 1220, and Soil 5550 in place of Chem 1110 and 1130; for **Certified Agronomist** and **Certified Weed Scientist** status, take Soil 5550.

**Agronomic Research Emphasis.** Students must complete the following courses: Biol 1210, 1220, 3200, 4400, Chem 1210, 1220, 1230, 1240, 2310, 2320, 2330, 2340, 3700, 3710, Econ 1500, Math 1050, 1060, Phyx 1200, PISc 2000, 5200, 5210, PSB 1050, 4890 (two semesters), Soil 3000, 5550, 5560. In addition, select 14 credits from the following: PISc 2650, 3700, 4280, 4300, 4320, 4600, 5550, 5700, 5750. Other recommended courses include: Biol 4410, 4500, 5410, Math 1210, Phyx 2110.

**Biotechnology/Research Emphasis.** Students must complete the following courses: Biol 1210, 1220, 3200, 4200, 4400, 4410, Chem 1210, 1220, 1230, 1240, 2310, 2320, 2330, 2340, 3700, 3710, Econ 1500, Math 1050, 1060, Phyx 1200, PISc 2000, 4300, 5200, 5210, 5440, 5450, 5750, PSB 1050, 4890 (two semesters), Soil 3000. Select at least two credits from the following courses:

PISc 3700, 4600, 5550, 5700. The following courses are also recommended: Biol 5410, Math 1210, Phyx 2110, PSB 5160, 5240.

### Horticulture Major

**Core Courses.** Chem 1110 or 1210, BIS 1400, FRWS 2200, Math 1050, PISc 2000, 2250 (or PSB 4250), 2650, PSB 1050, 4890 (two semesters), Soil 3000.

**Ornamental Emphasis.** In addition to the Core courses, select 36 credits from the following. Those marked with an asterisk (\*) are required. ASTE 3080, Biol 1210\*, 1220\*, PISc 2600\*, 2610\*, 2620\*, 3050, 3300, 3400, 3410, 3700, 3800, 4100, 4400\*, 4500\*, Soil 5550\*. Select two courses from the following: Biol 4500, 5410, FRWS 5100, PISc 5550. Select two of the following courses (not including Chem 1130): Biol 4400, 4410, Chem 1120, 1130, PISc 3500, 5200, 5210.

**Landscape Maintenance and Construction Emphasis.** In addition to the Core courses, students must complete all of the following: Biol 1010, 1020, LAEP 1200, 2600, 3500, 3610, PISc 2200, 2600, 2620, 3400, 3410, 3500, 3800, 4100, 4400 or 4500, 5550, Soil 4700. Suggested electives include: ASTE 3200, PISc 2610, 3700, Soil 5550.

**Business Emphasis.** In addition to the Core courses, select 24 credits from the following. Those marked with an asterisk (\*) are required. Biol 1010\*, 1020\*, PISc 2200\*, 2600, 2620, 3050, 3300, 3400, 3500\*, 3700, 3800, 4100, 4400\*, 4500\*, 5200, 5210, 5550\*, Soil 4700, 5550. The following courses are required for a **Business Minor**: Acct 2010, BA 3460, 3500, Econ 1500, 2010, MHR 2990 or BIS 3100, MHR 3110.

**Science Emphasis.** In addition to the Core courses, select 41 credits from the following. Those marked with an asterisk (\*) are required. Biol 1210\*, 1220\*, 2220, 4400, 4410, 5400, Chem 1120, 1210, 1220, 1230, 1240, 2310, 2320, 3700, 3710, Math 1060, 1100\*, Phyx 1200, PISc 3700, 4400\*, 4500\*, any ornamental horticulture class\*, PISc 5200\*, 5210, 5760, Soil 5550\*, Stat 3000. Select one of the following: Biol 4500, 5410, FRWS 5100, PISc 5550.

### Environmental Soil/Water Science Major

**Core Courses.** Biol 1210, 1220; Chem 1110, 1120, 1130, or Chem 1210, 1220, 1230, 1240, 2300; FRWS 2200 or Biol 2220; Geol 1150; Math 1050, 1060, 1210, or Math 1210, 1220; Phyx 2110, 2120, or Phyx 2210, 2220; Stat 2000 or 3000.

**Professional Core Courses.** Soil 3000, 5050, 5130; Soil 5310 or 5550 (Soil 5550 is required for the plant emphasis); Soil 5560, 5650, 5750, PSB 4890 (two semesters). **Emphases:** Students must select 12 credits from one or a combination of the following emphases:

**Soil Emphasis.** AWER 3900, 5930; Bmet 5250; Chem 3600; Geol 3500, 3550, 3600, 3700, 5600, 5630; Soil 3100, 4000, 5310, 5320, 5350, 5550.

**Water Emphasis.** ASTE 5260; AWER 3700, 4500, 4510, 4530, 5330, 5660; BIE 5010, 5110, 5150; Bmet 4300, 5250, 5500, 5700; CEE 3430, 3500; Chem 3600; Geol 5510; PISc 5200, 5210; Soil 4000, 4700.

**Plant Emphasis.** Biol 3400, 4400; Bmet 5500; FRWS 3220, 4450; PISc 2600 and 2610, or 2620; PISc 3300, 3400, 3410, 3800, 4100, 4280, 4300, 4320, 4400, 4500, 5200, 5210, 5430, 5550, 5760; Soil 4700.

### **Applied Ornamental Horticulture Certificate and AAS Degree**

**One-Year Certificate (27 credits required).** PISc 2600 and 2620 are required; 18.5-20 additional PISc credits must be completed from applied core courses emphasizing floriculture or landscape horticulture; and 3-5 credits from approved electives.

**Associate of Applied Science degree (64 credits required).** Students must complete all applied core courses; 11-19 credits of approved electives; and 14-16 credits of University Studies, including Engl 1010 and 2010; 5-7 credits Breadth Social Sciences (BSS)/Breadth Humanities (BHU) courses; 3-5 credits Breadth Life Sciences (BLS)/Breadth Physical Sciences (BPS) courses.

**Applied Core Courses.** BIS 1400, PISc 2200, 2250, 2600, 2610, 2620, 2650, 3050, 3300, 3400, 3700, 3800, PSB 1050.

**Approved Electives.** Choose any courses that are part of a BS degree in horticulture or PISc 2900, 3010, 3020 (11-19 credits required).

### **Minors**

**Crop Biotechnology Minor (16 credits required).** The following courses are required. PISc 2000, 3700, 5750. Select the balance of credits from the following courses. At least one of the production courses, marked with an asterisk, (\*) is required. PISc 3500, 4280\*, 4300\*, 4320\*, 4400\*, 4500\*, 5200, 5550, 5700, PSB 5160, 5240, 5260.

**Agronomy Minor (16 credits required).** A minimum of 6 credits of Soil Science courses must be taken, including Soil 3000. A minimum of 6 credits of Plant Science courses must be taken, including at least two of the following three courses: PISc 4280, 4300, 4320. Select the balance of credits from the following courses: Soil 4000, 4700, 5130, 5310, 5550, 5560, 5650, PISc 2200, 3800, 4400, 4500, 5200, 5550, 5700.

**Soil Science Minor (16 credits required).** The following course is required: Soil 3000. Select 12 credits from the following courses: Soil 4000, 4700, 5050, 5130, 5310, 5350, 5550, 5560, 5650, 5750.

**Ornamental Horticulture Minor (16 credits required).** The following courses are required: Soil 2000, PISc 2200, 3200. Select the balance of credits from the following courses: PISc 2600, 2610, 2620, 3050, 3300, 3400, 3410, 3700, 3800, 4400, 4500.

**Horticulture Minor (16 credits required).** Soil 2000 is required. Select 6 credits from the following courses: PISc 2200, 4400, 4500, one ornamental horticulture course. Select the remaining credits from the following: PISc 2000, 2650, 3050, 3300, 3800.

### **Additional Information**

For more information about Bachelor of Science requirements and the sequence in which courses should be taken, see major requirement sheets available from the Plants, Soils, and Biometeorology Department.

## **Graduate Programs**

### **Admission Requirements**

See general admission requirements, pages 72-73. Departmental admission committees and potential graduate student advisors (major professors) consider previous work experience, undergraduate and graduate records and curriculum, and formal recommendations in their decisions concerning acceptance of applicants. Students without an undergraduate or graduate degree in plants, soils, biometeorology, or a closely related field may be required to complete selected undergraduate courses prior to admission as fully matriculated graduate students in the Plants, Soils, and Biometeorology Department. Qualified applicants are occasionally denied admission because faculty members in the applicant's area of interest do not have the time or funds to advise additional students. The serious applicant is encouraged to discuss his or her goals with appropriate members of the graduate faculty prior to preparing an application.

Graduate student candidates must have scores on the verbal and quantitative portions of the Graduate Record Examination (GRE) at or above the 40th percentile. TOEFL scores of 550 or higher are required for candidates from abroad. International students with a prior degree from an English-speaking university are exempted from the TOEFL exam.

### **Degree Programs and Specializations**

The Master of Science and Doctor of Philosophy degrees are offered as follows: (1) **Plant Science** with specializations in crop production and management, weed science, plant nutrition, crop physiology, plant breeding and cytology, and space biology; (2) **Soil Science** with specializations in soil physics, soil and water chemistry, soils and irrigation, soil fertility and plant nutrition, soil biochemistry and ecology, molecular biology (interdepartmental program), soil conservation systems, soil-plant-water relations, and soil taxonomy and genesis; (3) **Biometeorology** with specializations in agricultural meteorology, climatology, micro-meteorology, turbulence in plant canopies, and remote sensing; and (4) **Ecology**. A **Master of Professional Studies in Horticulture (MPSH)** is also offered.

### **Course Requirements**

Course requirements leading to MS or PhD degrees are developed jointly by the student and the student's advisory committee. Course selections reflect areas of specialization. There are, however, specific departmental requirements regarding physical sciences, biological sciences, and mathematics courses, which differ depending on the area of specialization.

## Research

Research projects vary over time, depending on funding and other factors. Students are encouraged to visit the home page web sites of the graduate faculty to determine research interests and lists of recent publications. Some of the research interests in the department include (1) the control of diseases, nematodes, weeds, and other hazards to fruit, vegetable, ornamental, and field crops; (2) physiological and genetic improvement of fruit, vegetable, ornamental, and field crops (breeding and biotechnology); (3) the evolution, genetic regulation, and utilization of apomixis and other developmental phenomena of higher plants; (4) management of agronomic and horticultural production systems; (5) horticultural landscape water management; (6) soil formation and landscape evolution; (7) soil, plant, water, and nutrient relationships; (8) management of saline and sodic soils; (9) alternative land uses; (10) improved management of animal wastes and biosolids; (11) management of soil microbial processes; (12) drainage and irrigation systems; (13) adaptations to weather and weather modification; (14) analyses and modification of large-scale surface evaporation from atmospheric boundary layer measurements; (15) spatial and temporal properties of sun flecks in plant canopies; and (16) spatial variation in surface fluxes of heat and water vapor in semiarid regions.

## Financial Assistance and Assistantships

The financial awards provided by the School of Graduate Studies are listed on pages 71-72 of this catalog. The Department of Plants, Soils, and Biometeorology does not have a formal application form for financial assistance. Most monies used to assist students in the department come from research grants controlled by individual faculty members. Negotiations for financial assistance (research assistantships or part-time employment) are made between faculty members and students. The department provides a few part-time teaching assistantships (a semester at a time). Graduate teaching assistants are responsible to their major professor and to the instructor whom they assist. The MS and PhD in Biometeorology are Western Regional Graduate Programs (see page 71).

## Career Opportunities

A broad range of career opportunities exists for students completing the MS or PhD degree from the Department of Plants, Soils, and Biometeorology. Graduate students specializing in the plant sciences may expect to find employment as consulting scientists, or in the private sector as plant breeders, weed scientists, etc. Graduate students specializing in the soil sciences may expect to find employment as soil scientists with government agencies or in the private sector, where they may pursue careers in environmental consulting, fertilizer retail, irrigation system design, waste management, mineland reclamation, or related environmental or agricultural pursuits. Graduate students specializing in biometeorology may expect to find employment with government agencies, as consulting scientists, or with the private sector. Graduate students specializing in ecology may expect to find employment as research scientists, as consulting ecologists, or with environmental agencies. Graduate students completing the PhD may also find career opportunities in academia.

## Additional Information and Updates

Additional information and updates concerning graduate faculty and graduate student opportunities can be obtained from the web at: <http://psb.usu.edu>.

## Plant Science Courses (PISc)

**PISc 2000 (BLS). Plants, Genes, and Agriculture.** Introduction to the scientific process as it relates to modern agriculture. Principles of the disciplines involved in production of agronomic and horticultural crops, both for food and aesthetic purposes. Data and interpretation as separate components of the scientific process. Prerequisite: Math competency. (3 cr) (Sp)

**PISc 2100. Introduction to Horticulture.** Introduction to production of nursery, greenhouse, fruit, and vegetable crops. Explores residential and commercial landscape construction and management. Students also learn about interior plants, arboriculture, turf science, landscape plant materials, and home gardening. (3 cr) (F)

**PISc 2200. Pest Management Principles and Practices.** Overview of pest control considerations, procedures, and principles. Topics include integrated pest management, organic and chemical pest control, environmental considerations, safety, life cycles of pests, and commercial pesticide licensing. (3 cr) (Sp)

**PISc 2250. Occupational Experience in Agronomy and Horticulture.** Provides credit for on-the-job training in jobs related to plants or soils. (1-4 cr) (F,Sp,Su) ®

**PISc 2600. Annual and Perennial Plant Materials.** Identification, culture, and utilization of herbaceous ornamental plants in the landscape, including annual and perennial flowering plants, herbaceous ground covers, ornamental grasses, and herbs. (1.5 cr) (F)

**PISc 2610. Indoor Plants and Interiorscaping.** Identification, culture, use, and maintenance of indoor foliage and flowering plants used in the interior landscaping industry. (1.5 cr) (F)

**PISc 2620. Woody Plant Materials: Trees and Shrubs for the Landscape.** Identification, culture, and utilization of woody ornamental plants in the landscape, including shade trees, flowering trees and shrubs, hedge plants, and vines. Review of native plants commonly used in the landscape. (3 cr) (F)

**PISc 2650. Identification and Selection of Plants in Production Agriculture.** Identification of plants important in horticulture/agronomy and the morphological features making them useful for various agricultural purposes. (1 cr) (F)

**PISc 2900. Special Problems in Plant Science.** Student-selected practical problems in horticulture and/or agronomy. (1-4 cr) (F,Sp,Su) ®

**PISc 3010. Basic Flower Arranging.** Principles of basic flower design using fresh, dried, and artificial flowers. Proper care of cut flowers and foliage. Basic plant physiology behind such principles. Lab fee required. (2 cr) (F)

**PISc 3020. Floral Crops Judging and Contemporary Design.** Judging of potted ornamental plants and cut flowers for quality. Contemporary floral design and floral art. Prerequisite: PISc 3010 or professional design experience. Lab fee required. (2 cr) (Sp)

**PISc 3050. Greenhouse Management and Crop Production.** Design and management of commercial greenhouse facilities. Production requirements of primary greenhouse crops. (4 cr) (Sp)

**PISc 3200 (DSC). Horticultural Science.** Methods, technology, and scientific basis of landscape, fruit, and vegetable gardening in the arid west. Interaction of gardening with the urban environment. Contact department for information about semester to be offered. (3 cr)

**PISc 3300. Residential Landscapes.** Functional and aesthetic relationships of plants and structures in the landscape in connection with installation considerations. Use of imaging and CAD software in initial computer design layout. Prerequisite: PISc 2620. Recommended: PISc 2600. (3 cr) (Sp)

**PISc 3400. Managing for Sustainable Landscapes.** Interaction of expectations, maintenance needs, cost/benefit analysis, physiology, and ecology in managing landscapes on a sustainable basis. Prerequisites: PISc 2600, 2620. (3 cr) (F)

**PISc 3410. Practicum in Managing for Sustainable Landscaping.** Practical experience in evaluating maintenance tasks required in managing a landscape, cost estimation of such tasks, and how to make changes to a landscape to reduce costs. (1 cr) (F)

**PISc 3500. The Structure and Function of Economic Crop Plants.** Environmental effects on plant structure and function. Control of plant development for enhanced production of marketable goods. Introduction to principles using examples from horticulture and agronomy. Applications in these fields emphasized. Prerequisites: Integrated Science or comparable breadth course, Biol 1010. (3 cr) (Sp)

**PISc 3700. Plant Propagation.** Propagation of plants by sexual and asexual means. Covers fundamental physiology of propagation, as well as cultural practices and techniques used in crop production. Recommended: Biol 1210. (4 cr) (F)

**PISc 3800. Turfgrass Management.** Fundamentals of turfgrass science: species adaptation, identification, and cultural requirements; turfgrass growth and development; establishment; primary cultural practices (fertilization, irrigation, mowing); secondary cultural practices; pest management; integrated management planning for turfgrass systems. Prerequisites: Biol 1210, PISc 2650, 3500, or equivalents. (3 cr) (F)

**PISc 4100. Landscape Water Conservation.** Explains why water conservation is important, and how water can be conserved through precision irrigation and conversion to low-water-use landscapes. Contact department for information about semester to be offered. (2 cr)

**PISc 4280. Field Crops.** Economic importance, use, distribution, origin, history, classification, identification, botanical nature, marketing, processing, storage, certification, grading, diseases, insects, commercial production, and improvement of cereal, root, and oilseed crops. Two lectures, one lab per week. (3 cr) (F)

**PISc 4300. World Food Crops and Cropping Systems: The Plants That Feed Us.** Climatic, geographic, and management requirements of the world's plants that provide food for humans, including botanical relationships. Systems used to produce these crops and processes for turning them into food. Prerequisite: Integrated Science or comparable breadth course. (3 cr) (Sp)

**PISc 4320. Forage Production and Pasture Ecology.** Cultivation and management of legumes and grasses used throughout the world for grazing, stored feed, soil improvement, and conservation. Forage plant growth and development, nutrient and water utilization, and responses to environmental stress. Prerequisite: Integrated Science or comparable breadth course. (3 cr) (Sp)

**PISc 4400. Modern Vegetable Production.** Principles and practices underlying scientific vegetable culture. Discussion of production of important vegetables, focusing on the physiological processes influencing their culture. Explores crop performance in research and commercial applications. Prerequisite: Biol 1010 or 1210. (3 cr) (F)

**PISc 4500. Fruit Production.** Cultivars, physiology, anatomy, propagation, sites, soils, climate, culture, irrigation, fertilizers, insects, diseases, integrated management, plant and fruit growth and development, harvesting, storage, pruning, orchard architecture, environmental protection, and economics for both tree and small fruits. Prerequisite: Biol 1010 or 1210. (4 cr) (Sp)

**\*PISc 4600 (DSC, QI). Cereal Science.** Introduction to principles involved in cereal chemistry and processing. Covers starch chemistry, dry milling, wet milling, decortication, malting, and extrusion. Processing of all major cereals also covered.

Prerequisite: Math 1030 or Stat 1040 or completion of quantitative literacy requirements. (3 cr) (Sp)

**PISc 4800. Professional Turfgrass Management.** Fertilization, irrigation, and cultivation practices for managed landscapes. Construction issues, including compaction, soil modification, and specialized construction practices for golf courses and sports turf. Prerequisites: Soil 3000, PISc 3800. (2 cr) (Sp)

**PISc 5200 (d6200).<sup>1</sup> Crop Physiology.** The relationship between physiological processes and growth of whole plants. Energy balance and water use efficiency. Light interception and canopy geometry. Canopy photosynthesis and respiration. Carbon partitioning and source/sink relationships. Prerequisites: Biol 4400, Math 1050, or consent of instructor. (2 cr) (Sp)

**PISc 5210 (d6210). Crop Physiology Laboratory.** Measurement and analysis of physiological processes that result in whole plant growth. Includes an individual lab project. Designed to be taken concurrently with PISc 5200 or 6200. (1 cr) (Sp)

**\*PISc 5300. Principles of Cytogenetics.** Examination and analysis of variation in chromosome structure, behavior, and number. Includes discussions of developmental and evolutionary effects of this variation, and practical applications in plant and animal genetics. Prerequisite: Biol 3200. (3 cr) (Sp)

**\*\*PISc 5430 (d6430). Plant Nutrition.** Mechanisms of nutrient acquisition, rhizosphere interactions, root morphology and distribution, short- and long-distance transport, nitrogen fixation, and biochemical function of essential and beneficial elements. (2 cr) (F)

**\*\*PISc 5440 (d6440). Plant Molecular, Cellular, and Developmental Biology I.** Examines background and recent advances. Students analyze and discuss structure, genome, molecular development, and photosynthesis topics from a research perspective. Prerequisites: Biol 3200, 4200; Chem 3700 or 5710. Also taught as Biol 5440/6440. (3 cr) (Sp)

**\*PISc 5450 (d6450). Plant Molecular, Cellular, and Developmental Biology II.** Examines background and recent advances. Students analyze and discuss cell wall, growth regulator, and environmental response topics from a research perspective. Prerequisites: Biol 3200, 4200, Chem 3700 or 5710. Also taught as Biol 5450/6450. (3 cr) (Sp)

**PISc 5550 (d6550). Weed Biology and Control.** Management strategies for undesirable plant species in native and agroecosystems. Interference and allelopathy, undesirable plant invasion and spread, noxious weed eradication principles and practices, integrated plant management strategies, herbicide interactions with weeds and crops, and economics of management emphases. (4 cr) (F)

**\*\*PISc 5700. Principles of Plant Breeding.** Principles of plant breeding. Breeding techniques for self-pollinated, cross-pollinated, and asexually reproducing crops. Real-life breeding problems solved, showing that resource identification and allocation are the critical points in developing a successful program. Prerequisite: PISc 2000 or Biol 3200. (3 cr) (Sp)

**\*\*PISc 5750. Crop Biotechnology.** Lectures and laboratory exercises focusing on concepts, equipment, and procedures required for culturing plant cells and tissues, producing and processing secondary compounds in vitro, and genetic engineering of angiosperms. Presentation of physiological and biochemical factors important to success. Prerequisite: Biol 4400. (2 cr) (Sp)

**PISc 5760. Crop Ecology.** Features of agroecosystems compared with natural ecosystems; input of energy and materials to manipulate agroecosystems and produce maximum, sustained quality and yield of agricultural products. Prerequisites: Biol 4400, PISc 5200/6200, or instructor's consent. (2 cr) (Sp)

## Soil Science Courses (Soil)

**PISc 6100. Advanced Landscape Water Conservation.** Provides experience in setting up weather stations for measuring evapotranspiration. Students learn how to develop evapotranspiration-based landscape irrigation schedule using central controls. Analysis of landscape water demand with evapotranspiration data and geographical information systems database. Prerequisite: PISc 4100. (3 cr) (Sp)

**PISc 6200 (d5200). Crop Physiology.** The relationship between physiological processes and growth of whole plants. Energy balance and water use efficiency. Light interception and canopy geometry. Canopy photosynthesis and respiration. Carbon partitioning and source/sink relationships. Prerequisites: Biol 4400, Math 1050, or consent of instructor. (2 cr) (Sp)

**PISc 6210 (d5210). Crop Physiology Laboratory.** Measurement and analysis of physiological processes that result in whole plant growth. Includes an individual lab project. Designed to be taken concurrently with PISc 6200 or 5200. (1 cr) (Sp)

**PISc 6220. Professional Experience in Water Efficient Landscaping.** Internship component of water efficient landscaping master's program. Summer employment with water purveyors, consulting firms, and businesses involved in landscape irrigation. (6 cr) (Su)

**PISc 6230. Water Efficient Landscaping Seminar I.** Explores background topics in water development, as well as current topics in general water development and landscape water use. (1 cr) (Sp)

**PISc 6240. Water Efficient Landscaping Seminar II.** Students present summaries of summer internship experiences and attend seminars given by outside speakers. (2 cr) (F)

**PISc 6300. Planting Design for Low Water Use Landscapes.** Examines arid ecosystems, emphasizing the Intermountain West, and recreating such ecosystems in a range of amenity landscapes. Also covers procurement, propagation, establishment, and maintenance of plants appropriate for low water landscapes. Also taught as LAEP 6300. (3 cr) (F)

**\*PISc 6430 (d5430). Plant Nutrition.** Mechanisms of nutrient acquisition, rhizosphere interactions, root morphology and distribution, short- and long-distance transport, nitrogen fixation, and biochemical function of essential and beneficial elements. (2 cr) (F)

**\*PISc 6440 (d5440). Plant Molecular, Cellular, and Developmental Biology I.** Examines background and recent advances. Students analyze and discuss structure, genome, molecular development, and photosynthesis topics from a research perspective. Prerequisites: Biol 3200, 4200; Chem 3700 or 5710. Also taught as Biol 6440/5440. (3 cr) (Sp)

**\*PISc 6450 (d5450). Plant Molecular, Cellular, and Developmental Biology II.** Examines background and recent advances. Students analyze and discuss cell wall, growth regulator, and environmental response topics from research perspective. Prerequisites: Biol 3200, 4200, Chem 3700 or 5710. Also taught as Biol 6450/5450. (3 cr) (Sp)

**PISc 6550 (d5550). Weed Biology and Control.** Management strategies for undesirable plant species in native and agroecosystems. Interference and allelopathy, undesirable plant invasion and spread, noxious weed eradication principles and practices, integrated plant management strategies, herbicide interactions with weeds and crops, and economics of management emphases. (4 cr) (F)

**\*PISc 6570. Herbicide Physiology and Mode of Action.** Entrance, movement, and metabolism of major herbicides; and a critical study of the physiological processes affected by them. Prerequisites: Biol 4400, PISc 6550/5550 or instructor's consent. (3 cr) (Sp)

**Soil 2000 (BPS). Soils, Waters, and the Environment.** Introduction to principles of physical and biological science. Discussion of current environmental topics, focusing on soil and the waters that contact the soil. Topics include water quality, global climate change, deforestation, soil conservation, and agricultural sustainability. (3 cr) (Sp)

**Soil 3000. Fundamentals of Soil Science.** Fundamentals of soil science, emphasizing physical, chemical, mineralogical, and biological properties of soils, and how these properties relate to plant growth and environmental quality. Prerequisites: Chem 1110, Math 1050, or equivalents. (4 cr) (F,Sp)

**Soil 3100 (DSC). Soils and Civilization.** Lectures, readings, and discussions to explore effects of soil physical, chemical, and biological properties on civilization throughout history. Influence of soils on settlement patterns, land use/management, and civilization decline. Case studies focus on current soil and land use issues in western North America. (3 cr) (Sp)

**Soil 4000. Soil and Water Conservation.** Applied soil and water conservation in an agronomic setting. Management of soil-water-plant-atmosphere continuum. Soil conservation techniques as they apply to actual situations. (4 cr) (F)

**Soil 4600 (d6600). Principles of Surface Hydrology.** Study of physical elements of the water cycle, surface hydrological processes, and watershed responses. Explores basic hydrologic concepts and terminology, as well as collection, analysis, and presentation of hydrologic data. Includes field laboratory. Prerequisite: Soil 3000 or instructor's permission. Also taught as AWER 4600/6600. (3 cr) (Sp)

**Soil 4700. Irrigated Soils.** Soil salinity, soil-moisture-plant relationships, water supply and quality, irrigation water measurements, soil moisture movement, and irrigation methods. Prerequisite: Soil 3000 or equivalent, or instructor's consent. (2 cr) (Sp)

**Soil 5050 (d6050). Principles of Environmental Soil Chemistry.** Introduction to common chemical processes occurring among solid, liquid, and gas phases in soil systems. Emphasis placed on chemistry of arid land soils. Prerequisites: Chem 1110, Math 1050, Soil 3000. (3 cr) (Sp)

**Soil 5130 (d6130). Soil Genesis, Morphology, and Classification.** Morphology, development, and classification of soils. Lectures and weekly field exercises emphasize soil as a natural body of the landscape: its properties, distribution, behavior, and interpretations for diverse land uses. Prerequisite: Understanding of fundamental soil science; Soil 3000 recommended. (4 cr) (F)

**\*Soil 5310. Soil Microbiology.** Ecology and diversity of microorganisms in soils. Emphasis on factors controlling microbial activity and the role of microorganisms in organic matter decomposition and nutrient cycling. Prerequisites: Biol 1210, 1220; Chem 2300 or 2310; Soil 3000. Also taught as Biol 5310. (3 cr) (F)

**\*Soil 5320. Soil Microbiology Laboratory.** Techniques for measuring microbial activity and diversity in soils. Includes use of molecular and isotope methods. Prerequisite: Concurrent or prior enrollment in Biol/Soil 5310. Also taught as Biol 5320. (2 cr) (F)

**Soil 5350 (d6350). Wildland Soils.** Application of basic principles of soil science to wildland ecosystems. Effects of disturbance and land use on wildland soil properties. Role of soils in natural resource management. Prerequisites: Chem 1110, Soil 3000, and one additional upper-division Soils course, or permission of instructor. Also taught as FRWS 5350/6350. (3 cr) (Sp)

**Soil 5550 (QI) (d6550). Soils and Plant Nutrient Bioavailability.** Description of forms, transformations, and movement of plant nutrients in soils. Discussion of factors affecting nutrient supply, both qualitatively and quantitatively, for nutrient elements essential for plant growth. Prerequisites: Soil 3000; Chem 1110 or 1210. (3 cr) (Sp)

**Soil 5560 (d6560). Analytical Techniques for the Soil Environment.** Analysis of chemical and biological soil characteristics. Results interpreted for soil fertility, land use, and environmental remediation. Graduate credit requires a paper reviewing analysis of element or compound class. Prerequisite: Soil 5050/6050 or 5550/6550 (may be taken concurrently), or instructor's permission. (2 cr) (Sp)

**Soil 5620. Aquatic Chemistry.** Provides students with understanding of principles of aquatic chemistry, emphasizing chemical equilibria, acid-base reactions, complex formation, oxidation-reduction reactions, complex formation, and dissolution chemistry. Prerequisites: Chem 1210, CEE 3640. Also taught as CEE 5620. (3 cr) (F)

**Soil 5650 (d6650). Applied Soil Physics.** Characterization of the physical properties of soils and other porous media. Measurement, prediction, and control of processes taking place in and through soils (e.g., water flow and solute transport), including atmospheric and groundwater interactions. (3 cr) (F)

**Soil 5750. Environmental Quality: Soil and Water.** Senior capstone course for Environmental Soil/Water Science (ESWS) major. Students analyze current soil and water environmental quality problem(s), formulate remediation or mitigation plans, and present findings in oral and written reports. Prerequisites: Soil 5130 and two 5000-level Soil courses. (2 cr) (Sp)

**Soil 6050 (d5050). Principles of Environmental Soil Chemistry.** Introduction to common chemical processes occurring among solid, liquid, and gas phases in soil systems. Emphasis placed on chemistry of arid land soils. Prerequisites: Chem 1110, Math 1050, and Soil 3000. (3 cr) (Sp)

**Soil 6130 (d5130). Soil Genesis, Morphology, and Classification.** Morphology, development, and classification of soils. Lectures and weekly field exercises emphasize soil as a natural body of the landscape: its properties, distribution, behavior, and interpretations for diverse land uses. Prerequisite: Understanding of fundamental soil science; Soil 3000 recommended. (4 cr) (F)

**\*\*Soil 6140. Unsaturated Flow and Transport.** Measurement, prediction, and control of transport processes taking place in and through partially saturated porous formations (e.g., water flow and solute transport), emphasizing parameter estimation and multi-dimensional flow. (3 cr) (F)

**\*\*Soil 6190. Salt-affected Soils.** Emphasis on chemistry of salt-affected soils. Topics include carbonate chemistry, cation exchange, and reclamation of sodium and salt-affected soils. Exploration of effects of sodium accumulation on soil hydraulic conductivity and the biochemistry of salt and potentially toxic elements. (2 cr) (Sp)

**\*\*Soil 6200. Biogeochemistry of Terrestrial Ecosystems.** Inputs, outputs, and cycling patterns of major nutrients. Emphasis on mechanisms for transformations, factors influencing process rates, and the impacts of management and global change on nutrient cycles and air and water quality. Prerequisites: Biol 1220, Soil 3000, Chem 2300 or 2310, or permission of instructor. Also taught as Biol 6200 and FRWS 6200. (3 cr) (F)

**Soil 6350 (d5350). Wildland Soils.** Application of basic principles of soil science to wildland ecosystems. Effects of disturbance and land use on wildland soil properties. Role of soils in natural resource management. Prerequisites: Chem 1110, Soil 3000, and one additional upper-division Soils course, or permission of instructor. Also taught as FRWS 6350/5350. (3 cr) (Sp)

**\*\*Soil 6400. Spatial and Temporal Estimation Methods for Environmental Sciences.** Introduction to methods for obtaining spatial information and interpolation schemes. Incorporation of uncertainty into dynamic models (temporal predictions). Methods and models for combining spatial and temporal information, with applications to monitoring and forecasting natural processes. (2 cr) (Sp)

**Soil 6550 (d5550). Soils and Plant Nutrient Bioavailability.** Description of forms, transformations, and movement of plant nutrients in soils. Discussion of factors affecting nutrient supply, both qualitatively and quantitatively, for nutrient elements essential for plant growth. Prerequisites: Soil 3000; Chem 1110 or 1210. (3 cr) (Sp)

**Soil 6560 (d5560). Analytical Techniques for the Soil Environment.** Analysis of chemical and biological soil characteristics. Results interpreted for soil fertility, land use, and environmental remediation. Graduate credit requires a paper reviewing analysis of element or compound class. Prerequisite: Soil 6050/5050 or 6550/5550 (may be taken concurrently), or instructor's permission. (2 cr) (Sp)

**Soil 6600 (d4600). Principles of Surface Hydrology.** Study of physical elements of the water cycle, surface hydrological processes, and watershed responses. Explores basic hydrologic concepts and terminology, as well as collection, analysis, and presentation of hydrologic data. Includes field laboratory. Prerequisite: Soil 3000 or instructor's permission. Also taught as AWER 6600/4600. (3 cr) (Sp)

**Soil 6650 (d5650). Applied Soil Physics.** Characterization of the physical properties of soils and other porous media. Measurement, prediction, and control of processes taking place in and through soils (e.g., water flow and solute transport), including atmospheric and groundwater interactions. (3 cr) (F)

**\*\*Soil 6720. Chemistry of Arid Land Soils.** Chemical equilibria and kinetics of arid land soils. Special emphasis on solubility relationships of soil minerals and on carbonate chemistry. (3 cr) (Sp)

**\*\*Soil 7200. Soil Interfacial Processes and Reactive Transport.** Course divided into two blocks. Subject matter for first block is soil electrochemistry and surface chemistry. Second block applies material from first block to system in which transport limits reaction time. (3 cr) (Sp)

**Soil 7210. Advanced Topics in Pedology.** Strategies for designing and critiquing pedological research through literature, discussions, and field trips. Topics will change, depending upon student interest, and can include factors and processes involved in pedogenesis, soil mineralogy, soil-biota relationships, and landscape evolution. Prerequisite: Soil 6130/5130. (2 cr) (Sp) ®

## ***Biometeorology Courses (Bmet)***

**Bmet 2000 (BPS). The Atmosphere and Weather.** Survey of the processes governing the behavior of the atmosphere and the phenomenon of weather. Basic physical principles of radiation, energy, evaporation, and heat transport are introduced and connected to atmospheric circulation and weather. (3 cr) (F,Sp)

**Bmet 3250. Aviation Weather.** Discussion, observation, and analysis of weather important for pilots and those associated with air travel. (3 cr) (Sp)

**Bmet 3820 (DSC, QI). Global Climatology.** Develops general understanding of how the climate of the earth functions. Focuses on the connections of the earth system, along with its inherent variability. Prerequisites: Bmet 2000 or Geog 1130. Also taught as AWER 3820. (4 cr) (F)

**Bmet 4300. General Meteorology.** Introductory meteorology for students with background in physical sciences. Emphasis placed on physical processes (quantitatively) in the atmosphere, resulting in general weather phenomena around the world. Prerequisite: Bmet 2000. (3 cr) (F)

**Bmet 5250 (d6250). Remote Sensing of Land Surfaces.** Basic principles of radiation and remote sensing. Techniques for ground-based measurements of reflected and emitted radiation, as well as ancillary data collection to support airborne and satellite remote sensing studies in agriculture, geography, and hydrology. Prerequisites: Basic calculus and physics. Also taught as BIE 5250/6250 and FRWS 5250/6250. (4 cr) (Sp)

**Bmet 5400 (d6400). Introduction to Meteorology.** Designed for senior and graduate students in different fields who desire some basic introduction to meteorology. Bridges a large gap between courses describing meteorological phenomena in broad and simple terms and other courses treating the atmosphere more theoretically. (3 cr) (F)

**Bmet 5500 (d6500). Land-Atmosphere Interactions.** Examination of interactions between the surface and atmosphere. Consideration of flows of mass and energy in soil-vegetation-atmosphere continuum, and their linkage to local and regional climates. Detailed study of feedbacks between vegetation and atmosphere. (3 cr) (Sp)

\*\*\***Bmet 5680 (d6680). Paleoclimatology.** Covers climate through the past four billion years of geologic time. Explores driving forces behind climate changes. Examines data and methods used in paleoclimate research. Includes discussion of literature and stresses local paleoclimate records. Three lectures per week, along with field trips. Prerequisite: Geol/AWER 3600 or permission of instructor. Also taught as Geol 5680/6680 and AWER 5680/6680. (3 cr)

**Bmet 5700 (d6700). Environmental Measurements.** Examination of critical instrumentation and principles involved in measuring key properties of terrestrial environment. Consideration of measurements in soils, plants, and atmosphere. (3 cr) (Sp)

**Bmet 6250 (d5250). Remote Sensing of Land Surfaces.** Basic principles of radiation and remote sensing. Techniques for ground-based measurements of reflected and emitted radiation, as well as ancillary data collection to support airborne and satellite remote sensing studies in agriculture, geography, and hydrology. Prerequisites: Basic calculus and physics. Also taught as BIE 6250/5250 and FRWS 6250/5250. (4 cr) (Sp)

**Bmet 6300. Principles of Atmospheric Science.** Introduction to fundamental physical principles upon which atmospheric sciences are based. Thorough description and interpretation of wide range of atmospheric phenomena. Prerequisite: Instructor's consent. (3 cr) (F)

**Bmet 6400 (d5400). Introduction to Meteorology.** Designed for senior and graduate students in different fields who desire some basic introduction to meteorology. Bridges a large gap between courses describing meteorological phenomena in broad and simple terms and other courses treating the atmosphere more theoretically. (3 cr) (F)

**Bmet 6410. Applied Agricultural Meteorology.** Explores applied concepts in agricultural meteorology, with emphasis on weather-agriculture and microclimate-agriculture relationships. Includes crop modeling applications. Course materials, resources, and teaching provided in cooperation with Iowa State University. (2 cr)

**Bmet 6500 (d5500). Land-Atmosphere Interactions.** Examination of interactions between the surface and atmosphere. Consideration of flows of mass and energy in soil-vegetation-atmosphere continuum, and their linkage to local and regional climates. Detailed study of feedbacks between vegetation and atmosphere. (3 cr) (Sp)

\*\*\***Bmet 6680 (d5680). Paleoclimatology.** Covers climate through the past four billion years of geologic time. Explores driving forces behind climate changes. Examines data and methods used in paleoclimate research. Includes discussion of literature and stresses local paleoclimate records. Three lectures per week, along with field trips. Prerequisite: Geol/AWER 3600 or permission of instructor. Also taught as Geol 6680/5680 and AWER 6680/5680. (3 cr)

**Bmet 6700 (d5700). Environmental Measurements.** Examination of critical instrumentation and principles involved in measuring key properties of terrestrial environment. Consideration of measurements in soils, plants, and atmosphere. (3 cr) (Sp)

**Bmet 6800. Environmental Biophysics.** Explores connections between biosphere and atmosphere at many scales. Introduces processes governing exchanges of mass and energy between surface and atmosphere, as well as connections to climate. Examines role of the biota at local to global scales. (2 cr) (Sp)

**Bmet 6910. Special Problems in Climatology.** Study of physical causes and effects of various climate regimes found upon the Earth. Study of the basis and mechanisms of all types of physically-based climate models. Assists students in comprehending relative complexities and applicabilities of the whole range of climate models. (3 cr) (Sp) ®

## *Plants, Soils, and Biometeorology Courses (PSB)*

**PSB 1050. Plants, Soils, and Biometeorology Orientation.** Orientation to the teaching, research, and extension programs of the department, and to career opportunities. Optional orientation to a specific major: Horticulture, Crop Science, or Environmental Soil/Water Science. (1-2 cr) (F)

**PSB 4250. Internship in Plants, Soils, and/or Biometeorology.** Professional internship in crop science, horticulture, environmental soil/water science, and/or biometeorology. (1-4 cr) (F,Sp) ®

**PSB 4800. Teaching Practicum for Undergraduate Students.** Offers undergraduate students an opportunity for guided teaching and methods for student evaluation in a variety of Plants, Soils, and Biometeorology courses. (1-3 cr) (F,Sp)

**PSB 4890 (CI). Senior Seminar.** Student preparation for careers. Familiarization with placement processes. Discussion of role in society and career opportunities for graduates. Experiences in team building. Opportunities for oral presentations of solutions to current issues and scientific information. (1 cr) (F,Sp) ®

**PSB 4900. Special Problems.** Special topics and problems in crop science, horticulture, environmental soil/water science, and/or biometeorology. Subject, time, and credit arranged individually as needed. Department approval required. (1-4 cr) (F,Sp,Su) ®

**PSB 5160. Methods in Biotechnology: Cell Culture.** Techniques and fundamental knowledge for culturing mammalian and insect cells. Students will learn maintenance, growing, genetic engineering of cells, cytotoxicity, hybridoma creation, cloning, etc. Extensive laboratory experience is provided. Also taught as ADVS 5160, Biol 5160, Chem 5160, and NFS 5160. (3 cr) (Sp)

**PSB 5200. Site-Specific Agriculture and Landscape/Horticultural Management.** Integration of site-specific management technology, such as computers, GPS, yield monitors, variable rate controllers, mechanized samplers, and postharvest processing controllers with planning, tillage, planting, chemical applications, and harvesting to optimize off-site inputs and environmental/economical sustainability in crop or landscape management. (3 cr) (Sp)

**PSB 5240. Methods in Biotechnology: Protein Purification Techniques.** Reviews basic methods of protein purification, including scaled-up use of 100L fermenter, large-scale centrifugation, diafiltration, chromatography, and use of BioCAD. Prerequisite: Chem 3700. Also taught as ADVS 5240, Biol 5240, Chem 5240, and NFS 5240. (3 cr) (Sp)

**PSB 5260. Methods in Biotechnology: Molecular Cloning.** Laboratory-oriented course designed to teach molecular biology techniques such as DNA cloning, genetic probes, polymerase chain reaction, and DNA sequencing. Prerequisite: Chem 3700 or 5710; or Biol 3200; or permission of instructor. Also taught as ADVS 5260, Biol 5260, Chem 5260, and NFS 5260. (3 cr) (F)

**PSB 6700. Integrative Topics in Plants, Soils, and Biometeorology.** Team-taught special topics course encouraging interdisciplinary analysis of a research or policy area from the current literature, encompassing the three departmental subdisciplines. Emphasis on written and oral student presentations. (1-3 cr) (F) ®

**PSB 6800. Graduate Student Teaching Practicum.** Offers graduate students an opportunity for guided teaching and methods for student evaluation in a variety of Plants, Soils, and Biometeorology courses. (1-3 cr) (F,Sp)

**PSB 6890. Plants, Soils, and Biometeorology Graduate Seminar.** Review and critique of presentations. Communication practice in extemporaneous, extension, research, poster, and lecture presentations. PSB graduate students must enroll during both fall and spring semesters. (1 cr) (F,Sp) ®

**PSB 6900. Special Problems in Plants, Soils, and/or Biometeorology.** (1-8 cr) (F,Sp,Su) ®

**PSB 6970. Research and Thesis.** (1-18 cr) (F,Sp,Su) ®

**PSB 6990. Continuing Graduate Advisement.** (1-12 cr) (F,Sp,Su) ®

**PSB 7800. Graduate Student Teaching Practicum.** Offers graduate students an opportunity for guided teaching and methods for student evaluation in a variety of Plants, Soils, and Biometeorology courses. (1-3 cr) (F,Sp)

**PSB 7890. Plants, Soils, and Biometeorology Graduate Seminar.** Review and critique of presentations. Communication practice in extemporaneous, extension, research, poster, and lecture presentations. PSB graduate students must enroll during both fall and spring semesters. (1 cr) (F,Sp) ®

**PSB 7900. Special Problems in Plants, Soils, and/or Biometeorology.** (1-8 cr) (F,Sp,Su) ®

**PSB 7970. Research and Thesis.** (1-18 cr) (F,Sp,Su) ®

**PSB 7990. Continuing Graduate Advisement.** (1-12 cr) (F,Sp,Su) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

\*Taught 2002-2003

\*\*Taught 2003-2004.

\*\*\*This course is taught alternating years. Check with department for information about when course will be taught.

Department of  
**Political Science**

*College of Humanities, Arts and Social Sciences*

**Head: Professor Randy T. Simmons**, environmental politics and policy, public choice  
 Office in Main 320A, (435) 797-1310

**Assistant Head and Graduate Program Director: Associate Professor Peter McNamara**, political theory  
 Office in Main 320D, (435) 797-1318

**FAX** (435) 797-3751  
**E-mail** rsimmons@hass.usu.edu  
**WWW** <http://www.usu.edu/polisci>

**Professors** *William L. Furlong*, Latin America, Central America, democratization, development; *Amal Kavar*, comparative politics, Middle East, women and politics; *Carolyn Rhodes*, international relations, comparative politics, European union, trade; **Adjunct Professors** *Larry Boothe*, national security policy; *Charles E. Kay*, environmental policy ecology; *James L. Waite*, European policy, comparative European government, methodology, public opinion; **Professor Emeritus** *Stanford Cazier*, U.S. government, public law; **Associate Professors** *Peter F. Galderisi*, parties, elections, interest groups, research methods, statistics; *David B. Goetze*, human cooperation and conflict, ethnic conflict, evolutionary theory; *Roberta Q. Herzberg*, public choice, health policy, public policy; *Jing Huang*, Asian political thought, comparative politics, development; *Michael S. Lyons*, U.S. government, Congress, public policy, elections; *Veronica Ward*, international relations, social choice, global environmental issues, conflict and cooperation; **Assistant Professors** *Patria D. Julnes*, public administration, organization theory, information technology management, quantitative and statistical methods; *Anthony A. Peacock*, public law; **Lecturers** *Jeannie L. Johnson*, international relations, the Balkans; *Carol L. McNamara*, political theory, presidency; *Shannon Peterson*, international relations, foreign policy

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), and Master of Arts (MA) in Political Science; BS and BA in Law and Constitutional Studies. Participates in a pilot program of Master of Social Sciences (MSS), with an emphasis in Public Administration, administered through Continuing Education.

## ***Undergraduate Programs***

### ***Objectives***

The Department of Political Science offers a flexible program to accomplish the following objectives:

1. to provide students with theoretical and factual understanding of government, politics, and political philosophy, nationally and internationally;
2. to develop students' analytic ability, communication skills, and facility with political research methods;
3. to prepare students for effective participation in civic affairs, careers in government and the teaching of government, and graduate study in political science, law, and other fields related to the public sector; and
4. to further the liberal arts education mission of the University and to enrich the educational experiences of students in all programs of study.

### ***Admission and Prerequisite Requirements***

**Departmental Admission Requirements.** Admission requirements for the Department of Political Science include a minimum 2.0 GPA for Political Science majors and a minimum 3.0 GPA for

Law and Constitutional Studies majors. Students in good standing may apply for admission to the department.

**Prerequisites.** It is assumed that students registered for upper-division political science courses have acquired the basic knowledge and information taught in the lower-division courses required for the major. Anyone who wishes to take an upper-division course, but has not had the appropriate prerequisites, should consult with the instructor before registering. Faculty members reserve the right to drop from upper-division courses students who do not meet these requirements.

### ***Graduation Requirements***

**Political Science Major.** Students must have at least 36 semester credits in the field. These must include PolS 1100; PolS 2100 or 2200; PolS 2350, 3000, and 4990. PolS 4990 is a senior seminar and may be taken as early as the final semester of the junior year. In addition, students must take a minimum of 6 upper-division credits in each of two depth areas (U.S. Government, Comparative Politics, International Relations, or Political Theory). Internship credit does not count toward the depth requirement. A minimum 2.5 GPA in political science courses and a minimum 2.0 overall GPA are required.

**Law and Constitutional Studies Major.** This is a rigorous program designed for students interested in leadership roles in business, public communications, government, education, or the study or practice of law. Students must have at least 36 credits in political science. These must include PolS 1100, 2350, 3120, 3170, 4120, and 5130, as well as one of PolS 3320, 4130, or 4140. A minimum 3.0 GPA in political science courses and a minimum 3.0 overall GPA are required.

**Minor.** Students can obtain a minor in political science by completing a total of 18 credits in the field. PolS 1100; PolS 2100 or 2200; and PolS 2350 must be included. The remaining credits must be from upper-division courses.

**Teaching Major.** This program is intended exclusively for students seeking careers in *secondary* education. Students must have at least 36 credits in political science courses chosen from a list available from the department and in the *Guide to the Undergraduate Program in Secondary Education at USU*, available at the USU Bookstore. A minimum 2.5 GPA in political science courses and a minimum 2.75 overall GPA are required.

**Teaching Minor.** This minor is designed specifically for students seeking careers in *secondary* education. Students must have at least 18 credits in political science chosen from a list available from the department and in the *Guide to the Undergraduate Program in Secondary Education at USU*, available at the USU Bookstore.

**Certificate in International Relations.** Certificates are intensive programs of study similar to majors, but involving courses in more than one academic discipline. Political science, economics, and business, for example, may be combined. The Political Science Department participates in the International Relations certificate program. It is designed for those planning careers in international business or diplomacy. Information on this certificate is available from Veronica Ward, Main 324E, (435) 797-1319.

### **Internships**

The department places approximately 40-45 students in government or related internships each year. Most of these interns work with a member of the Utah delegation to the U.S. Congress in Washington, D.C., a member of the Utah Legislature in Salt Lake City, a political campaign, a state or local administrative agency, or a lobbying group. Students in any major, of at least junior class standing, and having a minimum GPA of 3.0 are eligible to apply.

### **Pi Sigma Alpha**

Pi Sigma Alpha is the national honorary political science society. A member must have at least 15 credits of political science with a minimum 3.0 GPA and a minimum 3.0 GPA overall.

### **Financial Support**

The Political Science Department offers a number of scholarships yearly to students. Contact the College of Humanities, Arts and Social Sciences dean's office for applications (usually available around the first week of January and due back the first week of March) at (435) 797-1195 or visit the college office in Main 338.

## **Graduate Programs**

### **Departmental Admission Requirements**

Applicants must have a BS or BA degree. An undergraduate GPA of 3.0 or better, **or** a GPA of 3.5 or better over the last 90 semester credits of undergraduate coursework is required. Students must have quantitative, verbal, and analytical GRE scores at or above the 50th percentile. Applicants with very high GPAs and other exceptional supporting materials may petition for admission with deficient GRE scores. The graduate admissions committee will review petitions individually.

International students must receive a score of 550 or better on the TOEFL exam.

Due to limited space, acceptance into Political Science graduate programs is not guaranteed, even for students who meet admission requirements. Moreover, all students are expected to perform at high levels throughout their program. Any student receiving a *C* grade or lower for any course at any level **or** a grade point average below 3.0 for a given semester will be placed on academic probation. Receipt of two grades of *C* or lower or a grade point average below 3.0 for two semesters will result in termination from the program. In addition, students must meet the requirements of the School of Graduate Studies. Applicants not meeting minimum requirements may be allowed to correct deficiencies concurrently with graduate coursework.

Applications will be considered throughout the year. However, students who wish to be considered for financial aid outside of the department must submit applications by **March 15** for the coming academic year.

**No application will be considered until all required information arrives in the office of the School of Graduate Studies.**

### **Assistantships**

The department appoints a number of teaching assistants, each with a \$7,000 annual stipend. Appointments are for one year, but are renewable for a second year. Research assistantships and government internships are sometimes available as well. Applications are available from the Political Science Department and are due on March 1.

### **Course Requirements**

Students must choose between two tracks: (1) **Public Choice and Public Policy** or (2) **Comparative and International Change**. Course requirements differ according to the track chosen. All students, however, must take PolS 6010, which is the foundation course for the program.

**Public Choice and Public Policy.** Students in this track must complete the following courses: PolS 6030 and 6040. In addition, students must complete 3 credits chosen from the following list: PolS 5110, 5130, 5180, and Econ 5500. Students must also take at least one course from the **Comparative and International Change** track.

**Comparative and International Change.** Students in this track must complete PolS 6220. In addition, students must complete 6 credits chosen from the following list: PolS 5200, 5210, 5230, 5270, 5290, 5350, and 6030. Students must also take at least one course from the **Public Choice and Public Policy** track.

For both tracks, the remaining 15 credits needed for the graduate degree may be comprised of: (1) up to 6 credits of PolS 6910 (subject to approval); (2) up to 3 credits of PolS 6920 (subject to approval); (3) up to 3 credits of approved graduate courses outside of Political Science; and (4) other Political Science graduate courses. No more than 15 semester credits of 5000-5990 coursework may be used for a graduate degree.

## Political Science Courses (PolS)

**PolS 1100 (BAI). United States Government and Politics.** U.S. Constitution, political parties and elections, interest groups, Congress, president, bureaucracy, courts, and civil rights and liberties. This course meets the Americanization requirement. (3 cr) (F,Sp) ©

**PolS 2100.<sup>1</sup> Introduction to International Politics.** Analysis of the nation-state system as well as interdependence of the global community. (3 cr) (F,Sp)

**PolS 2200 (BSS).<sup>1</sup> Comparative Politics.** Comparisons of differences in political culture, institutions, and processes, including authoritarian and democratic systems, violence and corruption, political development, and public policy. (3 cr) (F,Sp)

**PolS 2350. Introduction to Political Theory.** A survey course covering ancient and modern political theory. (3 cr) (F,Sp)

**PolS 3000 (QI).<sup>2</sup> Introduction to Political Research.** Methodology, methods, and approaches used to study and analyze political events and relationships, including the use of library resources. Prerequisite: Stat 1040 or Math 1030. (3 cr) (F,Sp)

**\*PolS 3100. Global Issues.** The origins and consequences of conflict and cooperation in an interdependent global community are examined in order to analyze how transnational, as well as competing national, interests and institutions affect economic, political, and environmental choices and outcomes. (3 cr) (F)

**\*\*PolS 3110 (DSS). Parties and Elections.** Political parties, campaigns, and elections. (3 cr) (Sp)

**PolS 3120 (DSS). Law and Politics.** Examines history, processes, and theories underlying American law and politics. Makes selective comparison of the American legal system with other legal systems. (3 cr) (F)

**PolS 3130 (DSS). United States Legislative Politics.** Legislative process. (3 cr) (Sp)

**\*PolS 3140 (DSS). The Presidency.** Examines the origins, purposes, and scope of the executive power in the American constitutional system. (3 cr) (F)

**PolS 3150. State and Local Government.** Includes state and local politics, in addition to metro-urban politics. (3 cr) (Sp)

**PolS 3160. Practicing American National Government.** Includes survey of legislative, executive, and judicial governing. Offers academic basis for Washington, DC experience. (3 cr) (F,Sp,Su)

**PolS 3170. Law and Economics.** Explains legal and political rules, the organization of government, and other institutional processes. Uses standard microeconomic tools and concepts, such as scarcity, choice, preferences, incentives, and supply and demand. Prerequisite: PolS 1100. Also taught as Econ 3170. (3 cr) (F)

**PolS 3190 (DSS). Gender, Power, and Politics.** Examines the question of gender inequality in politics, focusing on contemporary political issues cross-culturally and in different political systems. (3 cr) (F)

**\*\*PolS 3210 (DSS). Western European Government and Politics.** Britain, France, Germany, Scandinavia, and the European Union. (3 cr) (F)

**\*PolS 3220 (DSS). Russian and East European Government and Politics.** (3 cr) (F)

**\*\*PolS 3230. Middle Eastern Government and Politics.** General overview of political cultures and political developments in the Middle East. (3 cr) (F)

**PolS 3250 (DSS). Chinese Government and Politics.** (3 cr) (F)

**PolS 3270 (DSS). Latin American Government and Politics.** Survey of most of the governments and politics of Latin America, emphasizing events, policies, and governmental actions of the past decade. (3 cr) (F)

**PolS 3310 (DSS). American Political Thought.** Survey of American political thought from colonial times to the present. (3 cr) (F)

**PolS 3320. The Foundations of American Constitutionalism.** Introduces students to debate over constitutions, constitutionalism, and constitution-making which occurred during the period (roughly) from the Revolution to the election of 1800. (3 cr)

**PolS 3400 (DSS).<sup>3</sup> United States Foreign Policy.** Formulation, execution, and impact of United States foreign policy. (3 cr) (F,Sp)

**PolS 3430. Political Geography.** The relationship between earth and state. World political phenomena studied from a geographic point of view, including international boundaries, territorial seas, and landlocked states. Also taught as Geog 3430. (3 cr) (Sp)

**PolS 3810 (DSS). Introduction to Public Policy.** Examines different approaches to the study of public policy and different value dimensions in the design of policies. (3 cr) (F)

**PolS 4000.<sup>4</sup> Political Analysis.** Political data, quantitative and analytical techniques. Prerequisite for majors: PolS 3000. (3 cr) (F)

**PolS 4120. American Constitutional Law.** Governmental powers, separation of powers, checks and balances, federalism, and due process of law. Equality and Bill of Rights protections. (3 cr) (F)

**PolS 4130. Constitutional Theory.** Introduces students to modern constitutional theory, with particular emphasis on American Constitutional Theory. Prerequisite: PolS 1100. (3 cr) (Sp)

**PolS 4140. Political Organizations.** Focuses on formal and informal constitutional rules, examining how different sets of rule structures impact the collective decisions of individuals in society and how individuals can influence or shape the rules structuring their lives. Prerequisite: PolS 1100. (3 cr)

**\*\*PolS 4210. European Union Politics.** Explores creation and ongoing development of the European Union. Examines governing institutions, and internal and external politics of the European Union across a number of issues areas. (3 cr) (Sp)

**PolS 4220 (CI).<sup>4</sup> Ethnic Conflict and Cooperation.** Examines origins of ethnic groups and the causes of ethnic conflicts, as well as different strategies for prevent-

ing or resolving such conflict. Explores conditions facilitating interethnic cooperation, the more common form of ethnic group interaction. (3 cr) (Sp)

**\*\*PolS 4230. Issues in Middle East Politics.** Contemporary Middle Eastern political movements, regional conflicts, and state-level political change. (3 cr) (Sp)

**\*PolS 4260. Southeast Asian Government and Politics.** (3 cr) (Sp)

**\*PolS 4280. Politics and War.** Examines causes and implications of war. Study of wars from general to limited, including case studies such as the Vietnam War. (3 cr) (Sp)

**PolS 4310. History of Political Thought I.** Issues and thinkers in ancient and medieval political thought. (3 cr) (Sp)

**\*PolS 4320 (DSS). History of Political Thought II.** Issues and thinkers in modern and contemporary political thought. (3 cr) (Sp)

**\*PolS 4410. Global Negotiations.** Creates an awareness of international issues and other cultures. Utilizes a computer simulation program in which negotiating teams of students from around the world are linked in a negotiation simulation. (3 cr) (Sp)

**PolS 4450 (CI). United States and Latin America.** Study and analysis of foreign relations of Latin American nations among themselves and with the rest of the world. (3 cr) (Sp)

**\*PolS 4460. National Security Policy.** How intelligence systems function, fit within the policymaking systems of free societies, and are managed and controlled. (3 cr) (Sp)

**\*PolS 4470. Foreign Policy in the Pacific.** Analysis of contemporary foreign policies of major countries surrounding the North Pacific. (3 cr) (Sp)

**\*\*PolS 4480. International Trade Policy.** Examines governance and politics of international trade relations, focusing in particular on cooperation, conflict, and dispute resolution in the GATT/WTO, European community, NAFTA, and Asian cooperative regimes. (3 cr) (Sp)

**PolS 4810. Politics and Public Policy.** Explains public policies as rational expressions of political self-interest and explores the relationship between self-interest and values such as "equity" and "efficiency" in policy. (3 cr) (F)

**\*\*PolS 4820 (DSS). Natural Resources and Environmental Policy: Political Economy of Environmental Quality.** Causes of environmental and natural resources problems and evaluation of political and private responses to them. Study of economics and politics applied to the environment. Production, protection, and allocation of scarce resources by markets and political systems. (3 cr) (Sp)

**PolS 4890. Special Topics.** Credit arranged. Instructor's permission required. (1-5 cr) (F,Sp) ®

**PolS 4910. Readings and Conference.** Individually directed study in subjects of special interest to students. Credit arranged. Instructor permission required. (1-5 cr) (F,Sp,Su) ®

**PolS 4990 (CI). Senior Research Seminar.** Introduces students to the research process by having them complete a major research project in the topic area of the particular professor. (3 cr) (F,Sp) ®

**\*\*PolS 5110. Social Policy.** Examines health, education, and welfare policies in U.S. contexts and in comparative context. (3 cr) (F)

**PolS 5120. Economics of Russia and Eastern Europe, 9th Century to 21st Century.** Development of the economics of Russia and Eastern Europe from earliest times to the present, emphasizing the interaction between economic forces and policies of the state. Prerequisite: Econ 2010. Also taught as Econ 5120. (3 cr) (F)

**PolS 5130. Law and Policy.** Analyzes the relationship between law and the formation and implementation of policy. (3 cr) (Sp)

**\*\*PolS 5180. Natural Resource Policy.** Political and economic theory applied to the analysis of natural resource allocation conflicts and U.S. policies enacted to resolve such conflicts. (3 cr) (Sp)

**\*PolS 5200. Global Environment.** Examines different strategies for resolving global resource and environmental problems. (3 cr) (F)

**\*PolS 5210. Comparative Political Change/Development.** Emphasis on approaches and theories in the field of comparative politics, with a focus on political change/development. (3 cr) (F)

**\*PolS 5230. Development in the Middle East.** Study of Middle Eastern regimes, political cultures, and political developments. (3 cr) (Sp)

**PolS 5270.<sup>4</sup> Latin American Politics and Development.** Focuses on special contemporary issues of selected Latin American nations, such as democratization, the role of the military, and elections. (3 cr) (Sp)

**PolS 5290.<sup>4</sup> Development in Europe.** Emphasizes political and economic development in Europe. (3 cr) (Sp)

**\*PolS 5350 (DSS). Evolution, Conflict, and Cooperation.** Intensively examines human cooperation as a fundamental problem of development and human conflict as the major obstacle to development. (3 cr) (Sp)

**\*\*PolS 5440 (DSS). Gender and World Politics.** Examines the role gender inequality plays in the construction of international relations, using a variety of feminist approaches. Central theme of gendered critique is global security, defined in terms of economic, ecological, political, and military dimensions. (3 cr) (Sp)

**PolS 5910. Campaign Internship.** A semester campaign internship. Instructor approval required. (2-15 cr) (F,Sp,Su) ®

**PolS 5920. Washington Internship.** A semester congressional, administrative, or legal internship in Washington, D.C. Instructor approval required. (2-15 cr) (F,Sp,Su) ®

**PolS 5930. State Government Internship.** A semester legislative, lobbying, or administrative internship in the state government of Utah or those of any other state government. Instructor approval required. (2-15 cr) (F,Sp,Su) ®

**PolS 5940. Administrative Internship.** A semester administrative internship at the local or state level. Instructor approval required. (2-15 cr) (F,Sp,Su) ®

**PolS 6010. Scope and Methods of Political Science.** A graduate survey of the philosophy and methods of political analysis. Topics ranging from the methodology of inquiry to elementary statistical methods will be covered. (3 cr) (F)

**\*PoIS 6030. Political Theory, Political Economy, and Capitalism.** Provides an introduction to the study of political economy by considering the connections among political theory, political economy, and capitalism. (3 cr) (Sp)

**\*PoIS 6040. Public Choice.** Introduction to applying the microeconomic theory of markets to political processes. (3 cr) (F)

**PoIS 6100. Introduction to Public Administration.** Introduction to issues of public and nonprofit management. Provides overview of macro and micro forces influencing public and nonprofit management. (3 cr)

**PoIS 6110. Budgeting and Finance.** Surveys all major activities concerning allocation, investment, and control of public funds, as well as budgeting and revenues in context of fiscal policy making (3 cr) (Alt Sp)

**PoIS 6120. Program Assessment and Evaluation.** Practical guidelines for conducting evaluation studies. Discussion of performance measurement, social indicators, quantitative and qualitative methods, and experimental and quasi-experimental designs as used in applied policy and program research. (3 cr) (Alt F)

**PoIS 6130. Law and Administration.** Exploration and analysis of constitutional and legal basis in which American Public Administration is set, including separation of powers, checks and balances, delegation of discretionary authority, and common law and equity. (3 cr) (Alt Su)

**PoIS 6140. Leadership in Public Organizations.** Analysis of leadership behavior and managerial activities. Examination of major theories of leadership and motivation, including leadership vs. management, leadership qualities and characteristics, and leadership skills. (3 cr) (Alt Su)

**\*\*PoIS 6220. International Relations Theory.** Reading seminar on theory and method in the interplay of politics and economics in international relations. (3 cr) (F)

**PoIS 6810. Graduate Seminar.** American politics; comparative politics; political theory; international politics; public law; public administration. (1-4 cr) (F,Sp,Su) ®

**PoIS 6910. Graduate Tutorial.** Prerequisite: instructor's consent. (1-3 cr) (F,Sp,Su) ®

**PoIS 6920. Internship.** Internship in a public administration agency. Instructor approval required. (1-15 cr) (F,Sp,Su) ®

**PoIS 6970. Thesis Research.** Prerequisite: admission to candidacy. (1-9 cr) (F,Sp,Su) ®

**PoIS 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

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® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

<sup>1</sup>Taught Fall 2002, and Spring 2003 and 2004.

<sup>2</sup>Taught Spring 2003 and Fall 2003.

<sup>3</sup>Taught Fall 2002 and 2003, and Spring 2002 and 2004.

<sup>4</sup>Not taught 2002-2003 or 2003-2004.

Department of  
**Psychology**  
 College of Education

**Head: Professor David M. Stein**, clinical psychology  
 Office in Emma Eccles Jones Education 487E, (435) 797-1460

**Department Mailing Address:** Department of Psychology, Utah State University, 2810 Old Main Hill, Logan UT 84322-2810

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**Graduate Program Coordinators: Combined Clinical/Counseling/School PhD—Associate Professor Susan L. Crowley**, counseling; **Research and Evaluation Methodology PhD—Professor Karl R. White**, research and evaluation; **School Psychology MS—Associate Professor Gretchen A. Gimpel**, school; **School Counseling MS—Camille J. Odell**, school

**Undergraduate Program Faculty Coordinator—Professor Tamara J. Ferguson**, social and developmental psychology

**Professors Frank R. Ascione**, developmental; **Carl D. Cheney**, physiological; **Tamara J. Ferguson**, social and developmental psychology; **Cecilia H. Foxley**, counseling, human relations; **J. Grayson Osborne**, behavior therapy, child; **Richard N. Roberts**, developmental; **Charles L. Salzberg**, applied behavior analysis; **Research Professor Byron R. Burnham**, qualitative evaluation methods; **Professors Emeriti Michael R. Bertoch**, counseling; **Glendon W. Casto**, developmental; **Keith T. Checketts**, school psychology and counseling, research methodology; **John R. Cragun**, industrial; **Marvin G. Fifield**, school and counseling; **Arden N. Frandsen**, educational; **Richard B. Powers**, experimental social; **David R. Stone**, learning, educational; **Sebastian Striefel**, clinical child; **Associate Professor Kevin Masters**, clinical; **Research Associate Professor Mark S. Innocenti**, school psychology; **Associate Professors Emeritus William R. Dobson**, clinical; **Elwin C. Nielsen**, clinical and school; **Assistant Professors Pablo Chavajay**, developmental psychology, culture and cognition, cultural psychology; **M. Scott DeBerard**, health psychology; **Renee V. Galliher**, clinical psychology; **Donna M. Gilbertson**, school psychology; **Kentaro Hayashi**, quantitative psychology (psychometrics); **George Julnes**, evaluation methodology, research methodology; **Steve Lehman**, educational psychology; **Maria C. Norton**, research and evaluation methodology; **Melanie M. Domenech Rodríguez**, counseling, child clinical; **JoAnn T. Tschanz**, neuropsychology, abnormal psychology, physiological psychology; **Research Assistant Professor Susan G. Friedman**, research; **Assistant Professor Emeritus J. Whorton Allen**, counseling; **Adjunct and Clinical Faculty Kent W. Anderson**, professional-scientific; **Ann M. Berghout Austin**, infancy through childhood; **Carolyn G. Barcus**, counseling; **David W. Bush**, clinical/counseling; **Robert S. Cook**, rural and family interventions; **Gwenaëlle C. Couillard**, training; **Mary E. Doty**, clinical; **Monique Frazier**, child clinical; **Eric J. Gee**, research and evaluation; **Richard D. Gordin, Jr.**, sport and exercise psychology; **Randall M. Jones**, family research management; **Joan A. Kleinke**, counseling and personnel services; **J. Russell Mason**, sensory evaluation, ethology; **Kent E. Nabers**, gero-psychology; **Mark A. Nafziger**, counseling psychology; **D. Kim Openshaw**, marriage and family therapy; **Lori A. Roggman**, developmental; **Thomas R. Schenkenberg**, neuropsychology; **Patricia L. Truhn**, neuropsychology, crisis intervention; **Brian Tschanz**, social psychology; **Beth Walden**, research and evaluation methodology; **Leland J. Winger, Jr.**, clinical; **Jean Wollam**, educational psychology; **Blaine R. Worthen**, research and evaluation

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), and Doctor of Philosophy (PhD) in Psychology

**Graduate specializations:** MS—School Psychology, School Counseling; PhD—Combined Clinical/Counseling/School Psychology, Research and Evaluation Methodology

## Undergraduate Programs

### Objectives

Psychologists endeavor to scientifically understand the thought processes, emotions, and behavior of both humans and animals. Psychologists specialize in diverse areas. Some psychologists seek to better understand the interactions among genetic, biological, social, and psychological determinants of behavior. Other psychologists are concerned with how the body and brain create emotions, memories, and sensory experiences, and how these are perceived and interpreted. Still others are concerned with how we learn observable responses and how we process, store, and retrieve infor-

mation. Additionally, psychologists focus their careers on the causes, assessment, and/or treatment of emotional and behavioral disorders. Psychologists utilize research methods to understand the causes of behavior, emotion, and thought processes.

The Department of Psychology at USU offers a rich undergraduate program in psychology with the primary objectives being:

1. To provide students with substantive knowledge in the basic discipline of psychology, such as history/systems, basic behavior processes, biological bases of behavior, development, personality, learning and cognition, social influences on individuals, research methods, and psychological disorders and treatment.

2. Teaching students how to critically analyze and solve problems pertaining to human interaction, communication, and relationships.

3. Student mastery of principles relating to the causes of behavior, basic learning processes, and the measurement and analysis of behavior.

4. Training students to use scientific and quantitative methods to better understand and apply social science research.

5. Preparing students to compete successfully for entry into nationally and internationally recognized graduate programs in the social sciences.

6. Preparing majors and minors to compete successfully for postbachelor employment opportunities in private/public education, human services, government, and corporations.

The courses in Psychology and the electives available in related departments allow students to tailor their education to meet specific career goals. Some students who major in psychology may qualify for admission to unique specialty tracks: (1) **the (secondary education) Teaching Major**; (2) **Behavior Analysis Skill Track**; (3) **Interpersonal Relationships Skill Track**; and (4) **Graduate School Preparation Track**. A human services/caseworker training option may also be available to majors.

Students can complete the major or minor in psychology either on-campus (Logan), or through the USU Distance Education system (all required courses and selected electives are offered every 1-2 years) available throughout the State of Utah. The specific requirements for the skill tracks, the Apprenticeship, the on- and off-campus (distance education) options, and for how psychology electives can be used to advance students' career goals can be obtained from the **Psychology Advisement Office, Eccles-Jones Education Building, Room 475, (435) 797-1456**.

## Requirements

**Departmental Admission Requirements.** Students are admitted to the Department of Psychology as Prepsychology majors by meeting the Utah State University admission requirements (see pages 48-51). To be a Psychology major, a student must make written application to the department, after meeting the following prerequisites: (1) completion of at least 40 semester credits with a cumulative GPA of 2.75 or higher; (2) completion of at least 18 credits of the University Studies requirement with a GPA of 2.75 or higher; and (3) completion of Psy 1010, 1100, 1400, and 1410 with a GPA of 3.0 or higher. Application to the department should be made during the semester in which these prerequisites will be completed.

### General Undergraduate Psychology Major:

**Required Courses (22 credits), plus**

**Primary Electives (13 credits),**

**Secondary Electives (6 credits), and**

**Apprenticeship (6 credits)**

Requirements for a psychology major consist of a broad preparation of 22 credits of specified coursework, plus a minimum of 19 credits of approved Psychology elective courses, and 6 credits of an apprenticeship, which allows for integration of coursework knowledge (theory) through application, for a total of 47 credits. At least 28 Psychology credits must be upper-division, 12 of which must be taken at USU. The specific courses required are: Psy 1010, 1100, 1400, 1410, 2800, 3500, 5100, 5330 (22 credits).

Primary electives are: Psy 3210, 3510, 4210 (choose 6 credits); Psy 3460 or Biol 3020 or Psy 3450 (choose 3 credits); Psy 3400, 4420/4430 (choose 4 credits). Secondary electives are: Psy 1210, 2100, 3660, 4230, 4240, 4510, 5200, Psy/FHD 3120, Psy/PEP 4000, Psy/PEP 5050, Psy/ComD 5670, Psy/SpEd 5720 (choose 6 credits). Required Apprenticeship courses are: Psy 5950, 5960 (6 credits). A minor is required. A minimum overall USU GPA of 2.75 is required for graduation, with a minimum GPA of 3.0 in Psychology. Students must receive a grade of C- or higher in all psychology courses (USU and transfer) in order to have them counted toward graduation. (Students desiring licensure for teaching in secondary schools must also meet the requirements of the Secondary Education Department.)

To graduate with a major in psychology, students must meet a minimum end-of-level competency in all of the Psychology courses that they have been required to (or have elected to) take to fulfill the requirements of the psychology major. Students' end-of-level competencies are demonstrated by verifying how much information they have actually retained in given subject areas *later* in their college careers. Currently, students demonstrate their end-of-level competency by completing appropriate area tests within the context of Psy 5950 and 5960. It is recommended that students enroll for Psy 5950 the semester immediately following admission to the psychology major.

### Undergraduate Psychology Minor:

**Required Courses (10 credits), plus**

**Elective Courses (8 credits minimum)**

For a Psychology Minor, students must complete the following courses (10 credits): Psy 1010; Psy 1100 or 2100; Psy 1400, 1410. Also, at least 8 credits must be selected from courses listed as required or primary electives for the Psychology Major. The student's grade point average for all psychology courses, USU or transfer, must average 3.0 or above to qualify for credit toward the minor. At least 12 credits of the 18 required credits must be completed at USU. Students must receive a grade of C- or higher in all psychology courses (USU and transfer) in order to have them counted toward graduation.

### Psychology Teaching Major:

**Required Psychology Courses (27 credits), plus**

**Elective Psychology Courses (13 credits)**

Requirements for a Teaching Major in Psychology broadly consist of 27 credits of specified psychology coursework and 13 credits of elective psychology coursework, for a total of 40 credits in psychology. Only 16 of these 40 psychology credits may be taken in lower-division courses. The remaining 24 credits must be received in 3000- or 4000-level psychology courses. At least 12 of the upper-division credits must have been earned in courses completed at USU. A minor in another field of study is also required. Prospective teachers must complete 35 credits of the Secondary Teacher Education Program (STEP) in the Department of Secondary Education. Required GPA for psychology courses is 3.0. Students must receive a grade of C- or higher in all psychology courses (USU and transfer) in order to have them counted toward graduation.

### Undergraduate Psychology Teaching Minor

**Required Psychology Courses (15 credits), plus**

**Elective Psychology Courses (3 credits)**

Students who choose to pursue a psychology teaching minor must complete Psy 1010, 1100, 1400, 1410, 2100, and 3660, for a total of 15 semester credits. At least 12 credits of the 18 required

credits must be completed at USU. In addition, they must select at least one 3-credit class from the list of courses required for or serving as primary electives for the psychology major. Required GPA for psychology courses is 3.0. Students must receive a grade of C- or higher in all psychology courses (USU and transfer) in order to have them counted toward graduation. Finally, they need to fulfill the 35-credit requirement for the Secondary Teacher Education Program (STEP) in the Department of Secondary Education.

### ***Skill Tracks for Undergraduate Majors in Psychology***

The following skill tracks can be completed as part of a student's major in Psychology. A skill track represents a cluster of courses that help provide more comprehensive knowledge and practical skill in particular areas. After admission as a major in Psychology, students may apply for admission to a skill track. Completing a skill track requires careful planning, so that skill track courses and all other required and elective courses for the major are fulfilled. Enrollment in a skill track is entirely optional for majors.

**Behavior Analysis Skill Track.** The following cluster of courses will provide psychology majors with a basic foundation in experimental and applied behavior analysis: Psy 1400, 1410, 3400, 4910, 5720; SpEd 5010, 5050; Biol 3010; and Phil 4320 or 4900.

**Interpersonal Relationships Skill Track.** The following cluster of courses will assist psychology majors in systematically developing a broad range of interpersonal relationship skills, such as listening, assertiveness, negotiation, conflict resolution, anger management, etc.: Psy 1210, 3210, 3510, 4210, 4510, 5200; MHR 3710.

**Graduate School Preparation Track.** The major in Psychology has been designed so that students take classes that will help them compete in applying for graduate school. Students completing the graduate school track need to become actively involved with faculty research, form an association with Psi Chi, and enroll in independent research and readings courses. Students should also take a course covering use of statistical software (e.g., SPSS), offered through FHD or Sociology. Furthermore, it is recommended that students take at least one upper-division course in statistics from Psychology, FHD, or Sociology.

### ***Psychology Courses Fulfilling University Studies Requirements***

The following Psychology courses may be used to fulfill University Studies requirements, in the areas indicated:

**Breadth Social Sciences (BSS):** Psy 1010.

**Depth Social Sciences (DSS):** Psy 3210, 3400, 3500, 3510, 4210, 4230, 4240, 4420.

**Communications Intensive (CI):** Psy 4510, 5200, 5950, 5960.

**Quantitative Intensive (QI):** Psy 2800.

Although these courses may be applied toward fulfilling the University Studies breadth, depth, communications intensive, and quantitative intensive requirements, students must be prepared to complete additional writing or library assignments, as required for University Studies.

### ***Important Contingencies for Psychology Courses***

Prerequisites for Psychology courses are *strictly enforced*. The prerequisites are indicated, at the end of course descriptions, within the Psychology course listings (see pages 412-416).

A student must be admitted as a psychology major *or* must complete *at least* 45 semester credits with a GPA of 3.0 or higher prior to taking psychology courses numbered 3000 or above. However, students who have been admitted to the Teacher Education program may take Psy 3660, provided they have met the prerequisites. A student must be admitted as a psychology major *or* must complete *at least* 60 semester credits with a GPA of 3.0 or higher prior to taking psychology courses numbered 4000 or above.

Students desiring to receive credit for courses taken previously at other institutions will need to assure the Undergraduate Advising Office that the substitute class contained the requisite laboratory experience (where applicable).

Students who can complete a baccalaureate degree within seven years of enrollment at USU can qualify for graduation by meeting (1) the General Education/University Studies requirements in effect when they initially enrolled and (2) the major requirements in effect when they officially declared their major, even though there may have been changes in General Education/University Studies and major requirements since that time. Students who have not completed the baccalaureate requirements within seven years of their initial enrollment at USU must have their General Education/University Studies and major requirements evaluated and approved by their department head and dean. However, exceptions to this seven-year policy may be necessary for mandated changes in degree requirements.

Undergraduate psychology coursework (USU or transfer) that is *more than eight years old* may *not* be used toward meeting the specific psychology coursework requirements for a psychology major or psychology minor. However, the Psychology Department Undergraduate Committee may allow revalidation through testing. Testing arrangements may be made by contacting Tara Johnson by e-mail at [tjohnson@coe.usu.edu](mailto:tjohnson@coe.usu.edu).

## ***Graduate Programs***

### ***Admission Requirements***

Admissions requirements vary somewhat across Psychology graduate programs. However, applications submitted to the School of Graduate Studies must include the following: (1) transcript showing completion of undergraduate course prerequisites, plus any recommended coursework; (2) report of (GRE) test scores from ETS; (3) GPA of at least 3.2, covering the last 60 semester credits; (4) three letters of recommendation; and (5) a statement of professional goals and intent. The department requires a minimum GRE combined (Verbal and Quantitative) score of at least 1,100 for all programs.

The deadline for submitting applications for the Combined Clinical/Counseling/School Psychology PhD program is **January 15**. Applications for the Research and Evaluation Methodology PhD program are reviewed throughout the year. The application

deadline for the MS School Psychology program is **March 1**. Applications for the MS program in School Counseling must be submitted by **June 1** during odd-numbered alternate years (e.g., 2003, 2005, etc.). With the exception of the PhD program in Combined Clinical/Counseling/School, applications for programs may be accepted after these dates if openings still exist.

Students are admitted to Psychology master's degree programs, including School Psychology and School Counseling, following completion of a bachelor's degree. Prospective PhD program students can compete for admission to the Combined Clinical/Counseling/School program or the Research and Evaluation Methodology program if they possess either a bachelor's or a master's degree.

### **Prerequisites for Admission to Graduate Programs**

Applicants to the Master of Science (MS) and Doctor of Philosophy (PhD) program are advised that they should possess a broad base of knowledge at the undergraduate level in a *substantive subgroup* of the following: general psychology, human development, learning theory, cognition, personality theory research, psychometrics, elementary statistics, history and systems, physiological, sensation and perception, and social psychology. The absolute prerequisites for each graduate program are outlined below, along with a listing of graduate program course requirements for each program.

### **Psychology MS Programs**

#### **School Psychology, NASP-accredited**

USU's nationally accredited program in school psychology emphasizes child development issues, assessment and treatment of emotional and behavioral disorders, and traditional psychoeducational assessment and consultation activities appropriate to school settings. The program is approved by the Utah State Office of Education for certification of school psychologists. Students are required to complete either a research thesis (Graduate School Plan A option), or a major literature review/synthesis paper (Plan B).

**Absolute undergraduate course prerequisites** for admission to the MS in School Psychology are as follows: (1) *Elementary Statistics*; (2) *Theories/Research in Learning*; (3) *Abnormal Psychology*; and (4) *Theories/Research in Personality*.

The MS in School Psychology requires a **minimum of 60 semester credits**. The following courses are required: Psy 6150, 6220, 6270, 6290, 6310, 6330 or 6600, 6340, 6350, 6360, 6380, 6410, 6450, 6460, 6530, 6570; Psy 6650 or 6660; Psy 6880, 6890, 6950; and Psy 6970 (2-6 credits).

#### **School Counseling**

This program has been designed to help students earn an MS degree in psychology, with appropriate coursework for certification as a school counselor. School counselors are commonly employed by public and private elementary and secondary schools to provide educational/vocational guidance and counseling services. The program is approved by the Utah State Office of Education. It is offered via a live, video distance education system (EDNET). This program is not designed to meet the requirements for the Professional Counselor license (mental health).

**Absolute undergraduate course prerequisites** for admission to the MS in School Counseling are as follows: (1) *Developmental Psychology*; (2) *Abnormal Psychology*; (3) *Theories/Research in Personality*; and (4) *Psychological Statistics (or equivalent)*.

The MS in School Counseling requires **40 total semester credits**. The following courses are required: Psy 6150, 6220, 6240, 6250 (10 credits), 6260, 6290, 6330, 6350, 6370, 6460, 6660.

### **PhD Programs**

#### **Combined Clinical/Counseling/School Psychology, (APA-accredited)**

This program integrates the theory and practice of psychology common to the disciplines traditionally denoted as clinical, counseling, and school psychology. It subscribes to the scientist-practitioner model, and students completing the program will commonly enter professional practice in VA hospitals, mental health centers, hospitals, clinics, and academic settings. The program provides an excellent balance of research and practitioner skill training. Entering BS students can opt to earn an MS degree in either school counseling or school psychology prior to the PhD. A research thesis and dissertation are required of all students. The combined program provides generalized training, along with three areas of specialization. The emphasis areas are designed for students to begin systematically developing a specialty area in line with their future career goals. The three areas of specialization, which mirror faculty interest and expertise, are health psychology/neuropsychology, child clinical (with or without a school psychology emphasis), and rural and minority psychology. The program is also affiliated with the American Indian Support Project, one of the nation's most successful programs for training and mentoring American Indian PhD psychologists.

**Absolute undergraduate prerequisites** for admission to the PhD program in Combined Clinical/Counseling/School are as follows: (1) *Elementary Statistics*; (2) *Theories/Research in Learning*; (3) *Abnormal Psychology*; and (4) *Theories/Research in Personality*.

The Combined Clinical/Counseling/School Psychology PhD requires **103 total semester credits**, including the following: (1) *MS counseling psychology degree curriculum*: Psy 6290, 6310, 6320, 6350, 6360, 6570, 6600, 6880, 6970; and (2) *PhD program courses*: Psy 6220, 6510, 6530, 6610; Psy 6650 or 6660; Psy 7100, 7250, 7270, 7350, 7360, 7370, 7670, 7910, 7950, 7970; 6 credits of electives. **Note:** The MS counseling psychology degree is available *only* to students matriculated into the PhD Clinical/Counseling/School program.

#### **Research and Evaluation Methodology (REM)**

The department offers a PhD program in research and evaluation methodology. The program is designed to produce specialists in research and evaluation methodology capable of contributing to the knowledge base in psychology and education, and of evaluating programs, products, and processes employed in these two fields. While satisfying the department's general requirements, students may design their programs to become specialists in evaluation, applied research, basic research, or functional combinations of these roles. A research thesis and/or dissertation are required of all students.

**Absolute undergraduate prerequisites** for admission to the PhD program in Research and Evaluation Methodology are as follows: (1) *Elementary Statistics*; (2) *Psychometrics*; and (3) *History and Systems of Psychology*.

The Research and Evaluation Methodology PhD requires a **minimum of 72 total credits** past the MS degree, including the following: (1) **REM MS degree curriculum:** Psy 6010, 6530, 6570, 6600, 6610, 6650, 6660; Psy 6970 (8 credits); (2) **REM PhD degree curriculum:** Educ 6770; Psy 6930, 7020, 7030, 7050, 7060, 7070, 7080, 7090, 7670, 7700; Psy 7970 (12 credits).

### Additional Requirements for Psychology PhD Programs

All PhD candidates must meet the following general core requirements, regardless of specialty emphasis: (1) submission of an article for publication in a recognized journal; (2) presentation of research findings at a regional or national convention or professional meeting; (3) completion of the doctoral dissertation; (4) a comprehensive literature review; (5) completion of the research core; and (6) completion of an apprenticeship or internship. Students in the Professional-Scientific PhD program must also complete a formal case presentation, and compete nationally for admission to an APA-approved, 2,000-hour predoctoral internship. The REM program has an additional requirement of a grant proposal.

### Research Opportunities for Students

Departmental faculty are heavily involved in programmatic research. A sampling of the diverse research interests of tenured and tenure-track faculty available to students includes: *Ascione*—prosocial, moral development, domestic violence, relation between cruelty to animals and psychopathology; *Chavajay*—relations between culture and cognition, developmental psychology; *Cheney*—behavioral pharmacology, basic operant learning; *Crowley*—anxiety, depression, supervision and training; *DeBerard*—health psychology, behavioral medicine, spinal surgery outcome and technique efficacy; *Domench Rodriguez*—Latino family dynamics, parent training programs; *Ferguson*—social skills, guilt/shame development, social cognition; *Gallier*—social and dating relationship processes and dynamics in adolescence and rural mental health service delivery; *Gilbertson*—early intervention and prevention of behavior problems, school psychology; *Gimpel*—ADHD, behavioral disorders of children; *Hayashi*—quantitative methods, psychometrics; *Julnes*—evaluation theory, human service delivery, family; *Lehman*—Web/Internet learning variables and efficacy, educational psychology; *Masters*—exercise and health, health psychology, therapy outcome, religion and health; *Osborne*—experimental and applied behavior analysis; *Roberts*—early intervention with families of young children, community-based systems of services; *Stein*—addictive behaviors and models, drug and alcohol prevention/treatment; *J. Tszanz*—neuropsychology of Alzheimer’s disease and other dementias; *White*—educational research, hearing loss detection in infancy and program evaluation.

### Graduate Student Financial Assistance

Financial support for students enrolled in terminal MS programs is limited. MS students should meet with their academic advisor for information about possible assistantship opportunities.

PhD students are guaranteed an assistantship for at least their first year. However, for at least the last 15 years, 100 percent of

PhD students have continued to enjoy assistantship support beyond their first year, if they desired it. The department has available a number of teaching assistantships. Though these are generally awarded to students matriculated in psychology PhD programs, they are occasionally given to exceptional MS students. Also, faculty in the department and college regularly offer research assistantships to graduate students, as does the Counseling Center and a variety of on- and off-campus facilities (e.g., Center for Persons with Disabilities, Bear River Mental Health Center, Head Start, and Early Head Start). Additionally, first-year psychology PhD students typically compete extremely well for several University Fellowships, which were established to attract top student scholars to USU. Furthermore, the department has some scholarship support specifically available to psychology graduate students (e.g., Walter Borg and Elwin Nielsen scholarships). Finally, in accordance with current School of Graduate Studies policy, PhD students may qualify for full tuition remission for up to 70 credits within their program.

## Psychology Courses (Psy)

**Note:** Prerequisites for Psychology courses are *strictly enforced*. In the course listings below, prerequisites are indicated at the end of course descriptions. See page 410 for *important contingencies for Psychology courses*.

**Psy 1000. University Survival.** Based on young adult psychological development theory, course is designed to provide students with the opportunity to understand the expectations and challenges of university life and the normal transitional issues at this stage of young adult/psychological development. Introduces learning strategies for academic success and behavioral strategies to cope with the university environment. (2-3 cr) (F)

**Psy 1010 (BSS). General Psychology.** Explores basic areas of psychology, and how each explains human thought and behavior at the individual, familial, and cultural levels. (3 cr) (F,Sp,Su)

**Psy 1100. Developmental Psychology: Infancy and Childhood.** Introduction to psychological development with emphasis on perceptual, language, cognitive, and social development in children. Prerequisite: Psy 1010. (3 cr) (F,Sp)

**Psy 1210. Psychology of Human Adjustment.** Examination of life situations affecting human adjustment to everyday living, with emphasis on practical applications. Prerequisite: Psy 1010. (3 cr) (F,Sp,Su) ©

**Psy 1220. Career and Life Planning.** Students assess and clarify their interests, values, skills, and temperaments. Emphasizes discovering relationships between these personal characteristics and the realities of educational and employment opportunities. Explores setting goals, creating action plans, and coping with change. (3 cr) (F,Sp)

**Psy 1400. Analysis of Behavior: Basic Principles.** A laboratory course about the scientific methods used in the study of animal and human behavior. Prerequisite: Psy 1010. (3 cr) (F,Sp,Su)

**Psy 1410. Analysis of Behavior: Basic Principles Lab.** Laboratory experience accompanying Psy 1400. Prerequisite: Psy 1010. (1 cr) (F,Sp,Su)

**Psy 1730. Strategies for Academic Success.** Orients students to the systems, tools, and resources unique to higher education that are needed to maximize academic success (e.g., library, computer lab use, etc.). Also helps students develop critical thinking, study, and learning strategies necessary for college success. (1-3 cr) (F,Sp)

**Psy 1750. Comprehension Strategies for College Reading.** Practical course emphasizing application of strategies and development of critical thinking skills needed to comprehend and distill meaning from college-level texts. (1 cr) (F,Sp)

**\*\*Psy 2100. Developmental Psychology: Adolescence.** Characteristics of adolescents and their psychological, educational, and adjustment problems are discussed in detail. Prerequisite: Psy 1010. (3 cr) (Sp)

**Psy 2250. Introductory Cooperative Work Experience.** Educators and employers cooperate to provide opportunities for students to apply classroom theory and principles in job environments, thereby gaining practical experience in their field. Prerequisite: Approval of Psychology Department coop education counselor. (1-6 cr) (F,Sp,Su) ®

**Psy 2800 (QI). Psychological Statistics.** Elementary study of statistical procedures in handling test scores and other data, and of the concepts needed for each current type of educational and psychological literature. Prerequisite: Stat 1040. (3 cr) (F,Sp)

**Psy 3120. Abuse and Neglect.** Students examine causes, treatment, and laws associated with family violence, including child abuse and neglect, partner abuse, and elder abuse. Prerequisite: FHD 1500 or Psy 1100. Also taught as FHD 3120. (3 cr) (F,Sp,Su) ©

**Psy 3210 (DSS). Abnormal Psychology.** Introduction to “abnormal” human behavior. Covers characteristics, etiology, and treatment of a variety of psychological disorders. Prerequisite: Psy 1010. (3 cr) (F,Sp) ©

**Psy 3400 (DSS). Analysis of Behavior: Advanced.** In-depth examination of principles introduced in Psy 1400. Considers principles governing more complex human and animal behavior, as well as emotional and motivational factors in behavior. Lab included as part of credit. Prerequisites: Psy 1400 and 1410. (4 cr) (Sp)

**Psy 3450. Perception and Psychophysics.** Analysis of how sensory processes and principles help determine behavior. Introduction to methods used to measure sensory-determined behavior. Methods, results, and principles of sensory communication. Lab required as part of 3 credits. Prerequisite: Psy 1010. (3 cr) (F)

**Psy 3460. Physiological Psychology.** Introductory course examining relationship between central system anatomy and physiology, and behavior and emotional functioning. Also considers neural and biochemical substrates of behavior. Lab required as part of 3 credits. Prerequisite: Psy 1010. (3 cr) (Sp)

**Psy 3500 (DSS). Scientific Thinking and Methods in Psychology.** Social science research is commonly reported by the media, and by political and governmental interests. Students learn how to legitimately interpret such research through a study of accepted research methods and analysis procedures, and through critical study of the common interpretive mistakes made by media writers. Prerequisites: Psy 1010 and 2800. (3 cr) (F,Sp)

**Psy 3510 (DSS). Social Psychology.** Study of the individual in society; problems, theories, and methods of social psychology; will relate reading assignments to current social issues. Prerequisite: Psy 1010. (3 cr) (F,Su)

**Psy 3660. Educational Psychology for Teachers.** Principles and practices for development of conditions for effective learning. Lab required. Prerequisite: Psy 1100 or 2100. (2 cr) (F,Sp)

**\*\*\*Psy 4000. Mental Aspects of Sports Performance.** Provides an understanding of theory and applications in the specialty area of sports psychology, including enhancement of motivation and performance, stress, anxiety, aggression and time management, and the relation of these issues to physical development and coaching styles. Also taught as PEP 4000. (3 cr) (F,Sp,Su)

**Psy 4210 (DSS). Personality Theory.** Explanatory study of various personality theories, their origin, and approaches to the understanding of human behavior. Prerequisites: Psy 1010 and 2800. (3 cr) (Sp) ©

**Psy 4230 (DSS). Psychology of Gender.** Critical analysis of evidence for sex differences, gender roles, the effect of gender on traditional psychology, and other topics, including parenthood, cultural influence, and sexual orientation. (3 cr) (Sp)

**Psy 4240 (DSS). Multicultural Psychology.** Explores cultural influences on basic psychological processes, including perception, cognition, language, emotion, intelligence, attitudes, values, and intergroup relations. Prerequisite: Psy 1010. (3 cr) (F)

**Psy 4250. Advanced Cooperative Work Experience.** Cooperative education work experience position; increased level of complexity and a more professional level of experience as student advances toward completion of the program. Prerequisite: Approval of Psychology Department cooperative education coordinator. (1-12 cr) (F,Sp,Su) ®

**Psy 4420 (DSS). Cognitive Psychology.** In-depth study of basic concepts, methods, and theories involved in perception, memory, and thinking. Lab required. Prerequisite: Psy 1010. (3 cr) (Sp)

**Psy 4430. Cognitive Psychology Laboratory.** Required laboratory, designed to accompany Psy 4420. Focuses on conducting cognitive experiments via computer simulations and sampling data collection. Designed to increase skills in designing data collection and interpreting experimental data. (1 cr) (Sp)

**Psy 4510 (CI). Effective Social Skills Interventions.** Examination of theory and practice of social skills training with children, adolescents, and adults. Prerequisites: Psy 1010, 1100, and either Psy 3210 or 3510. (3 cr) (Sp)

**Psy 4910. Undergraduate Research Creative Opportunity.** A cooperative process of discovery, investigation, research, or creativity between faculty and one or more students. Prerequisite: Approval of Psychology Department URCO coordinator. (1-3 cr) (F,Sp,Su) ®

**Psy 4920. Practicum.** Field work in applied psychological setting at BS level. (1-3 cr) (F,Sp,Su) ®

**Psy 5020 (d6020).<sup>1</sup> Multicultural Issues in Psychology.** Examines role of culture in human development, with emphasis on understanding relations between culture, ethnicity, and identity and how images of “cultural selves” and “cultural others” are produced and “naturalized.” (3 cr) (F)

**Psy 5050 (d6050). Psychological Aspects of Sports Performance.** Psychological theory and principles applied to sports. Includes motivational techniques, psychological evaluation, stress and anxiety in sports, personality and sports performance. Also taught as PEP 5050/6050. (3 cr) (Sp)

**Psy 5100 (d6100). History and Systems of Psychology.** Theoretical and historical developments in psychology with primary emphasis on nineteenth and twentieth century developments, although earlier precursors are also considered. Prerequisite: Psy 1010. (3 cr) (Sp)

**Psy 5200 (CI). Introduction to Interviewing and Counseling.** Theory, models, and practice in basic principles of interviewing and counseling, including listening skills, facilitation of verbal interaction, gathering information, attending to nonverbal behavior, interpersonal dynamics, and promoting helping relationships. Prerequisites: Psychology major or minor, matriculation in master’s program requiring Psy 5200, or consent of instructor. (3 cr) (F)

**Psy 5330 (d6330). Psychometrics.** Overview of measurement development principles and statistics. Evaluation, interpretation, and uses of standardized tests of aptitude, intelligence, achievement, personality, and adjustment. Prerequisites: Psy 1010, 2800. (3 cr) (F)

**Psy 5500. Interdisciplinary Workshop.** (1-3 cr) (F,Sp,Su) ®

**Psy 5670. Psychological Principles and Individuals who are Deaf and Hard of Hearing.** Psychological theories and research used to describe the deaf and hard of hearing. Exploration of principles that can be used in helping these individuals achieve emotional well-being. Also taught as ComD 5670. (3 cr) (Sp)

**Psy 5720. Behavior Analysis Practicum.** Students receive supervised training in applying behavior analysis principles in community, school, and institutional settings.

Either SpEd 5050 or Psy/SpEd 5720 fulfill part of practicum requirement for Behavior Analysis track. Prerequisite: Permission of instructor. Also taught as SpEd 5720. (3 cr) (F)

**Psy 5900. Independent Study.** Individual discussion and intensive study of a particular problem or area. Prerequisite: Instructor's consent. (1-3 cr) (F,Sp,Su) ®

**Psy 5910. Independent Research.** Experiments and demonstration projects are conducted and reported. Prerequisite: Instructor's consent. (1-3 cr) (F,Sp,Su) ®

**Psy 5930. Instructional Apprenticeship in Psychology.** Didactic and applied experience in course preparation and instructional techniques applicable to the teaching of psychology. Intended for students planning careers as instructors at the secondary and postsecondary levels. Prerequisite: Instructor's consent. (1-3 cr) (F,Sp,Su) ®

**Psy 5950 (CI). Undergraduate Apprenticeship I.** Orientation to profession of psychology. Students clarify career goals, identify steps necessary to achieve goals, prepare a vita, plan and begin executing their apprenticeship experience with faculty member(s) or approved agency, and present progress reports to diverse audiences. Prerequisites: Psychology major, junior standing, and consent of on-campus USU Psychology Advising Office. (3 cr) (F,Sp)

**Psy 5960 (CI). Undergraduate Apprenticeship II.** Under supervision of departmentally approved agency and/or faculty member(s), students complete their pre-approved apprenticeship, which involves conducting research and/or providing community service. Students prepare a report of this experience and present it to diverse audiences. Prerequisites: Psy 5950, Psychology major, senior standing, and consent of on-campus USU Psychology Advising Office. (3 cr) (F,Sp)

**Psy 6010. Introduction to Program Evaluation: Evaluation Models and Practical Guidelines.** Alternative approaches and practical guidelines for conducting evaluation studies. Through case studies and simulations, addresses impact of social, political, and ethical issues on evaluation. Also taught as Educ 6010. (3 cr) (F,Su)

**Psy 6020 (d5020). Multicultural Issues in Psychology.** Examines role of culture in human development, with emphasis on understanding relations between culture, ethnicity, and identity and how images of "cultural selves" and "cultural others" are produced and "naturalized." (3 cr) (F)

**Psy 6050 (d5050). Psychological Aspects of Sports Performance.** Psychological theory and principles applied to sports. Includes motivational techniques, psychological evaluation, stress and anxiety in sports, personality and sports performance. Also taught as PEP 6050/5050. (3 cr) (Sp)

**Psy 6100 (d5100). History and Systems of Psychology.** Theoretical and historical developments in psychology with primary emphasis on nineteenth and twentieth century developments, although earlier precursors are also considered. Prerequisite: Psy 1010. (3 cr) (Sp)

**Psy 6150. Behavioral Assessment and Treatment of Childhood Psychological Disorders.** Introduction to single-subject treatment designs and basic principles of applied behavior analysis. Behaviorally-oriented treatment approaches for psychological disorders of childhood. Should be taken concurrently with a clinical practicum or assistantship. (3 cr) (Sp)

**Psy 6220. Group Counseling.** Introduction to theory of group counseling with illustrative experiences to show how theory may be applied. Prerequisite: Psy 6350. (3 cr) (F)

**Psy 6240. Introduction to School Counseling and Guidance.** Introduction to role and function of school counselors. Overview of history of school guidance and counseling, and role of counselors in comprehensive guidance program. (3 cr) (F)

**Psy 6250. Internship in School Counseling and Guidance.** Internship in approved school system involving comprehensive guidance activities, under supervision of certified school counselor. (1-10 cr) (F,Sp,Su) ®

**Psy 6260. Career Development: Theory and Practice.** Consideration of career patterns and factors influencing career development and career effectiveness. (3 cr) (Sp)

**Psy 6270. Child Psychopathology.** Focuses on issues relevant to the understanding of child emotional and behavioral disorders. Discussion of symptom characteristics, assessment, and treatment protocols, as well as research pertaining to the major mental health problems found in children and adolescents. Prerequisite: Admission to graduate program in psychology or permission of instructor. (3 cr) (F)

**Psy 6290. Diversity Issues in Treatment and Assessment.** Introduction to diversity issues in counseling and psychological/educational assessment, including culture, gender, language, and related issues. Training in models for providing effective psychological services to clients, taking into account their unique background. Prerequisite: Psy 6350 or instructor's consent. (3 cr) (Sp)

**Psy 6310. Intellectual Assessment.** Training and supervised experience in administering and interpreting individual intellectual ability tests, such as the Wechsler and Stanford-Binet scales. Prerequisite: Matriculation into School Psychology program or Combined Psychology program. (3 cr) (F)

**Psy 6320. Objective Assessment of Personality and Affect.** Research bases and clinical applications of objective psychological assessment instruments and techniques, designed to measure adolescent and adult personality, affect, and psychotherapy. Prerequisite: Psy 6310. (3 cr) (Sp)

**Psy 6330 (d5330). Psychometrics.** Overview of measurement development principles and statistics. Evaluation, interpretation, and uses of standardized tests of aptitude, intelligence, achievement, personality, and adjustment. Prerequisites: Psy 1010, 2800. (3 cr) (F)

**Psy 6340. Psychological and Educational Consultation.** Overview of theory and practice of consultation as provided by counselors, psychologists, and other mental health education professionals. Consultation with teachers, parents, medical professionals, and organizations, emphasizing applications in educational settings. (3 cr) (F)

**Psy 6350. Introduction to Theory and Practicum in Counseling.** Introduction to basic theories and techniques of counseling, with applied practice in role-playing, interviewing, and actual counseling sessions with practice subjects. Prerequisite: Matriculation in School Counseling, School Psychology, or Combined Psychology program. (3 cr) (F)

**Psy 6360. Practicum in Counseling and Psychotherapy.** Supervised practicum in counseling and psychotherapy conducted within Psychology Community Clinic. Closely supervised practice in assessment, counseling, psychotherapy, and consultation with individuals, couples, and families. Prerequisite: Psy 6350. (3 cr) (Sp,Su) ®

**Psy 6370. Practicum in School Counseling.** Supervised practicum in public school setting, under direction of certified school counselor. Taken by students in School Counseling master's program. (3 cr) (F,Sp,Su) ®

**Psy 6380. Practicum in School Psychology.** Supervised practicum in school psychology in public school or closely related setting. Taken by second-year students in School Psychology master's program. (3 cr) (F,Sp,Su) ®

**Psy 6410. Psychoeducational Assessment.** Training and supervised experience in assessment of school-age and preschool-age children. Administration and interpretation of cognitive, developmental, and academic achievement measures, along with other psychoeducational assessment instruments and methods. (3 cr) (Sp)

**Psy 6450. Introduction to School Psychology.** Introductory overview of field of school psychology. Role and function of school psychologist, historical context of school psychology, and trends and new developments in service provision. Prerequisite: Matriculation into School Psychology master's program or Combined Psychology doctoral program. (1 cr) (F)

**Psy 6460. Professional Issues in School Counseling and School Psychology.** Legal, ethical, and professional issues relevant to school counselors and school psychol-

ogists. Issues and practices in providing counseling and psychological services to "at-risk" students. Prerequisite: Graduate standing in psychology or instructor's consent. (3 cr) (Su)

**Psy 6470. Health Psychology.** Explores psychological and behavioral principles relating to health and illness. Focuses on development and maintenance of health behaviors. Emphasizes integration of research findings with clinical intervention. Prerequisite: Graduate standing in Psychology; or graduate standing in Health, Physical Education and Recreation. (3 cr) (F)

**6500. Interdisciplinary Workshop.** Series of self-instructional modules and videos and a variety of elective training. Module topics include developmental disabilities, legal aspects and issues, assessment, intervention, assistive technology, transition, and prevention/intervention for aggression and violence. (1-2 cr) (F,Sp,Su) ®

\*\*\***Psy 6510. Social Psychology.** Provides all graduate students with common knowledge base in social psychology. Emphasizes overview of recent developments, while also discussing social psychology principles as a guide in executing evaluation research and helping clients. Understanding of both emphases ensures breadth as psychologists. Prerequisite: Psy 3510. (3 cr) (Sp)

**Psy 6530. Developmental Psychology.** Advanced survey course in general developmental psychology. Theory and research in human development across the lifespan, with particular emphasis on child and adolescent development. (3 cr) (F)

**Psy 6570. Introduction to Educational and Psychological Research.** Provides introduction to research methods, including identification of research problem, review and evaluation of research literature, and design and implementation of research project. Prerequisite: Psy 2800. Also taught as Educ 6570. (3 cr) (F,Sp,Su)

**Psy 6600. Measurement, Design, and Analysis I.** Integrates concepts in measurement, research design, and statistical analysis for research in psychology and education. Emphasizes experimental design, correlation, regression, and general linear model. Prerequisites: Psy 2800, Educ/Psy 6570. Also taught as Educ 6600. (3 cr) (F,Sp,Su)

**Psy 6610. Measurement, Design, and Analysis II.** Builds on content of Educ/Psy 6600, and extends measurement, research design, and statistical analysis concepts to include within-subject and factorial designs, analysis of variance and covariance, and introduction to factor analysis and structural equation modeling. Prerequisite: Educ/Psy 6600. Also taught as Educ 6610. (3 cr) (F,Sp,Su)

\*\*\***Psy 6650. Theories of Learning: The Behavioral Perspective.** In-depth examination of the major behavioral theories of learning, including classical and operant conditioning. (3 cr) (F)

\*\*\***Psy 6660. Cognition and Instruction.** Survey of theory and principles in cognitive psychology, with special emphasis on applying these principles in instructional settings. (3 cr) (Sp)

**Psy 6750. Empirically Validated Treatments.** Emphasizes development of knowledge regarding criteria for determining if a treatment is empirically supported. Explains methods for identifying specific empirically supported treatments. Develops skills for applying these treatments to psychological disorders and for understanding how to evaluate the efficacy of treatments. (3 cr) (Sp)

**Psy 6810. Seminar.** Special topics designed to help students develop in-depth knowledge of emerging research, theory, and practice in psychology. Taught in seminar format by USU faculty or visiting scholars. (1-3 cr) (F,Sp,Su) ®

\*\*\***Psy 6820.2 Clinical Applications of Biofeedback.** Training in clinical applications of biofeedback for treating common health, psychological, and stress related problems. Practical experience provided in use of different modalities of biofeedback (e.g., neurofeedback, skin temperature training, and electrodermal training). Stresses importance of integrating biofeedback into other appropriate treatments. Prerequisite: Graduate standing in psychology or instructor's consent. (3 cr) (F)

**Psy 6880. Transcultural Assessment Lab.** Psychoeducational assessment laboratory experience to be taken by students in the School Psychology and Combined Psychology programs in conjunction with Psy 6290. (1 cr) (Sp)

**Psy 6890. Assessment of Child and Adolescent Psychopathology and Personality.** Theoretical foundations and applied training in methods of assessing and classifying behavioral, social, and emotional problems of children and adolescents. Prerequisite: Matriculation into Combined Psychology doctoral program or School Psychology master's program. (3 cr) (Su)

**Psy 6900. Independent Study.** Individual discussion and intensive study of a particular problem or area. Prerequisite: Instructor's consent. (1-3 cr) (F,Sp,Su) ®

**Psy 6910. Independent Research.** Experiments and demonstration projects are conducted and reported. Prerequisite: Instructor's consent. (1-3 cr) (F,Sp,Su) ®

**Psy 6930. University Teaching Apprenticeship.** Prepares graduate students for college teaching. Students learn to prepare study guides, examinations, and lectures, and learn to use audio-visual aids. Students also examine various current methods of instruction and course evaluation schemes. (1-3 cr) (F,Sp,Su) ®

**Psy 6950. Internship in School Psychology.** Internship in approved school system involving assessment, counseling, consultation, and program development, under the supervision of a certified school psychologist. Prerequisite: Matriculation into School Psychology master's program or Combined Psychology doctoral program. (3 cr) (F,Sp,Su) ®

**Psy 6970. Thesis.** (1-6 cr) (F,Sp,Su) ®

**Psy 6990. Continuing Graduate Advisement.** (1-12 cr) (F,Sp,Su) ®

\***Psy 7020. Advanced Evaluation Methodology and Techniques.** Provides advanced theory and practice in focus group interviews, on-site visit techniques, observation and anchor scales, multiple-site evaluation standards, and advanced reporting techniques. Prerequisite: Psy 6010. (3 cr) (Sp)

\*\*\***Psy 7030. Instrument Development.** In-depth study of factors and techniques critical for designing and developing evaluation and research instruments. (3 cr) (F)

**Psy 7040. Practicum in Evaluation Planning and Contracting.** Provides detailed information on methods for planning program evaluations, negotiating agreements with client/sponsor, and finalizing evaluation contract. Taught every third year. Prerequisite: Educ/Psy 6010. (3 cr) (Sp)

**Psy 7050. Internship in Program Evaluation.** Experience in practical aspects of program evaluation through planned, supervised evaluation project participation approved by student's supervisory committee. Prerequisite: Educ/Psy 6010. (1-9 cr) (F,Sp,Su) ®

**Psy 7060. Internship in Research.** Research experience gained through conducting planned, supervised research project. Prerequisites: Approval by supervisory committee and Educ/Psy 6570. (1-9 cr) (F,Sp,Su) ®

**Psy 7070. Advanced Measurement Theories and Practice.** Covers psychometric topics, including classical test theory, generalizability theory, item response theory, and issues concerning bias in psychological testing. Prerequisites: Psy 5330/6330, Educ/Psy 6600. (3 cr) (F)

**Psy 7080. Multivariate Methods in Psychology and Education.** Focuses on application of multivariate methods (factor analytic techniques, structural equation modeling, canonical correlation, multivariate analysis of variance, etc.) in research and measurement in psychology, education, and other social and behavioral sciences. Prerequisites: Psy 5330/6330, Educ/Psy 6600, 6610. (3 cr) (F)

**Psy 7090. Research and Evaluation Methodology Program Seminar.** Provides opportunity for all doctoral students in the Research and Evaluation Methodology

Program to meet on a regular basis to read journal articles, explore student and faculty research projects, and discuss current issues in the field. (1 cr) (F,Sp) ®

\*\*\***Psy 7100. Biological Basis of Behavior.** Explores normal and abnormal behavior from a basic neuroanatomical/neurophysiological perspective. Discusses pharmacological/nonpharmacological applications. (3 cr) (Sp)

**Psy 7110. Advanced Theories in Cognitive Psychology.** In-depth study of theories, models, and current research in the field of cognitive psychology, including memory, perception, problem-solving, and decision making. Prerequisite: Psy 4420 or 6660. (3 cr) (F)

\*\*\***Psy 7230. Theory and Research in Personality.** Overview of theoretical approaches, research, and clinical applications regarding personality differences. (3 cr) (F)

\*\*\***Psy 7250. Professional Ethics and Standards.** Designed to train clinicians and researchers in the field of psychology to operate within the professional ethics and standards of the field. (3 cr) (F)

\*\*\***Psy 7270. Psychopathology.** Summarizes research on risk, epidemiologic factors, and etiological perspectives regarding emotional and behavioral disorders of adolescents and adults. Models of classification of disorders are outlined, emphasizing the DSM system. Focuses on anxiety, mood, somatoform, dissociative, personality, and psychosexual disorders, as well as schizophrenia, drug/alcohol dependence, violence, and psychological factors affecting physical illness. (3 cr) (F)

**Psy 7320. Advanced Personality Assessment.** Theory and clinical training in personality assessment, with additional techniques than those covered in Psy 6320. Focuses on the comprehensive scoring system of Rorschach. Prerequisite: Psy 6320 or instructor's consent. (2 cr) (Su)

**Psy 7350. Practicum in School Psychology.** Doctoral-level practicum in a school or closely related setting. Supervised experience in developmental, learning, and school-related problems. Appropriate assessment and consultation with teachers, administrators, parents, and other related individuals. Prerequisite: Permission of program chair. (3 cr) (F,Sp,Su) ®

**Psy 7360. Practicum in Counseling Psychology.** Doctoral-level practicum in a counseling setting. Supervised experience in individual, group, and family counseling. Appropriate assessment and consultation. Prerequisite: Permission of program chair. (3 cr) (F,Sp,Su) ®

**Psy 7370. Practicum in Clinical Psychology.** Doctoral-level practicum in a clinical setting. Supervised experience in individual, group, and family psychotherapy. Includes psychological assessment and consultation. Prerequisite: Permission of program chair. (3 cr) (F,Sp,Su) ®

**Psy 7670. Proposal Development.** Advanced concepts in designing, writing, and critiquing literature reviews including meta-analysis. Students work with instructor

and their advisor to develop a dissertation proposal. Prerequisite: Educ/Psy 6610, Educ 6770. Also taught as Educ 7670. (1 cr) (F,Sp,Su)

\*\***Psy 7700. Grant Writing.** Students learn to identify funding sources, select strategies for seeking resources, and write proposals for research, development, training, and service activities in education, psychology, and related fields. Prerequisite: Psy/Educ 6570. (3 cr) (Sp)

**Psy 7810. Seminar.** Special topics designed to help students develop in-depth knowledge of emerging research, theory, and practice in psychology. Taught in seminar format by USU faculty or visiting scholars. (1-3 cr) (F,Sp,Su) ®

**Psy 7820. Neuropsychological Assessment Workshop.** Discussion and presentation of neurological syndromes and the various techniques of diagnosis and assessment. (2 cr) (Su)

\*\*\***Psy 7840.2 Psychopharmacology.** Provides psychology graduate students with basic working knowledge of the field of psychopharmacology and the medical use of psychotropic drugs. Prerequisite: Psy 6320. (1 cr)

**Psy 7900. Independent Study.** Individual discussion and intensive study of a particular problem or area. Prerequisite: Instructor's consent. (1-3 cr) (F,Sp,Su) ®

**Psy 7910. Independent Research.** Experiments and demonstration projects are conducted and reported. Prerequisite: Instructor's consent. (1-3 cr) (F,Sp,Su) ®

**Psy 7950. Internship in Professional Psychology.** One-year, supervised, full-time internship required of doctoral candidates in professional psychology (clinical, counseling, and/or school psychology). Prerequisite: All doctoral coursework completed, with the possible exception of the dissertation if approved by the student's committee, prior to initiating the internship. (1 cr) (F,Sp,Su) ®

**Psy 7970. Dissertation.** (1-18 cr) (F,Sp,Su) ®

**Psy 7990. Continuing Graduate Advisement.** (1-12 cr) (F,Sp,Su) ®

<sup>1</sup> Parenthetical numbers preceded by *d* indicate a *dual* listing.

<sup>2</sup> This course is offered infrequently. For more information, contact Psychology Department.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

\*\*\*This course is taught alternating years. Check with department for information about when course will be taught.

Department of  
**Secondary Education**  
 College of Education

**Head: Professor Barry M. Franklin**, curriculum policy, theory, and history; teacher education  
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**Professors** *Michael W. Heikkinen*, science education, measurement/evaluation, research methods; *William J. Strong*, English education, Director of Utah Writing Project; **Professors Emeriti** *Ross R. Allen*, mathematics education, comparative education; *Eldon M. Drake*, journalism, general student teaching; *Kenneth C. Farrer*, curriculum development; *Richard S. Knight*, social studies education, curriculum foundations, teaching/learning theory; *Izar A. Martinez*, administration, research methods, measurement/evaluation; *Walter L. Saunders*, science education, research methods; *James P. Shaver*, social studies education, research methods; **Associate Professors** *Kay Camperell*, content area reading/writing, learning theory, literacy education; *Grace C. Huerta*, educational foundations, multi-cultural education; **Associate Professor Emeritus** *Varnell A. Bench*, extension, administration, supervision; **Lecturers** *Marilee Coles-Ritchie*, content-area literacy, ESL; *C. Gregg Jorgensen*, social studies education; **Undergraduate Advisor** *Harold E. Heap*

**Degrees Offered:** Second Bachelor of Science (BS), Second Bachelor of Arts (BA), Master of Science (MS), Master of Arts (MA), and Master of Education (MEd) in Secondary Education; BS and BA in Composite Teaching—Social Studies. The department participates in the Interdepartmental Doctor of Education (EdD) and Doctor of Philosophy (PhD) programs, focusing on the Curriculum and Instruction specialization.

## Undergraduate Programs

### Objectives

The Department of Secondary Education coordinates state-approved programs for secondary teacher licensure across campus. The department offers the Secondary Teacher Education Program (STEP), a sequence of courses and field experiences designed to prepare students for teaching careers in secondary schools. The STEP program is fully accredited by the Utah State Board of Education and by the National Council for Accreditation of Teacher Education. Students who successfully complete the program are recommended for secondary licensure in the State of Utah, enabling them to teach in grades 6-12.

### Requirements

**Departmental Entrance Requirements.** In addition to meeting the admission requirements for the University, students in good standing must have a minimum entrance GPA of 2.75 and maintain that GPA in order to student teach. All students must be admitted to the teacher education program. See details below.

**Admission to Teacher Education.** Prior to enrolling in STEP courses, students must be admitted to the teacher education program. Criteria for admission include completion of a minimum of 60 semester credits, and (1) minimum ACT scores, (2) University Studies requirements, (3) a speech and hearing test, (4) a computer skills competency test (or equivalent coursework), (5) successful completion of the Teacher Education Writing Exam, and (6) recommendations from advisors in major and minor fields. Application forms are available from advisors; from the Office of Teacher Education, Graduation, and Educator

Licensing, Room 103, Emma Eccles Jones Education Building; and from the Department of Secondary Education, Room 330, Emma Eccles Jones Education Building.

Students must submit copies of University transcripts, including transfer coursework, verifying a minimum total GPA of 2.75. Criminal Background Check materials, required by the State of Utah, must also be submitted at this time. The fee for the Criminal Background Check is payable to the Utah State Office of Education. A money order must be provided as payment. Questions about the admission requirements may be directed to the Secondary Education advisor.

**Bachelor's Degree in Social Studies Composite Teaching.** Students who are accepted in good standing by the University and who have a minimum total GPA of 2.75 may be admitted to the Social Studies Composite Teaching Major. In order to graduate with the Social Studies Composite Teaching degree, students must (1) maintain a minimum 2.75 total GPA, (2) earn a grade of C or better in all courses in the major, (3) complete the Secondary Teacher Education Program (STEP), and (4) meet all requirements for the Secondary Teacher License (see below).

For the bachelor's degree, students must complete: (1) University Studies requirements, (2) courses required for the Social Studies Composite Teaching Major (see list below), (c) The Secondary Teacher Education Program (STEP), and (4) electives. Students must complete each course in the Social Studies Composite Teaching Major with a minimum grade of C. Upon completing all requirements for graduation, students are eligible for a secondary teaching license from the Utah State Office of Education (grades 6-12). Students with the Social Studies Composite Teaching Major graduate from the Department of Secondary Education. Courses in the Social Studies Composite Teaching

Major are provided by various departments. Students should check regularly with these departments and the Secondary Education advisor for changes and substitutions.

Students must complete a total of 60 credits selected from various social science courses listed below. The number of credits and course choices are listed after the area in which they must be completed.

**History (21 credits).** Hist 1030, 1040, 1050, 2700, 2710, 3850, and 4860.

**Geography (15 credits).** Geog 1030, 1130, 2030, 3850, and 4200 (Utah).

**Economics (6 credits).** Econ 1500 and 2010.

**Political Science (9 credits).** PolS 1100; PolS 4120 or 4130; electives (3 credits minimum), chosen from PolS 2200, 3130; and a third PolS course approved by the Secondary Education Advisor.

**Psychology/Sociology/Anthropology (15 credits).** Psy 1010, Soc 1010, Anth 1010; choose 6 credits from Soc 2500, 3010, or other courses approved by the Secondary Education Advisor.

**Secondary Teaching License (grades 6-12).** To obtain a teaching license, undergraduate students must complete (1) 30 credits of University Studies requirements, including written communications, (2) an approved composite teaching major *or* approved teaching major and teaching minor (see below), and (3) the Secondary Teacher Education Program (STEP). The Secondary Education advisor will assist returning students who already have an undergraduate degree with program planning for licensure. These students occupy “Second BS” or “Second BA” status while pursuing licensure. They also may apply for a second bachelor’s degree in conjunction with teacher licensure. Consult the Admissions Office for details.

All students should note that secondary teacher licensure is not automatic upon completion of the program. In order to receive Utah licensure, students must apply for the Basic Teaching License. Applications are available in the Office of Teacher Education, Graduation, and Educator Licensing, Emma Eccles Jones Education Building, Room 103.

**Elementary Education Dual Licensure.** Beyond the basic requirements for the elementary education license, students must: (1) complete the requirements for a composite teaching major or for a teaching major/minor as indicated above, and (2) complete the Secondary Teacher Education Program (STEP), including special methods courses and student teaching at the secondary level.

**Special Education Dual Licensure.** Students can be licensed in both special education and in a secondary subject area through a dual licensure program offered jointly by two departments. Early in their programs, students should consult with undergraduate advisors in Secondary Education and the Department of Special Education and Rehabilitation.

**Optional Middle Level Endorsement (grades 6-9).** The Department of Secondary Education has joined with the Department of Elementary Education to offer a Middle Level Endorsement for students seeking initial teacher licensure and for persons who already have an elementary or secondary teaching license. Students pursuing this endorsement must take additional coursework that specifically focuses on middle level curriculum and instruction. To be recommended for the Middle Level Endorsement, students must student teach (ScEd 5600) in the middle grades. Information

about this program is available from the Secondary Education Advisor and the Department of Elementary Education.

**ESL Teaching Minor.** The USU Elementary Education Department and the Secondary Education Department jointly offer a K-12 English as a Second Language (ESL) endorsement. Undergraduate students seeking initial teacher licensure can obtain an ESL Teaching Minor (24 credits) and the ESL endorsement. Students pursuing the minor must complete the following courses: Ling 4100, 4400, 4900; ScEd 3300 or 4300; ScEd 4710, 4770, 5600.

**Composite Majors, Teaching Majors, and Teaching Minors.** As suggested above, secondary licensure requires that students select a composite teaching major *or* a teaching major plus a teaching minor. Students are encouraged to begin with the *Guide to the Undergraduate Program in Secondary Education at USU*. The following composites, majors, and minors are approved by the Utah State Board of Education. Specific course requirements are available from departmental advisors across campus.

**Composite Teaching Majors (46 credits minimum).** Agricultural Education, Art Education, Biological Science, Business Information Technology and Education, Earth Science, Family and Consumer Sciences Education, Marketing Education, Music Education, Social Studies Education, and Technology and Industrial Education.

**Teaching Majors (30 credits minimum).** Chemistry, English, Geography, Health Education, History, Mathematics, Modern Languages, Physical Education (K-12), Physics, Political Science, Psychology, Sociology, and Theatre Arts.

**Teaching Minors (16 credits minimum).** Business Computer and Information Systems, Business Information Technology and Education, Chemistry, Economics, English, Geography, Health Education, History, Marketing Education, Mathematics, Modern Languages, Physical Education/Coaching, Physics, Political Science, Psychology, Sociology, Speech Communication, and Theatre Arts.

### ***Secondary Teacher Education Program (STEP)***

**Three-Level Program (35 credits).** Secondary Education coordinates a state-approved program to complement the teaching majors and minors in 21 departments. The framework is organized into three sequential levels, each taken during a different semester. Students should plan to take the STEP during their junior and senior years while completing major and minor coursework. *All three levels of the STEP are offered during fall and spring semesters, but not during summers. Levels of the STEP are taken as a package, not piecemeal. Each level must be satisfactorily completed before students advance to the next level.*

As outlined below, Level 1 and Level 2 courses are offered by the Department of Special Education and Rehabilitation and the Department of Secondary Education. Special methods classes are offered by many departments across campus. Students should consult the requirement sheet for their composite teaching major, teaching major, or teaching minor to determine which departmental methods course they should take at Level 1 or Level 2 to prepare for student teaching at Level 3. A master schedule of the special methods courses is available from departmental advisors or from the Department of Secondary Education. Student teaching in *both* the major and minor fields is required.

**Level 1 (10 credits).** After admission to teacher education, students should take ScEd 3100 and 3210 during the same semester. In addition, Level 1 students must take a special methods course in either their major or minor teaching field. Finally, a departmentally sponsored course with a 3300 number should be taken for in-school clinical experiences.

**Level 2 (10 credits).** After successfully completing Level 1 courses, students should take SpEd 4000 and ScEd 4200, 4210 during the same semester. In addition, Level 2 students must take a special methods course in either their major or minor teaching field. Finally, a departmentally sponsored course with a 4300 number should be taken for in-school clinical experiences.

**Level 3 (15 credits).** After successfully completing Level 2 courses, students should take InsT 5200 and ScEd 5300, 5500, 5600. In addition, students should enroll for a student teaching seminar for secondary student teaching.

Students must enroll for either Clinical Experience I or Clinical Experience II concurrent with their special methods courses. Special methods instructors set up and monitor these field activities in middle and high school settings. The clinical experiences provide a classroom context for understanding STEP and special methods courses. A third clinical experience is taken two weeks prior to student teaching at Level 3. A clinical experience fee of \$50 is assessed at each of the three levels. This fee provides a stipend to classroom teachers who work with clinical experience students in the public schools.

**Background Check and Student Teaching.** As a result of legislative mandate, all applicants for student teaching must undergo a criminal background check prior to student teaching placement. The Office of Field Experiences, Emma Eccles Jones Education Building, Room 330, will assist students in complying with this mandate. The fee for the background check is payable only by money order to the Utah State Office of Education.

Applications for student teaching must be submitted to the Office of Field Experiences, Emma Eccles Jones Education Building, Room 330, by March 1 for fall semester and by October 1 for spring semester. *Students must have completed 80 percent of their teaching major/minor (or composite major) requirements prior to student teaching.* The Portfolio Interview is part of the application process.

Students should be financially prepared to stay off campus, if necessary, during the 10-week block of student teaching. Because student teaching requires a major commitment of time and energy, it should be planned with care. Students are urged to forego outside employment, if possible, during the student teaching experience.

## Graduate Programs

### Admission Requirements

The Department of Secondary Education assists in the preparation of graduate students seeking the MEd, MA, and MS degrees, as well as the EdD and PhD degrees. Students desiring information concerning the various graduate programs should contact the department head. The application for admission to a graduate program is made through the School of Graduate Studies. See *Graduate Admission Procedures* (pages 72-73).

Students applying to a master's degree program may take either the Miller Analogy Test (MAT) or the Graduate Record

Exam (GRE). Students applying to a doctoral degree program should take the GRE. Scores at the 40th percentile or above are required for admission. In addition, students must have at least one year of teaching experience (or comparable professional experience) and a valid secondary teaching license.

All students applying to the doctoral degree program (Curriculum and Instruction specialization) participate in oral interviews with the Curriculum and Instruction Management Committee. A sample of academic writing should be included as part of the doctoral-level admission folder.

Master's applications are considered three times a year: June 15 for fall semester registration, October 15 for spring semester registration, and March 15 for summer semester registration. Doctoral applications are considered more frequently. *Application folders will be not be considered until all required information is received by the School of Graduate Studies and sent to the department.*

### Master's Degree Programs

Secondary Education master's degree programs provide coursework and professional experiences for those preparing to become master teachers, teacher-leaders, supervisors, or curriculum specialists. Each program provides coursework in education, with associated work in a specialized subject matter, which is the teacher's area of concentration. Typically, the area of concentration derives from the teacher's ongoing work with middle school or high school students.

Areas of emphasis in Secondary Education include the following: Educational Leadership, ESL, Gifted and Talented, English, Mathematics, Middle School, Reading, Science, and Social Studies. Three University departments—Art, Business Information Systems, and Music—also participate in master's degree programs sponsored by Secondary Education. Admission to these fields of study requires approval of the cooperating department. In planning areas of emphasis, students work with a faculty advisor and select graduate courses from the University-wide curriculum.

**MEd Degree Plan B (36 credits).** The MEd Plan B option culminates in the presentation of a creative project in a final exam setting. Students take a common core of courses from college and departmental curricula, then plan areas of concentration in relation to their teaching specialties. The research course for the MEd focuses on issues of application, as well as action research. Students may prepare creative projects of diverse kinds linked to teaching realities. In lieu of the creative project, students may select Plan C, an extra coursework option.

**MEd Degree Plan C (40 credits).** The Plan C MEd culminates in the presentation of a Professional Portfolio organized around principles of effective teaching that form the conceptual framework for courses in the Department of Secondary Education. Students take a common core of courses from college and departmental curricula, then plan areas of concentration in relation to their teaching specialties. The purpose of the portfolio is for students to integrate and apply concepts learned in the master's program.

**MS and MA Degrees Plan A (30 credits).** The MS/MA option culminates in a formal defense of a thesis. This option is for teachers whose long-term goals require a traditional, research-oriented degree. The MS thesis involves either an experimental or qualitative research study. The MA thesis involves development of a scholarly literature review. The MA degree also requires foreign language competency.

## Doctoral Degree Programs

For students who have already completed a master's degree, Secondary Education participates in the interdepartmental doctoral program coordinated by the dean of the College of Education. Both PhD and EdD degrees are offered in the Curriculum and Instruction specialization. For an overview of the program, including program requirements and admission procedures, see pages 211-212 of this catalog. As with any degree program, students interested in doctoral study are encouraged to contact the department head of Secondary Education.

## Financial Assistance

Departmental support or grant support is available to doctoral-level students pursuing full-time study on campus. Such financial support typically is through assistantships, which carry half-time teaching, research, or supervisory obligations. Typical assistantships carry forward for three or four years. Awards are made on a competitive basis. Doctoral students who wish to be considered for financial aid should apply to the department no later than February 1 for the following academic year. Acceptance to graduate study does not guarantee financial assistance.

## Secondary Education Courses (ScEd)

**ScEd 1000. Volunteer Experience.** Optional course providing orientation to agencies coordinating volunteer experiences in the community; such experiences are part of standards for admission to secondary teacher education. (1 cr) (F,Sp,Su)

**ScEd 3100. Motivation and Classroom Management.** Designed to lead pre-service secondary school teachers to address two questions: (1) What diverse traits, talents, attitudes, and experiences do pre-adolescent and adolescent students bring to the middle school, junior high school, and high school environment? and (2) In light of these diverse traits, talents, attitudes, and experiences, how should teachers work with students to build cooperative classroom communities where students are motivated to engage in productive learning activities? (3 cr) (F,Sp)

**ScEd 3210 (CI, DSS). Educational and Multicultural Foundations.** Provides preservice teachers with the opportunity to critically examine the political, economic, and educational policies influencing students' access to equitable educational experiences. Examines historical and philosophical foundations influencing the nature of multicultural education in our Democratic society, how personal biases can influence instructional practices, and development of multicultural curriculum relevant to specific content areas. (3 cr) (F,Sp)

**ScEd 3300. Clinical Experience I.** First clinical practicum (40 hours minimum) in middle and secondary schools, arranged by special methods instructors in department. Required at level 1. Prerequisite: Program admission. (1 cr) (F,Sp)

**ScEd 3400. Teaching Science I.** Laboratory practicum focused on design, practice, and performance of secondary science demonstrations and investigative lab activities. Must be taken at Level 1. Prerequisite: Program admission. (3 cr) (F,Sp)

**ScEd 3500. Teaching Social Studies.** Methods course focused on social studies curriculum and instruction for preservice secondary teachers with teaching majors or minors in history or any of the social sciences. Should be taken at Level 1. Prerequisite: Program admission. (3 cr) (F,Sp)

**ScEd 3600. Teaching English.** Methods course focused on English curriculum and instruction for preservice secondary teachers with teaching majors or minors in Eng-

lish. May be taken at either Level 1 or Level 2. Prerequisite: Program admission. (3 cr) (F,Sp)

**ScEd 4200 (CI). Reading, Writing, and Technology.** Performance-based class focused on a wide range of academic skills related to reading, writing, and advanced technology access. Prerequisite: Program admission and completion of Level 1. (3 cr) (F,Sp)

**ScEd 4210. Cognition and Evaluation of Student Learning.** Designed to lead the preservice secondary school teacher to address two questions: (1) How do students construct concepts; discover relationships; and develop knowledge-level skills, comprehension and communication skills, and problem-solving abilities? (2) How do teachers monitor students' progress, evaluate and communicate their achievement, and interpret the results of system-wide and standardized test results to students and their parents? (3 cr) (F,Sp)

**ScEd 4300. Clinical Experience II.** Second clinical practicum (40 hours minimum) in middle and secondary schools, arranged by special methods instructors in department. Required at level 2. Prerequisite: Program admission and completion of Level 1. (1 cr) (F,Sp)

**ScEd 4400. Teaching Science II.** Methods course focused on science curriculum and instruction for preservice secondary teachers with teaching majors in any of the science areas. Must be taken at Level 2. Prerequisite: Program admission, completion of Level 1, and ScEd 3400. (3 cr) (F,Sp)

**ScEd 4600 (d6600).<sup>1</sup> Philosophy and Organization of the Middle Level School.** Focuses on characteristics of young adolescents and how middle level schools can be organized to meet those characteristics through interdisciplinary teaming, advisory programs, and exploratory mini-courses. Also taught as EIED 4600/6600. (3 cr) (F,Su)

**ScEd 4610 (d6610). Curriculum, Methods, and Assessment for the Middle Grades.** Integrates current approaches to curriculum design with instructional models and assessment of learning appropriate for grades 5-9. Also taught as EIED 4610/6610. (3 cr) (Sp,Su)

**ScEd 4620 (d6620). Service Learning Applications for the Middle Grades.** Examines literature related to service learning for the middle grades. Application of service learning in curriculum. Also taught as EIED 4620/6620. (3 cr) (Su)

**ScEd 4710. Diversity in Education.** Provides educators with background and techniques for more effectively addressing the needs of students in a culturally and linguistically diverse society. Diversity topics also include religion, socioeconomic class, ability differences, gender, and sexual orientation. Also taught as EIED 4710. (3 cr) (F,Sp)

**ScEd 4760 (d6760). ESOL Instructional Strategies.** Includes principles and techniques for promoting oral language, reading, and writing development for K-12 English language learners. Explores language acquisition theory, classroom organization, teaching strategies, and parental involvement for effective English language instruction. Also taught as EIED 4760/6760. (3 cr) (F,Sp)

**ScEd 4770 (d6770). ESOL Instructional Strategies in the Content Areas.** Focuses on strategies which help language-minority students in content-area classrooms to increase academic learning. Includes methods for increased integration of language learners into the larger school community. Discussion of parental involvement. Also taught as EIED 4770/6770. (3 cr) (Su)

**ScEd 4780 (d6780). Assessment for Language Learners.** Explores principles and techniques for developing, analyzing, and interpreting assessment measures for language learners, including oral, writing, reading, and content-area assessment. Exam-

ines assessment requirements for public schools, intensive language programs, and higher education. Also taught as EIED 4780/6780. (3 cr) (Su)

**ScEd 4900H. Senior Thesis.** Student-initiated research project under faculty supervision. Requires prior approval of department head, honors committee, and instructor. Prerequisite: Approval of department head. (1-6 cr) (F,Sp)

**ScEd 5000 (d6000). Practicum in Improvement of Instruction.** Open topics course focusing upon effective teaching methods, teaching performance, curriculum decision-making, and characteristics of learners. Also taught as EIED 5000/6000. (1-6 cr) (F,Sp,Su) ®

**ScEd 5300. Clinical Experience III.** Third clinical practicum in middle and secondary schools. Arranged by Office of Field Experiences for 5 weeks before student teaching (40 hours minimum). Required of all students at Level 3. Prerequisites: Level 1 and Level 2 completion, and student teaching placement. (1 cr) (F,Sp)

**ScEd 5400. Laboratory Practicum.** Laboratory practicum for inservice teachers, focused on design, practice, and performance of secondary science demonstrations and investigative lab activities. (3 cr) (F,Sp)

**ScEd 5500. Student Teaching Seminar.** Ten-week capstone seminar focused upon student teaching issues, professional development, and principles of effective instruction, emphasizing reflective teaching. Prerequisites: Level 1 and Level 2 completion, and student teaching placement. (2 cr) (F,Sp)

**ScEd 5600. Student Teaching in Secondary Schools.** Ten-week culminating practicum in which students assume full-time teaching responsibilities under direction of cooperating teachers in major and minor fields. Prerequisites: Level 1 and Level 2 completion, and student teaching placement. (8 cr) (F,Sp)

**ScEd 5700. Modified Student Teaching.** Culminating practicum experience for students seeking dual licensure, earning half of their student teaching credit in a secondary school setting. Prerequisite: Program admission and completion of Level 1 and Level 2. (2-4 cr) (F,Sp)

**ScEd 5800. Secondary School Internship.** Advanced practical teaching experience under combined public school and University supervision. Offered only by arrangement with Director of Field Experiences. Prerequisites: Level 1 and Level 2 completion, and special recommendation. (2-6 cr) (F,Sp)

**ScEd 5900. Independent Study.** Prerequisite: Instructor approval. (1-3 cr) (F,Sp) ®

**ScEd 6000 (d5000). Practicum in Improvement of Instruction.** Open topics course focusing upon effective teaching methods, teaching performance, curriculum decision-making, and characteristics of learners. Also taught as EIED 6000/5000. (1-6 cr) (F,Sp,Su) ®

**ScEd 6040. Designing and Interpreting Measurements for Assessing Student Learning.** Teachers and instructional supervisors develop their talents for (a) designing and interpreting measurements for monitoring students' learning and (b) interpreting scores from standardized and government-mandated tests. Also taught as EIED 6040. (3 cr) (F,Su)

**ScEd 6100. Motivation and Management in Inclusive Settings.** Leads in-service teachers to develop classroom management strategies for gaining and maintaining students' cooperation. Also taught as EIED 6100. (3 cr) (Sp,Su)

**ScEd 6150. Foundations of Curriculum.** Examination of theories, principles, and foundations of curriculum, emphasizing program planning and current curriculum trends. Also taught as EIED 6150. (3 cr) (F,Su)

**ScEd 6190. Theories of Teaching and Learning.** Demonstration, analysis, and evaluation of various models of teaching, emphasizing research-based principles of learning. Also taught as EIED 6190. (3 cr) (Sp,Su)

**ScEd 6250. Mathematics Curriculum and Instruction.** Examination of current curriculum standards, trends, and effective methods of instruction for mathematics in middle and secondary schools. (2 cr) (Su)

**ScEd 6300. English Curriculum and Instruction.** Examination of current curriculum standards, trends, and effective methods of instruction for English/language arts in middle and secondary schools. (2 cr) (Su)

**ScEd 6310. Content Area Reading and Writing.** Practical approaches for teaching reading/writing and learning skills to elementary, middle, and high school students, in all content areas. Also taught as EIED 6310. (3 cr) (Su)

**ScEd 6320 (d7320). Literacy and Cognition.** Examination of cognitive and sociocultural research related to K-12 students' acquisition and use of reading, writing, and learning strategies. Explores implications for school policies and classroom instruction. Also taught as EIED 6320/7320. (3 cr) (Sp)

**ScEd 6330. Utah Writing Project.** Workshop, seminar, and institute experiences in the Utah Writing Project, focusing on writing process, principles, and research-based strategies for improving writing instruction in grades K-12. Also taught as EIED 6330. (1-6 cr) (Su)

**ScEd 6340. Issues and Trends in Literacy.** Exploration of current issues and instructional trends in the teaching of reading and writing. Emphasis on reading widely and critically in the professional literature. Prerequisites: EIED 3100, 4040; or teaching experience in elementary or middle school. Also taught as EIED 6340. (2 cr) ®

**ScEd 6350. Reading Assessment and Diagnosis.** Covers the correlates and diagnosis of reading problems, as well as methods and materials for remedial reading instruction. Prerequisites: EIED 3100, 4040; or teaching experience in elementary, middle, or secondary school. Also taught as EIED 6350. (3 cr) (Sp)

**ScEd 6360. Reading Improvement and Remediation.** Designed to help classroom teachers update and enhance components of their reading instruction and assessment. Emphasizes development of balanced and comprehensive reading instruction program. Prerequisites: EIED 3100, 4040; or teaching experience in elementary or middle school. Also taught as EIED 6360. (3 cr) (Su)

**ScEd 6370. Supervised Internship in Reading and Writing.** Individual practicum experience designed to allow graduate students to implement and focus on one or more aspects of reading and writing instruction in a classroom or clinical setting. Prerequisite: Consent of instructor. Also taught as EIED 6370. (1-3 cr) (F,Sp,Su)

**ScEd 6390. Teaching with Tradebooks in the Elementary and Middle Level Classroom.** Explores the use of trade books in the elementary and middle level classroom. Focuses on how teachers can use various genres to invite children to read and write. Prerequisites: ScEd/EIED 6310 or 6360. Also taught as EIED 6390. (3 cr) (Su)

**ScEd 6400. Multiple Talent Approach to Teaching.** Explores one model for embedding the teaching of creative and critical thinking in regular curricula. Includes practical application requirements. Also taught as EIED 6400. (2 cr) (Su)

**ScEd 6420. Education of Gifted and Talented Learners.** Provides multiple cultural and historical perspectives on giftedness and talent. Explores characteristics of gifted individuals, with emphasis on identifying needs. Provides general overview of possible services for gifted learners. Must be taken concurrently with EIED/ScEd 6430. Also taught as EIED 6420. (2 cr) (F)

**ScEd 6430. Practicum: Individual Case Study.** Practicum experience in association with EIEd/ScEd 6420. Requires intensive supervised study of gifts and talents of individual child of student's choice. Must be taken concurrently with EIEd/ScEd 6420. Also taught as EIEd 6430. (1 cr) (F)

**ScEd 6440. Creativity in Education.** Exploration of theories, research, and strategies concerning creativity, and their application to personal creativity and to improvement of classroom practice. Also taught as EIEd 6440. (2 cr) (Su)

**ScEd 6460. Identification and Evaluation in Gifted Education.** Provides educators with theory and models for identifying students as gifted, creative, and talented. Presents models for evaluation of programs for gifted learners. Explores instruments for use in identification and evaluation. Must be taken concurrently with EIEd/ScEd 6470. Also taught as EIEd 6460. (2 cr) (Sp)

**ScEd 6470. Practicum: Team Consultation.** Practicum experience in association with EIEd/ScEd 6460. Requires participation, as part of a consultative team, to improve practice in an approved setting for a specific child, classroom, school, school district, or other educational entity. Must be taken concurrently with EIEd/ScEd 6460. Also taught as EIEd 6470. (1 cr) (Sp)

**ScEd 6480. Methods and Materials in Gifted Education.** Explores programming and curriculum models in gifted education, with special attention to the development of instructional materials for use with students. Must be taken concurrently with EIEd/ScEd 6490. Also taught as EIEd 6480. (2 cr) (F)

**ScEd 6490. Practicum: Classroom Applications.** Practicum experience in association with EIEd/ScEd 6480. Requires application of at least three curriculum, cognitive, or affective models in the student's current teaching assignment. Must be taken concurrently with EIEd/ScEd 6480. Also taught as EIEd 6490. (1 cr) (F)

**ScEd 6500. Science Curriculum and Instruction.** Examination of current curriculum standards, trends, and effective methods of instruction for science in middle and secondary schools. Emphasizes science program improvement through investigative lab activities. (2 cr) (Su)

**ScEd 6550. Social Studies Curriculum and Instruction.** Examination of current curriculum standards, trends, and effective methods of instruction for social studies in middle and secondary schools. (3 cr) (Su)

**ScEd 6570. Advanced Comprehension.** Designed to enhance teachers' understanding of research and practice related to teaching vocabulary and reading comprehension and fostering motivation for reading. Prerequisite: EIEd/ScEd 6310 or 6360. Also taught as EIEd 6570. (3 cr) (Alt years)

**ScEd 6580. Character and Values Education.** Overview of research, theory, and practical approaches to values education, emphasizing processes of moral development and socialization. Also taught as EIEd 6580. (2 cr) (Su)

**ScEd 6590. Supervising School Reading Program.** Examines strategies for improving school reading programs. Emphasizes simulations, guided practice, and small group discussions. Prerequisites: EIEd/ScEd 6350 and 6360. Also taught as EIEd 6590. (2 cr) (Sp)

**ScEd 6600 (d4600). Philosophy and Organization of the Middle Level School.** Focuses on characteristics of young adolescents and how middle level schools can be organized to meet those characteristics through interdisciplinary teaming, advisory programs, and exploratory mini-courses. Also taught as EIEd 6600/4600. (3 cr) (F,Su)

**ScEd 6610 (d4610). Curriculum, Methods, and Assessment for the Middle Grades.** Integrates current approaches to curriculum design with instructional mod-

els and assessment of learning appropriate for grades 5-9. To receive credit for 6610, graduate students design and implement an action research project related to curricular or pedagogical interests, then share their findings in class. Project will include review of literature related to student's interest. Prerequisite: EIEd/ScEd 6600. Also taught as EIEd 6610/4610. (3 cr) (Sp,Su)

**ScEd 6620 (d4620). Service Learning Applications for the Middle Grades.** Examines literature related to service learning for the middle grades. Application of service learning in curriculum. Also taught as EIEd 6620/4620. (3 cr) (Su)

**ScEd 6760 (d4760). ESOL Instructional Strategies.** Includes principles and techniques for promoting oral language, reading, and writing development for K-12 English language learners. Explores language acquisition theory, classroom organization, teaching strategies, and parental involvement for effective English language instruction. Also taught as EIEd 6760/4760. (3 cr) (F,Sp)

**ScEd 6770 (d4770). ESOL Instructional Strategies in the Content Areas.** Focuses on strategies which help language-minority students in content-area classrooms to increase academic learning. Includes methods for increased integration of language learners into the larger school community. Discussion of parental involvement. Also taught as EIEd 6770/4770. (3 cr) (Su)

**ScEd 6780 (d4780). Assessment for Language Learners.** Explores principles and techniques for developing, analyzing, and interpreting assessment measures for language learners, including oral, writing, reading, and content-area assessment. Examines assessment requirements for public schools, intensive language programs, and higher education. Also taught as EIEd 6780/4780. (3 cr) (Su)

**ScEd 6840. Workshop: Intermountain Conference on Education of the Gifted and Talented.** Provides instruction by leading national authorities in gifted and talented education, as well as networking with educators of the gifted from throughout the Intermountain West. Also taught as EIEd 6840. (1-2 cr) (Su) ®

**ScEd 6900. Independent Study.** Individually directed readings and conference. Departmental permission required before registration. Prerequisite: Instructor's approval. (1-3 cr) (F,Sp,Su) ®

**ScEd 6910. Independent Research.** Individually directed research projects. Departmental permission required before registration. Prerequisite: Instructor's approval. (1-3 cr) (F,Sp,Su) ®

**ScEd 6940. Supervision and Administration Internship.** Individually directed internship experiences in secondary school settings for development of supervisory and administrative skills. Prerequisite: Instructor's approval. (3 cr) (F,Sp,Su)

**ScEd 6960. Creative Project.** Individually directed creative project, with a focus closely related to coursework or to area of teaching specialization. Only students pursuing the Plan B MEd option should enroll in this course. Prerequisite: Instructor's approval. (3 cr) (F,Sp,Su)

**ScEd 6970. Master's Thesis.** Individually directed work in thesis writing, with guidance from committee chair. Designed for use on MA and MS degrees only. Prerequisite: Instructor's approval. (3-6 cr) (F,Sp,Su)

**ScEd 6980. Portfolio Project.** Individually directed portfolio for students in the MEd Plan C degree, only to be taken at the end of student's program of study. Designed for students to integrate and apply concepts learned in the master's program. Prerequisite: Instructor's approval. (3 cr) (F,Sp,Su)

**ScEd 6990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

**ScEd 7000. Student Teacher Supervision.** Experiences in providing guidance for secondary student teachers in public schools. Analysis of roles and responsibilities of

cooperating teachers and university supervisors. Prerequisite: Instructor's approval. (1-3 cr) (F,Sp)

**ScEd 7050. Internship in Program Evaluation.** Experiences in practical aspects of program evaluation through planned and supervised evaluation project participation. Must be approved by student's graduate committee. Prerequisite: Instructor's approval. (1-6 cr) (F,Sp,Su)

**ScEd 7060. Internship in Research.** Experiences in conducting research through planned and supervised research project participation. Must be approved by student's graduate committee. Prerequisite: Instructor's approval. (1-6 cr) (F,Sp,Su)

**ScEd 7320 (d6320). Literacy and Cognition.** Examination of cognitive and sociocultural research related to K-12 students' acquisition and use of reading, writing, and learning strategies. Explores implications for school policies and classroom instruction. Also taught as EIEd 7320/6320. (3 cr) (Sp)

**ScEd 7330. Internship in Supervision.** Directed experiences in supervision with selected public school personnel in approved settings. Experiences arranged by student's graduate committee. Prerequisite: Instructor's approval. (1-3 cr) (F,Sp,Su)

**ScEd 7350. Internship in Curriculum Development.** Directed experiences in curriculum development with selected public school personnel in approved settings. Experiences arranged by student's graduate committee. Prerequisite: Instructor's approval. (1-3 cr) (F,Sp,Su)

**ScEd 7500. Interdisciplinary Workshop.** Prerequisite: Instructor's approval. (1-3 cr) (Su) ®

**ScEd 7810. Research Seminar.** Identification of research problems, consideration of research methods, and application of data analysis procedures under faculty direction. Prerequisite: Instructor's approval. (1 cr) (F,Sp,Su) ®

**ScEd 7900. Independent Study.** Individually directed reading and conference. Departmental permission required before registration. Prerequisite: Instructor's approval. (1-3 cr) (F,Sp,Su) ®

**ScEd 7910. Independent Research.** Individually directed research projects. Departmental permission required before registration. Prerequisite: Instructor's approval. (1-3 cr) (F,Sp,Su) ®

**ScEd 7970. Dissertation.** Individual work on research problems in the PhD or EdD program. Prerequisite: Instructor's approval. (1-12 cr) (F,Sp,Su) ®

**ScEd 7990. Continuing Graduate Advisement.** Prerequisite: Approval of instructor. (1-12 cr) (F,Sp,Su) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

## *Interdepartmental Program in Social Sciences*

**Degree Coordinator:** Dean *Elizabeth S. Grobsmith*, College of Humanities, Arts and Social Sciences  
Office in Main 338, (435) 797-1195

**Degree offered:** Master of Social Sciences (MSS)

**Major Disciplines (specializations):** Economics, History, Human Resources Management, Human Resources Management with emphasis in Student Services Personnel Administration, and Sociology

**Minor Disciplines:** Anthropology, Business Administration, Instructional Technology, Economics, Family and Human Development, Geography and Earth Resources, History, Political Science, Psychology, Social Work, Sociology, and Management and Human Resources

### *Graduate Program*

#### *Administration*

The program is administered by a committee of the department heads (Management Committee) from the four major disciplines or their designees. The committee is chaired by annual rotation by one of the members of the committee, and reports to the Degree Coordinator. The Management Committee reviews policy and develops recommendations which are submitted to the Degree Coordinator for approval.

#### *Degree Description*

The social sciences are disciplines that have as a common objective the understanding of human behavior and social relationships. The MSS offers multidisciplinary graduate training for candidates desiring in-depth applied understanding of human performance, human environments, and/or the structuring of social, political, and economic systems. There are Plan B and Plan C options in the MSS Program. Students in Economics, History, and Sociology typically follow the Plan B option, while Human Resources Management students typically follow the Plan C option. The Plan B option requires a minimum of 30 credits and the Plan C option requires a minimum of 33 credits. Both options require a minimum of 15 credits in a major discipline plus a minimum of 15 credits from one of the following two tracks: *Track A:* a minimum of 15 credits from two approved minor areas, with at least two courses in each minor area. *Track B:* a minimum of 15 credits from an approved minor and a cluster, with at least two courses in the minor and two courses in the cluster. Courses counted in a cluster must be outside the selected major and minor. Three of the 30 credits required for the Plan B option must be thesis credits, but no more than 3 credits of thesis can be counted toward a degree. Plan C requires 33 credits of coursework with no thesis credit allowed. Departments may impose more rigorous requirements. A maximum of 3 credits may be earned either from readings/conferences or from independent research.

The MSS degree is primarily intended to prepare degree recipients for employment or advancement in social science-related occupations. Students interested in pursuing doctoral work should consider a Plan A Master of Science program.

#### *Admission Requirements*

See general admission requirements, pages 72-73. In addition, the faculty of each discipline determines whether to recommend to the graduate dean the acceptance of applicants. For further information, contact the Graduate Coordinator in the department of the proposed major.

#### *Specializations*

Program specializations and emphases and the qualifications for each are summarized below.

**Economics.** The areas of emphasis in Economics include Labor Economics, Economic History/Comparative Economic Systems, Business and Government, Economic Education, Environmental Economics, Trade and Development, and Rural Economic Development. Acceptable minor fields include any of the cooperating minor disciplines.

**History.** The MSS in History is designed for secondary teachers who want more training to certify in additional teaching fields. Acceptable minor fields include Instructional Technology, Economics, Geography, Political Science, Psychology, and Sociology/Anthropology.

**Human Resources Management.** Human Resources Management deals with those processes that provide, develop, and maintain a productive workforce in a dynamic and changing environment. Subject areas include human resource planning; recruiting; selection; placement; compensation and benefits; performance management; career planning, training, and development; labor relations; and ethical/legal employment practices. Individuals interested in a general management program are referred to the College of Business MBA Program.

**Sociology.** The MSS specialization in Sociology is well-suited to individuals with interdisciplinary interests. International Rural and Community Development is a currently well-developed emphasis within the Sociology specialization.

### ***Degree Requirements***

**Student Supervision.** For each student admitted, a supervisory committee is ordinarily appointed consisting of at least one faculty representative from the student's major discipline and (a) one from each of the minor disciplines, or (b) one from a minor discipline and one from a discipline associated with the cluster. Policies governing student supervision may vary from specialization to specialization.

**Plan C Culminating Experience.** Each major discipline has an integrative requirement toward the end of the student's program for the Plan C option. The requirement may include a comprehensive examination, a capstone course, and/or an integrative project.

**Plan B Research Paper.** Each Plan B student must submit a research paper for thesis credit in accordance with School of Graduate Studies and departmental requirements. Ordinarily, the Plan B paper is written in the major discipline, but in some cases, with the approval of the student's supervisory committee, it may be written in one of the minor disciplines. Information specific to each major discipline may be obtained by contacting the sponsoring department.

### ***Further Information***

Candidates interested in pursuing this degree program may obtain specific information by contacting the head of one of the participating departments, the School of Graduate Studies, or the dean of Humanities, Arts and Social Sciences.

Department of

# Sociology, Social Work and Anthropology

College of Humanities, Arts and Social Sciences

**Head: Professor Gary H. Kiger**, social psychology; gender, work, and family; research methods  
Office in Main 224, (435) 797-1230

**Assistant Head and Director of Graduate Studies: Professor Richard S. Krannich**, environmental, community, and rural sociology; research methods

**FAX** (435) 797-1240

**E-mail** pwilson@hass.usu.edu

**WWW** <http://www.usu.edu/sswa>

**Professors** Stan L. Albrecht, Provost and Executive Vice President of Utah State University, environmental sociology, rural sociology, health studies; Richley H. Crapo, religion, sex, and gender; sexuality and homosexuality; Steven E. Daniels, rural development, natural resource policy; Susan E. Dawson, occupational and environmental health; H. Reed Geertsens, community, sociological theory, medical; Elizabeth S. Grobsmith, Dean of College of Humanities, Arts and Social Sciences, anthropology; Yun Kim, demography, development, quantitative methodology; David F. Lancy, educational anthropology, ethnography; Ann Leffler, social psychology, theory, rural, family, gender (sabb. 2001-2002 academic year); Gary E. Madsen, methods; Jon R. Moris, applied anthropology, rural development, contemporary Africa; Pamela J. Riley, social psychology, international development, criminology, gender; Steven R. Simms, archaeology, anthropological theory, behavioral ecology; Michael B. Toney, demography, ecology; **Adjunct Professor Douglas N. Sharon**, cultural anthropology; **Professors Emeriti** Therel R. Black, theory, rural sociology; H. Bruce Bylund, social change, methods; Gordon N. Keller, comparative kinship, applied anthropology; Ronald L. Little, environmental sociology, rural, quantitative methodology; Wesley T. Maughan, community organization, sociology of education; Bradley W. Parlin, comparative sociology of work; David L. Rogers, complex organizations, political sociology, communities; William F. Stinner, social demography, life course, community; Alison C. Thorne, marriage and family; **Associate Professors** E. Helen Berry, demography, ecology, methods, urban; M. Diane Calloway-Graham, women's development, women's clinical and societal issues, social work theory; Bonnie Glass-Coffin, medical anthropology, shamanism, Latin America, applied anthropology, method and theory; Derek T. Mason, juvenile delinquency; Terry L. Peak, social policy, health care, gerontology; **Adjunct Associate Professors** Dale J. Blahna, natural resource sociology, policy, and outdoor recreation; Joanna L. Endter-Wada, cultural anthropology and natural resource policy and sociology; **Assistant Professors** Douglas B. Jackson-Smith, sociology of agriculture, natural resources and environment, research methods, economic sociology; Patricia M. Lambert, biological anthropology, bioarchaeology, paleopathology; Peggy Petrzalka, environmental sociology, rural sociology, social change and development; Neil F. Wieloch, deviance, criminology, theory; **Adjunct Assistant Professors** Nazih T. Al-Rashid, sociology of work; Sue H. Guenter-Schlesinger, diversity; Chalon Keller, Assistant Director of MBA Program; Don C. Larson, demography; Janet L. Osborne, sociology of gender; Theresa L. Selfa, sociology of development; Bryan R. Spykerman, research methods; **Assistant Professor Emeritus** Alice C. Smith, sociology

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), Master of Arts (MA), and Doctor of Philosophy (PhD) in Sociology; participates in Master of Social Sciences (MSS); BS and BA in Social Work; BS and BA in Anthropology

**Graduate Specializations:** *PhD*—Demography, Environmental Sociology/Sociology of Natural Resources, Social Problems, and Sociology of Development

## Undergraduate Programs

### Objectives

The department offers educational programs for students to prepare for positions in business, social welfare, teaching, research, personnel, government service, law enforcement, and industry, as well as providing liberal and general education for all interested students. The program offers a wide range of courses for the study of social, cultural, and behavioral dynamics. The department also provides University Studies, Liberal Arts and Sciences, and other service courses for students from all majors.

### Requirements

**Departmental Admission Requirements.** New freshmen admitted to USU in good standing qualify for admission to the sociology and anthropology majors, as well as to the pre-social work major. Transfer students from other USU majors or other institutions must have a minimum 2.5 overall GPA.

For admission to the sociology major, students must additionally have earned a grade of C- or better in Soc 1010. For admission to the social work major, transfer students must have earned a minimum 2.75 GPA in all social work classes. Applicants to the social work major must have completed the basic social work core curriculum, must have a minimum 2.5 overall GPA and a mini-

mum 2.75 GPA in social work classes, must have completed SW 1050 with a grade of C+ or better, and must have completed an application form (available from the department).

## Sociology

**Undergraduate Program Director:** Gary E. Madsen  
**Program Office:** Main 224, (435) 797-1230

The study of the human individual and human groups is central to sociology. These subjects offer a broad foundation for understanding human behavior on an individual and group basis, and encourage the development of skills necessary for establishing favorable societal conditions for human development.

Students learn to systematically describe and explain group behavior, including the effects of one group on another and of groups upon individual behavior. Required sociology classes deal with how people in different societies organize and control their societies, critical issues in sociology as they have developed through history, and statistical methods for analyzing sociological data.

Upon completion of the prescribed program for a major in sociology, the student should be able to:

1. Demonstrate knowledge essential for understanding society from a sociological perspective;
2. Identify and critically evaluate the contributions of sociologists, social scientists, and scholars;
3. Identify and critically evaluate the forces and institutions that influence his or her life as a member of society;
4. Identify, comprehend, and critically evaluate the influences of race, class, gender, age, and disability on a member of society;
5. Pursue careers in sociological areas, business, government, and/or graduate study; and
6. Apply the methods and concepts of sociology to the analysis of social issues, problems, and conflicts in preparation for participation as agents of creative social change.

Students select courses from three different areas. **Social problems** classes focus on retirement and other aspects of aging, the causes and prevention of juvenile delinquency, and the cultural characteristics of minority groups. **Groups and institutions** courses look at collective behavior, the organization of communities, and the development of gender roles, as well as economic systems, educational systems, and social inequality. **Population, environment and development, and human ecology** courses deal with the effects of the environment and human behavior and the consequences of different patterns of population growth and settlement. A Law and Society Area Studies Certificate is available. A teaching major in sociology is available for students wishing to teach in secondary schools.

Surveys of graduates indicate that sociology majors pursue a wide range of occupations. About one-third are employed in the professional sector, while close to one-fourth are in service occupations. In addition, 26 percent are involved in sales or management/administration. In terms of specific job titles, social service is a popular option, as are retail sales and teaching. Other frequent job titles include: vocational rehabilitation counselor, research analyst, data coordinator, management analyst, district sales manager, parole officer, juvenile probation officer, social services director, civil service test examiner, personnel director, insurance

salesman, and correctional service officer. A variety of government and business positions are also expanding for sociology majors with the new emphasis on a liberal arts education. The growing awareness of the value of sociological perspectives for problem-solving continues to provide an increasing range of opportunities for employment in a variety of work settings.

**Departmental Graduation Requirements.** Sociology majors must meet the following course requirements:

1. Complete the general requirements of the University. Majors are expected to take Stat 1040 to fulfill the quantitative literacy requirement for University Studies.
2. Complete a minimum of 33 credits of sociology coursework. At least fifty percent of the sociology coursework should be completed in the USU Sociology program. Sociology majors must maintain a minimum GPA of 2.5 in sociology courses and earn a grade of C- or better in courses to be counted toward the major.
  3. A minor outside the program is encouraged but not required.
  4. Complete the following required courses: Soc 1010, 3010, 3110, 3120, and 4010.
  5. Choose a minimum of 18 credits from the following sociology elective courses. At least 3 credits must come from each of the three specialty areas listed below.
    - a. *Social Problems:* Soc 1020, 3410, 3420, 3430, 3750, 4420.
    - b. *Groups and Institutions:* Soc 2500, 3320, 3330, 3500, 4330.
    - c. *Population, Environment, and Development:* Soc 3200, 3600, 3610, 4620, 4710, 4730, 5650/6650.

**Sociology and Social Work Dual Major.** Sociology majors desiring additional preparation for employment in the social services may complete a dual major in sociology and social work. With the help of advisors, students who will seek positions in other special areas could include appropriately related courses.

**Minor.** Students minoring in sociology must complete a minimum of 12 credits in sociology courses. Soc 1010 and 1020, as well as six additional credits with a Soc prefix, are required.

**Teaching License.** Sociology is defined as an approved teaching major in Utah secondary schools by the State Board of Education. The sociology major must complete a minor in a subject that is required in Utah high schools. In addition to completing the courses required for the sociology major, the sociology teaching major must also complete the required teaching licensure courses in education. Students can also elect sociology as an approved teaching minor.

**Law and Society Area Studies.** The Department of Sociology, Social Work and Anthropology sponsors an interdisciplinary program emphasizing the study of the relationship between law and society. Students must complete 24 credits, chosen from a selected list of courses, in at least three disciplines. A minimum 3.0 GPA must be maintained in these courses.

The selected courses are: FHD 3120; JCom 4030; MHR 2990, 3810, 5640; Phil 2500, 4600, 4610, 5600; PolS 3120, 3130, 3170, 3320, 3810, 4120, 4130, 4810, 5130; Soc 1020, 3410, 3420, 3430, 4420; SpEd 5070; SW 5350. Only 12 credits may be selected from a single discipline. The Law and Society Area Studies program is pursued in conjunction with a major. Credits may be applied to the major, as well as to the area studies requirements. A

student's transcript will reflect the Law and Society Area Studies emphasis upon completion of requirements for a degree.

More information may be obtained from the department or from the Science/HASS Advising Center, Student Center 302.

**Gerontology Program.** The Department of Sociology, Social Work and Anthropology is one of several departments sponsoring an interdisciplinary gerontology program, which prepares students for careers in the field of aging. Students may earn a certificate in gerontology by completing a selected list of course requirements, including supervised field practicum in a gerontological setting.

More information concerning the gerontology certification program may be obtained from the Department of Family and Human Development.

**American Studies Major.** The Department of Sociology, Social Work and Anthropology is one of several departments offering an area of concentration for the American Studies program. Students who wish to focus their work in American culture should refer to the American Studies program description (page 230) and check with the Sociology program for further information.

## Social Work

**Program Director:** *M. Diane Calloway-Graham*

**Program Office:** Main 239, (435) 797-1286; or Main 224, (435) 797-1230

Utah State University's Social Work Program offers a baccalaureate degree in social work. The program is accredited by the Council on Social Work Education (CSWE) and meets requirements established by the State of Utah for licensure of social service workers. Its basic mission is to train students for employment as beginning, generalist social work practitioners.

The program's guiding educational philosophy is based on two broad traditions: (1) generalist social work practice and (2) the Land Grant University heritage. The Social Work Program provides a learning environment for those who seek to acquire knowledge and skill in order to bring about meaningful social change in individuals, groups, communities, and society in accordance with democratic principles of civil, social, political, and economic justice. The program is directed toward providing grounding in the fundamental generalist skills, knowledge, and values of social work, such as critical thinking, clarification of personal values, awareness of diversity, professional use of self, and communication and interpersonal relationship skills. Correspondingly, the mission of the program is to prepare social workers for beginning practice in a diverse society that has been unable to meet the needs of a vast segment of its people and to equip students with the knowledge and skills essential to the general tasks of promoting social welfare in institutions such as education, health, employment, housing, and criminal justice.

The program is committed to enhance the quality of life in Utah, the nation, and the world through service learning, leadership development, research, and extension; and is reflective of the fundamental need to adjust social institutions to the democratic and egalitarian ideals of both the university and the social work profession. Social Work at Utah State University recognizes the historic importance of social welfare in balancing the country's economic and social structure. The program is committed to the realization of the goals of the American people, through recognized practice principles of the social work profession, and to the

resolution of contemporary human social problems, such as poverty, racism, discrimination, exploitation, economic injustice, poor housing, malnutrition, alienation, and inadequate education.

### Program Goals

There are two fundamental goals that guide the Social Work Program:

**1. To prepare students for employment as generalist social workers through education in a professional foundation curriculum and selected liberal arts education coursework.**

**2. To prepare students for advanced education, as well as to enlighten students with responsible citizenship in the areas of service and research.**

The program is based on a generalist conception of social work and a problem-solving, empowerment, and strengths model of practice. The social work sequence stresses problem solving at the interface of person and environment, which requires that students develop a repertoire of generalist practice skills. The program inculcates in students the knowledge, skills, understanding, and values necessary to perform multi-level assessments and interventions utilizing a theoretical knowledge base. The program is committed to building a student's education on a solid base which includes a liberal arts perspective vital to the development of a social worker.

The program endeavors to prepare students for advanced standing in graduate professional programs and to provide a solid academic base for continuing education. To accomplish this, the program is designed to facilitate the development of the profession's knowledge, values, and skills and provide a well-rounded liberal arts educational foundation, good study habits, written and oral communication skills, and the ability to think critically.

The program also endeavors to maintain a campus environment which will foster a sense of community and social responsibility, as well as responsible citizenship in the areas of service and research. To accomplish this, the program provides opportunities for service learning, social development, and educational research forums through the state-affiliated National Association of Social Workers student organization and the Social Work Phi Alpha Honor Society.

### Licensure

In the State of Utah, graduates with a bachelor's degree in Social Work are eligible to be licensed upon graduation as social service workers. Students may obtain further information on licensure from:

Department of Commerce  
Division of Occupational and Professional Licensing  
160 East 300 South  
PO Box 45802  
Salt Lake City UT 84145-0802  
(801) 530-6628

### Social Work Major

**Liberal Arts Foundation.** All students pursuing an undergraduate degree at Utah State University must meet requirements designed to assure a broad, solid liberal arts foundation. Cross-cultural and cross-disciplinary perspectives are vital to a student's development as a social worker. The University Studies program, which is described in detail in this catalog (see pages

56-63), is required of all majors. Majors are expected to take Stat 1040 to fulfill the quantitative literacy requirement for University Studies. In addition to fulfilling University Studies requirements, majors will need to complete specific liberal arts courses, listed in the Social Work Program requirements, some of which fulfill both University Studies and Social Work Program requirements. Social Work majors must complete Stat 1040 and Soc 3120 to graduate.

**Program Admission Requirements.** The following regulations apply for admission to the Social Work Program: (1) New freshmen admitted to USU in good standing qualify for admission to the Social Work Major. (2) Transfer students from other institutions must obtain a minimum overall GPA of 2.5 and a minimum overall GPA of 2.75 in social work classes. (Refer to the *USU Social Work Program Transfer of Credit Policy*.) (3) Students transferring from other USU majors must complete the Social Work Major course of study and must obtain a minimum overall GPA of 2.5 and a minimum overall GPA of 2.75 in social work classes. (4) Students must apply for and meet criteria for advanced standing, in order to continue on in upper-division social work practice courses and field practicum courses. (5) Students are responsible for reviewing and knowing the requirements for the Social Work degree. (6) All courses required for the Social Work degree must be taken for a letter grade.

**Social Work Major.** Students may declare Social Work as their major at any time. All course offerings in social work are open to all Social Work majors, with the exception of the practice courses (SW 3050, 4150, and 4160) and the field practicum courses (SW 4870 and 5870), which require admission to advanced standing. Social work students are expected to take courses in sequence, in order to have the professional foundation knowledge required for each class. Maintenance of a high grade point average is important as students progress through the major and continue on to graduate school. Requirements for the Social Work major are as follows:

*First year:* SW 1050, FHD 1500 (BSS), Engl 1010 (CL), Biol 1010 (BLS), Soc 1010 (BSS), Psy 1010 (BSS), Stat 1040 (QL), and Anth 1010 (BSS).

*Second year:* Engl 2010 (CL), SW 2400, 2500, and one elective enrichment course. Apply for advanced standing.

*Third year:* SW 3050, 4100, 4150, 4160, Soc 3120, and two elective enrichment courses. Apply for practicum.

*Fourth year:* SW 4870, 5350 (CI), and 5870.

**Procedures for Advanced Standing in the Social Work Major.** In order to be considered for advanced standing, students must turn in a completed application form by March 5 of the academic year. Applications for admission can be obtained in the Social Work office, Main 239. At the end of spring semester, when the criteria for advanced standing has been met, eligible students will be ranked according to their grade point average, personal statement, performance on the advanced placement test, and faculty evaluation. The highest ranking students will receive advanced standing, which will allow them to enroll in upper-division practice courses. **Only those students who have completed first- and second-year requirements by the end of spring semester of the application year will be considered for advanced standing.** The primary reasons for this evaluation are: (1) to maintain a high-quality educational experience for students in upper-division practice courses, and (2) to maintain the status

of full accreditation by the Council on Social Work Education. Students will receive notification of acceptance in May of the application year. Those students who do not receive advanced standing, and are therefore not allowed to enroll in upper-division practice courses, may return the following year to retake courses to improve their GPA and reapply for advanced standing.

To be considered for advanced standing, students must meet the following minimum criteria:

1. Completion of the following courses with a *C* or better: FHD 1500 (BSS); Engl 1010 (CL), 2010 (CL); Anth 1010 (BSS); Biol 1010 (BLS); Soc 1010 (BSS); Psy 1010 (BSS); and SW 2400, 2500.
2. Completion of SW 1050 with a grade of *C+* or better.
3. Junior status (61-90 credits) upon application.
4. Maintenance of a minimum overall GPA of 2.5 and a minimum GPA of 2.75 in social work classes.
5. No *Pass-D-Fail* grades in courses required for the major.

Students should also be aware that if there is any personal data, such as that included on the application for state licensure, which indicates a potential threat to the public safety and welfare, a student may be denied advanced standing in the program. Students turned down for advanced standing will be assisted in finding a more suitable major.

To maintain advanced standing and eligibility for graduation as a Social Work Major, a student: (1) must obtain a *B-* or better in SW 3050, 4150, and 4160; (2) must have completed SW 1050 with a *C+* or better; (3) must maintain a minimum overall GPA of 2.5 or better and a minimum 2.75 GPA in the Social Work Major; (4) must receive a grade of *C* or better in all other courses required for the major; (5) must not repeat more than once, to improve a grade, any course required for the major; and (6) must not receive a *Pass-D-Fail* grade for any course required for the major.

**Procedures for Admission to Field Practicum.** Students must complete 480 clock hours of supervised field practicum and integrative seminar coursework. The field practicum courses are SW 4870 (Beginning Field Practicum) and SW 5870 (Advanced Field Practicum). Students may register for SW 4870 only after making application with the practicum director. Application must be made during the spring semester of the academic year prior to enrollment in the practicum, and is due by February 20. Applications are available in Main 239. No applications for the practicum will be accepted from students who will not complete all required coursework by the end of spring semester.

The following are eligibility criteria for admission to the field practicum:

1. Senior status (92-120 credits completed) by the end of the spring semester in which the student applies. Only those students who are candidates for the baccalaureate degree in social work may be admitted to the field practicum.
2. Completion of University Studies program (including Depth Education requirements) and all social work courses, with the exceptions of SW 4100 and 5350.
3. A grade of *B-* or better in SW 3050, 4150, and 4160.

4. A grade of *C* or better in all courses required for the major and a grade of *C+* or better in SW 1050.

5. No *Pass-D-Fail* grades received in courses required for the major.

6. Demonstration of appropriate professional, moral, and ethical character, and must abide by the National Association of Social Work (NASW) code of ethics.

7. Maintenance of an overall minimum GPA of 2.5 and a 2.75 minimum GPA in the Social Work Major.

Students should also be aware that if there is any personal data, such as that included on the application for state licensure, which indicates a potential threat to the public safety and welfare, a student may be denied continuation in the program. If a student is denied admission to the practicum, the faculty will review his or her file upon request.

Students entering the practicum cannot ordinarily begin their placement earlier than the start of fall semester. If they do so, this practice falls outside of the Social Work Program's responsibility, and any accrued hours will not count toward the practicum.

Students entering the field practicum are strongly encouraged to join the NASW and be involved in the NASW Student Program Unit.

**Transfer of Credit Policy.** Students who transfer to the USU Social Work Program are required to complete an application for transfer credit. Students may substitute certain social work classes taken at other Council of Social Work Education (CSWE) accredited programs for USU courses. Approval must be sought from the student's advisor. When petitioning for a substitution, the student is responsible to meet with an advisor and fill out a transfer of credit form, available in Main 239. Social work courses taken ten or more years ago *cannot* ordinarily serve as substitutes. Courses taken in a department or program *not accredited* by the CSWE *cannot* ordinarily serve as substitutes for the USU Social Work courses *unless* they have been covered in an articulation agreement.

The following regulations apply to transfer students: (1) A transfer credit application, with official transcripts from all institutions previously attended, must be submitted. (2) The transcripts must reflect a cumulative grade point average of at least 2.5 (on a 4.0 scale) and a 2.75 GPA in all social work courses. (3) The credentials of students seeking transfer to the Utah State University Social Work Program will be evaluated on an individual basis. (4) University Studies Depth Education requirements must be completed by **all** students, including transfer students who have earned an associate degree.

The following courses, or their equivalents, will be considered for transfer credit: SW 1050; Stat 1040 (QL); FHD 1500 (BSS); Engl 1010 (CL), 2010 (CL); Anth 1010 (BSS); Biol 1010 (BLS); Soc 1010 (BSS); Psy 1010 (BSS); and SW 2400, 2500. Students transferring from junior colleges will be required to apply for advanced standing and take upper-division social work courses at USU. Only those social work courses taken within the last ten years will be considered. Students transferring credits from CSWE accredited programs must apply for advanced standing and take SW 4150 (Practice II), SW 4160 (Practice III), SW 5350 (CI) (Social Welfare Policy), SW 4870 (Beginning Field Practicum), and SW 5870 (Advanced Field Practicum) with the USU Social Work Program.

During the month of March, Social Work faculty members will review applications for advanced standing, to qualify students to enroll in upper-division practice classes. Advanced standing is based on the following criteria: (1) completion of FHD 1500 (BSS); Engl 1010 (CL), 2010 (CL); Anth 1010 (BSS); Biol 1010 (BLS); Soc 1010 (BSS); Psy 1010 (BSS); and SW 2400, 2500 with a grade of *C* or better; (2) completion of SW 1050 with a grade of *C+* or better; (3) junior status (61-90 credits) upon application; (4) maintenance of a minimum overall GPA of 2.5 and a minimum GPA of 2.75 in social work classes; and (5) no *Pass-D-Fail* grades received in courses required for the major. Students transferring to USU should obtain and complete a copy of the social work advanced standing application and send the application to the Social Work Program by March 5, prior to the fall semester in which they intend to transfer.

Students transferring to USU should be advised that social work education is a professional program, having the purpose of preparing competent and effective social work professionals. Coursework is based upon a specific body of knowledge, values, and professional skills. Therefore, if students have not completed the required criteria for advanced standing, completion of their educational program could take additional time. For more information about the Social Work Program, call (435) 797-1286.

### ***Social Work Student Organizations***

The Social Work Program recognizes the importance of students having opportunities to learn and socialize outside of the classroom. Students are encouraged to become involved with the NASW student organization, as well as the USU Social Work Program Phi Alpha Honor Society. Information is available in Main 239.

## ***Anthropology***

**Program Director:** *Bonnie Glass-Coffin*

**Program Office:** Main 245, (435) 797-0219; or Main 224, (435) 797-1230

Anthropology is the integrated study of humans in all their aspects. It offers a broad framework for understanding humans as individuals and as members of widely varying societies through courses dealing with the biological evolution of humans, prehistoric culture change, and present diversity of cultures and human types. Two parallel goals of the discipline are to explore and develop an appreciation for human diversity and the shared legacy of our common humanity.

Anthropology includes the following subspecialties: cultural anthropology, biological anthropology, archaeology, and linguistics. Major requirements are designed to encourage broad exploration across anthropology, and students who major in anthropology examine a wide range of peoples and cultures, both past and present. They examine lifeways as different as the hunter-gatherers of Ice-Age Europe, tribal horticulturalists of lush interior Amazonia, and the diverse ethnic neighborhoods of modern U.S. cities. They explore both the biological and cultural basis of human behavior, and examine how it is manifested in individuals and groups. Anthropology courses use both scientific and humanistic approaches to the study of humankind, in all its complexity. Courses emphasize critical reasoning, oral and written communication skills, and the expansion of thinking beyond the familiar.

The contemporary social science student lives in a world of diminishing cultural and national barriers. In this setting, a major in anthropology can lead to a wide variety of careers. Anthropologists are on the staff of leading medical, business, law, public affairs, and other professional schools, and have played critical roles in international ventures, public health programs, community development activities, and minority and migrant social actions. Additionally, anthropology serves applied interests in international development, archaeology and cultural resource management, cross-cultural health care, and osteology/forensics. With first-hand experience in every region of the country and around the world, anthropologists bring a unique understanding of specific social and ethnic groups and of the biological, ecological, and cultural factors that influence human behavior.

Special features of the anthropology program include smaller courses, individualized attention, opportunities for laboratory, museum, and field work, and the opportunity of working in teaching assistant positions. All these features give anthropology majors choice and experiences unavailable to undergraduates in most programs. The Anthropology Museum and the Archaeology Field School provide additional hands-on learning opportunities. Anthropology participates in the Department of Geology emphasis in Geoarchaeology, the American Studies Program, and the Folklore Program in the Department of English.

Anthropology leads to a variety of “real-world” jobs. Anthropology graduates are: lawyers, nurses, health care administrators, travel consultants, teachers of all kinds, cultural resource professionals, agency and program administrators, and technical writers. They work for museums, government land management, environmental and foreign service agencies, Indian tribes, and are common in both the government and private sectors of the environmental-cultural heritage protection industry. They can be found in public and private foundations, bureaus, and agencies for the arts, humanities, sciences, and tourism.

Graduate study in anthropology opens the world of practicing anthropology. Not limited to college teaching, anthropologists with graduate degrees can be found in a variety of private sector and government agency positions.

For students seeking a dual major, an Anthropology major can complement a major in American Studies, Biology, Geology, Geography, History, Languages, and Political Science. It also pairs well with majors in Natural Resources, because cultural resource and Native American issues are important to many positions in private firms and government agencies concerned with land management and the environment.

**Major Requirements.** A minimum of 33 credits is required for the anthropology major. All students must take four required courses, including a three-semester sequence in the basic areas of anthropology and a beginning upper-division level course in the history of anthropology. The anthropology major also requires exposure across the breadth of the discipline. To achieve this, students select courses from topical and area clusters at the upper-division levels and a final capstone course. Additional graduation requirements include:

*Methods component.* Majors must complete one “Methods” course. The course chosen to meet this requirement may also count toward other anthropology major requirements.

A minimum of 16 credits of the anthropology course credits counting toward the major must be Utah State University courses. Credits from distance and residence center courses are subject to departmental approval for application toward the anthropology major.

Students majoring in anthropology must maintain a minimum 2.5 GPA in anthropology courses. A grade of *C* or better must be attained in courses counted for the major, including foreign language and statistics courses. In addition, majors must: (1) complete the general requirements of the University in consultation with the student’s advisor; (2) complete the following required courses: Anth 1010, 1020, 1030, 3990; (3) choose a minimum of six credits from: Anth 2100, 3110, 3150, 3160, 4110, 4120, 4130, 5100, 5120, 5160; (4) choose a minimum of six credits from: Anth 3200, 3250, 4250, 5210; (5) choose a minimum of six credits from: Anth 3170, 3300, 3310, 3350, 4350, 4360, 5300, 5310; and (6) choose a minimum of one course from: Anth 4250, 4350, 5650, 5990.

Students planning to receive a BA degree must complete two years training or equivalent in a foreign language approved by the Languages and Philosophy Department or one year or equivalent in each of two foreign languages approved by the Languages and Philosophy Department.

Students planning to receive a BS degree must complete Stat 1040 (Introduction to Statistics), **and** one course having a Quantitative Intensive (QI) University Studies designation.

Anthropology majors are encouraged to complete both the foreign language and statistics requirements.

**Minor Requirements.** A minimum of 18 credits is required for the anthropology minor. A minimum of 12 anthropology credits counting toward the minor must be Utah State University courses. Credits from distance and residence center courses are subject to departmental approval for application toward the anthropology minor. Students must maintain a minimum 2.5 GPA in anthropology courses. A grade of *C* or better must be attained in courses counting toward the minor.

The following courses are required for the anthropology minor: Anth 1010, 1020, 1030 (9 credits). In addition, students must complete three upper-division (3000-5000 level) courses (9 credits) in anthropology, excluding Anth 5210 (Physical Anthropology Lab), Anth 5310 (Archaeology Lab), and Anth 5900 (Independent Studies).

## *Sociology Graduate Program*

Students must have scores on the verbal and quantitative portions of the Graduate Record Examination (GRE) at or above the 40th percentile. TOEFL scores are required for international candidates, with a minimum score of 600 deemed acceptable. The Test of Spoken English (TSE) is also strongly recommended, with a minimum score of 50 deemed acceptable. International applicants who are admitted without having taken the TSE will be required to take a test of spoken English fluency administered by the Intensive English Language Institute (IELI) at Utah State University prior to beginning their first semester in the Sociology Graduate Program. Dependent upon the test results, the student may be required to complete a program of English language training during the first semester of residence in the graduate program. For consideration for admission to the MSS degree program, applicants may submit either GRE or Miller Analogies Test scores.

Applications are screened throughout the year by the Graduate Program Executive Committee. No applications will be considered until all required information arrives in the School of Graduate Studies or a formal petition to review a nearly-complete file is made and approved.

Students with or without an undergraduate degree in sociology may enter the master's degree program. However, before matriculating, basic competencies in sociology that have not been acquired through prior courses or experience must be satisfied. Students entering the doctoral program must complete master's level prerequisites in sociological theory and research methods and statistics.

### ***PhD in Sociology***

In addition to coursework in sociological theory and methods, students are expected to concentrate in two of the following specialty areas. Specialty areas are distinct, but are also highly integrative. One line of integration involves the department's continuing emphasis on **Rural Sociology**, which links elements of all four specialty areas. The program is sufficiently flexible to permit students with a strong interest in an area other than the established specialty areas to elect that area as an emphasis area, rather than having a second specialization, with approval of the supervisory committee and the department head or his or her delegated representative. In this case, the student would select a series of courses in that area in consultation with his or her supervisory committee and the department head or his or her delegated representative.

**Demography.** The demography area of specialization is administered through the Population Research Laboratory. The orientation is twofold: (1) basic and policy-oriented research on sociological aspects of demographic structure and processes, including migration, marriage and fertility, morbidity, and mortality; and technical demographic topics such as population estimates and projections; and (2) the provision of demographic training to domestic and international students relevant to their respective settings. Research endeavors encompass a broad range of local, regional, national, and international projects in the areas of migration and population redistribution, family demography, life course and aging, health and disability, labor force, and population estimates and projections. Graduate coursework is provided in social demography, population theories and policy, and demographic methods, as well as through various special topic seminars.

**Social Problems.** The social problems area is a specialization focused on theoretical and research-related issues relevant to a range of topics currently defined as "social problems." Students will find a good deal of flexibility in the program, allowing them to pursue special interests. The faculty members affiliated with this specialty area are actively involved in social problems research.

A number of themes are emphasized in each of the specific content courses for the social problems area. For example: How are social problems defined? What identifiable interest groups are involved in defining social problems? How do responses to social problems vary across time, place, and group? Examples of specific content courses this area may include are: criminal justice, aging, gender, race and ethnic relations, mental health, sexuality, social change, stratification, science and technology, medicine, and work.

**Environmental Sociology/Sociology of Natural Resources.** The faculty in this area maintain an active research involvement in a wide variety of areas, such as natural resource development, land use changes, public participation in environmental planning, hazardous facility siting, recreation, risk assessment, population/environment relationships, public land management issues,

and natural resource policy. Faculty have been engaged in cooperative research ventures with engineering, natural resource sciences, and other physical and social sciences faculty. Graduate curricula offerings are focused on the sociology of natural resources, environmental sociology, population and environment, and social risk analysis.

**Sociology of Development.** This specialization focuses on both domestic and international issues. Two major goals of the program are to give students the conceptual and analytic foundations to understand development, and to convey specific skills required for effective performance in applied fields. The basic curriculum includes courses covering a broad range of topics related to processes in local, national, and international development, including rural sociology, international development, women and development, applied anthropology, and economic development.

**Core Courses.** The core courses for the PhD degree in Sociology include Soc 7010, 7100, and 7110.

### ***MS and MA in Sociology***

The main objective of this degree program is to provide a firm foundation in sociological theory and methods. Students also have the opportunity to take electives in any of the departmental specialty areas or outside the department.

**Core Courses.** The core courses for this degree include Soc 6010, 6020, 6100, and 6150. The ability to utilize a statistical package (or permission of instructor) is a prerequisite to Soc 6150. Such competence may be gained by taking Stat 4910 (SPSS Shortcourse, 1 credit) or Stat 4920 (SAS Shortcourse, 1 credit).

### ***MSS Sociology Specialization***

This specialization enables interdisciplinary training in three related disciplines. The program requires a minimum of 35 credits, including 17 credits in a major discipline (Sociology); and either (1) a minimum of 9 credits in each of two minors *or* (2) a minimum of 9 credits in a minor and a minimum of 9 credits in a cluster. Two credits for the Plan B paper are included in the minimum 17 credits in Sociology. A minimum overall GPA of 3.0 is required. This is an applied degree. Individual options and plans of study can be arranged in consultation with the student's supervisory committee. At present, the degree is available with an emphasis in International Rural and Community Development.

**International Rural and Community Development.** This emphasis is designed to prepare administrators, planners, and researchers for work in international settings. The emphasis is on social and community factors in development. The interdisciplinary curriculum in sociology of development, rural sociology, economic anthropology, political science, and the economics of development has been specifically designed to prepare practitioners and leaders for careers in applied social development. The coursework can be adapted to the individual career interest of each student. The program involves students both from abroad and from the United States.

**Core Courses.** Individualized programs of study are prepared with the cooperation of the student and supervisory committee.

## Research

The graduate program's research agenda is focused within the framework of the department's specialty areas. Since the areas are integrative, research tends to involve collaborative participation by several faculty members. Several active research projects are supported by the Utah Agricultural Experiment Station. Research is conducted at various levels, including international, national, regional, and state. The department houses two active research units, the Institute for Social Science Research on Natural Resources, and the Population Research Laboratory. Faculty play key roles in several interdisciplinary research units, including the Institute for Rural and Community Development and the Women and Gender Research Institute. Graduate program faculty are frequently involved in the research activities of other research units on campus, including the Center for Persons with Disabilities, the Utah Water Research Laboratory, the Mountain West Center for Regional Studies, and the International Irrigation Center.

## Financial Assistance

Both departmental support and formal research grant support are available to graduate students and are awarded on a competitive basis. Some highly qualified departmental graduate students are also nominated to compete for University fellowships. Students who wish to be considered for financial aid must submit applications by February 1 for the coming academic year. Financial aid forms are available from the Department of Sociology, Social Work and Anthropology. Late applications are considered only if additional funds are still available.

Teaching assistantships are available through the department. Research assistantships are available through faculty members who have ongoing projects with the Utah Agricultural Experiment Station or who have research grants from the University, private companies, and federal or state agencies.

## Career Opportunities

Traditionally, persons with advanced degrees in sociology have been employed in college and university settings. Recent evidence has shown a greater variety of career paths. A survey conducted by the American Sociological Association showed that 21 percent of sociologists holding the doctoral degree were employed in the private sector; 31 percent were working in the nonprofit sector; 46 percent were working in federal, state, or local government agencies; and 12 percent were self-employed. USU sociology graduates have followed this pattern of diversity. They have secured appointments in a variety of academic, governmental, and private settings, both domestic and abroad. A sizeable number have achieved key leadership positions and high visibility in the profession.

## Sociology Courses (Soc)

**Soc 1010 (BSS). Introductory Sociology.** Examination of social behavior of humans and social institutions. Theories and methods for studying society and social issues, along with insights from related disciplines. (3 cr) (F,Sp) ©

**Soc 1020. Social Problems.** Study of major U.S. and international social problems. Examination of how issues are defined as social problems and ways groups attempt to solve the problems. (3 cr) (F,Sp)

**Soc 2500. Sociology of Gender.** Examines impacts of social constructions of gender on individual and collective experience. Investigates how gender is shaped through social processes and through the effects of social institutions. Particular attention given to relation of gender to social stratification. (3 cr) (F)

**Soc 3010. Race, Class, and Gender.** Examines theories and research concerning how race, class, and gender intersect in the lives of societal members. (3 cr) (F,Sp)

**Soc 3110 (CI). Methods of Social Research.** Methods and techniques of analyzing social data. Examines surveys, field research, observational studies, and other social science techniques. Emphasizes analysis of data and published research. (3 cr) (F,Sp)

**Soc 3120 (QI). Social Statistics I.** Examines use of statistics in social sciences. Particular focus on use of statistical analysis with surveys and census-type data. Includes parametric and nonparametric statistics utilized most in social analysis. Prerequisite: Stat 1040 or equivalent. (3 cr) (F,Sp)

**Soc 3200 (DSS). Population and Society.** Examination of interrelationships between population change and social structure in national and international context. Examines contributions of fertility, mortality, and migration to population characteristics, particularly sex, age, and ethnic composition. Stresses demographic data and analysis. (3 cr) (F,Sp)

**Soc 3320. Sociology of Work and Organization.** Stresses contribution of sociology to the understanding of industry as a social system. (3 cr) (Sp)

**Soc 3330. Medical Sociology.** In-depth analysis of major contributions of sociology to field of medicine. (3 cr) (F)

**Soc 3410. Juvenile Delinquency.** Focuses on nature, extent, and causes of delinquent behavior. Examines workings of juvenile justice system and programs for delinquency prevention. (3 cr) (F,Sp) ©

**Soc 3420. Criminology.** Examines theoretical explanations for crime in the U.S. Describes characteristics of major forms of criminal behavior. (3 cr) (F,Sp) ©

**Soc 3430. Social Deviance.** Examination of sociological perspectives on deviance as they apply to lifestyles, commitment, and social control in American society. (3 cr) (F)

**Soc 3500. Social Psychology.** Explores interaction between the social system and the individual. Examines human behavior in terms of positions people occupy in the social structure. (3 cr) (F,Sp)

**Soc 3600. Sociology of Urban Places.** Provides historical and international perspective on social, cultural, and spatial characteristics of urban places. Examines changes associated with urbanization processes and the effect of urbanization on community, crime, neighborhoods, and urban space. (3 cr) (F)

**Soc 3610 (DSS). Rural Sociology.** Examines patterns and processes of social change in rural and nonmetropolitan sectors of the U.S. and other advanced industrial societies. Considers how rural social change is influenced by demographic, economic, political, and natural resource conditions at regional, national, and global scales. (3 cr) (F)

**Soc 3750. Sociology of Aging.** Examination of social context in which aging occurs, the social implications of aging, and attendant social policy issues. Considers both individual and societal aging, using an historical and global approach. (3 cr) (F)

**Soc 4010. Contemporary Sociological Theory.** Critical analysis of major theorists and schools of theory in sociology from the late nineteenth century through recent

and current works. Emphasizes contemporary issues, insights, and uses of sociological theory. (3 cr) (F)

**Soc 4330. Sociology of Religion.** Discussion of theories and research used by sociologists to understand social dimensions of religion. Includes ways in which religion influences and is influenced by other societal institutions, such as politics, the economy, and the class system. (3 cr) (F)

**Soc 4420 (CI). Criminal Law and Justice.** Sociological analysis of relationship between law and social control and social change, especially regarding law enforcement, courts, and corrections. (3 cr) (Sp)

**Soc 4620 (DSS). Sociology of the Environment and Natural Resources.** Social aspects associated with the environment and natural resources. Topics include: environmental attitudes and perceptions, environmentalism as a social movement, resource scarcity and land use, and social change in resource-based communities. (3 cr) (Sp)

**Soc 4710. Asian Societies.** Explores history; social, economic, and political institutions; and peoples and cultures of Asian Societies. (3 cr) (Sp)

**Soc 4730. Women in International Development.** Examines status of women in developing countries, and the role they play in the development process. (3 cr) (Sp)

**Soc 4800. Seminar in Sociology.** Seminars in various areas of sociology: (a) theory, (b) methodology, (c) demography, (d) social organization, (e) social deviance, (f) social psychology, (g) human ecology, (h) gerontology. (1-3 cr) (F,Sp,Su) ®

**Soc 4900. Independent Readings in Sociology.** Independent readings in various areas of sociology: (a) theory, (b) methodology, (c) demography, (d) social organization, (e) social deviance, (f) social psychology, (g) human ecology. Prerequisite: Permission of instructor. (1-5 cr) (F,Sp,Su) ®

**Soc 5100. Interpreting Social Research.** Examines research design issues (conceptualization and measurement, sampling), modes of observation (experiments, surveys, field research, evaluation research), and interpreting social research findings (basic understanding of statistical analysis), as well as focusing on the ethics and politics of social research. (3 cr) (F,Su)

**Soc 5650 (DSS) (d6650).<sup>1</sup> Developing Societies.** Reviews how sociology, cultural geography, and economic anthropology analyze processes of globalization in postcolonial societies. Examines changing livelihoods, patterns of spatial incorporation and societal evolution, and emergent policy problems associated with rapid socioeconomic change. Also taught as Anth 5650/6650 and Geog 5650/6650. (3 cr) (F)

**Soc 6010. Development of Sociological Theory.** Examines development of social theory from early to premodern times. Special attention given to nineteenth century European influences on development of American sociological theory. (3 cr) (F)

**Soc 6020. Contemporary Sociological Theory.** In-depth analysis of selected modern representatives of major theoretical orientations in sociology. Includes relationships between theory and research. (3 cr) (Sp)

**Soc 6100. Advanced Methods of Social Research.** Examines philosophical bases, techniques, and political and ethical aspects of social research. (3 cr) (F)

**Soc 6150. Social Statistics II.** Statistical procedures for sociological analysis; nonparametric statistics; inferential statistics, cross-tabulation, and log-linear analysis; correlation; regression; ANOVA; and other multivariable social science statistical treatments. (3 cr) (Sp)

**Soc 6200. Social Demography.** Focuses on relationships between demographic and sociological processes. Study of theoretical perspectives and empirical analyses of the determinants. Consequences of change in population size, composition, and distribution, as well as changes in demographic processes. (3 cr) (F)

**Soc 6230. Techniques of Demographic Analysis.** Provides instruction in use of rates, ratios, life tables, and related measures to describe, analyze, and estimate population. Review of measures designed to examine the three demographic processes: fertility, mortality, and migration. Utilization of analytical tools to explore population composition. Special emphasis placed on use of U.S. Census data to create population profiles. (3 cr) (Sp)

**Soc 6250. Sociology Internship/Co-op.** Professional level of educational work experience in an internship/cooperative education position for graduate students. (1-6 cr) (F,Sp,Su)

**Soc 6310. Sociology of Work and Occupations.** Uses an applied and comparative cross-cultural perspective to examine work in pre-industrial (agricultural/pastoral), industrializing, industrialized, and post-industrial societies. (3 cr) (Sp)

**Soc 6420. Gender and Social Inequality.** Contemporary American gender stratification, including (1) What is the problem? (2) Why is it a problem? (3) How does it interact with other stratifiers? (4) What caused or is causing it? (5) How and why is it maintained? and (6) When does it vary and why? Comparison of different views on these issues. (3 cr) (Sp)

**Soc 6450. Special Topics in Social Problems.** Seminars on various topics appropriate to sociological analysis of contemporary social problems. Subject matter will reflect current faculty research and interests. (3 cr) (F,Sp) ®

**Soc 6460. Sociology of Health.** Examination of social and cultural factors influencing health. Analysis of health behaviors as consequences of variety of diverse personal and social processes. (3 cr) (Sp)

**Soc 6620. Environment, Technology, and Social Change.** Focuses on human interactions with the physical environment and changes brought about by this interaction. Topics of major emphasis include: approaches to environmental sociology; environmental values and attitudes; social movements pertaining to environmental concern; and social change responses to technology and resource scarcity. (3 cr) (Sp)

**Soc 6630. Natural Resources and Social Development.** Focuses on social dimensions of natural resources use, development, scarcity, and allocations. Examines ways in which changing resource conditions impact human social organization. Emphasis on topics including: social characteristics of resource-dependent communities and areas; social organizational responses to changes in availability of, or access to, natural resources; and social impacts of natural resource development activities. (3 cr) (Sp)

**Soc 6650 (d5650). Developing Societies.** Reviews how sociology, cultural geography, and economic anthropology analyze processes of globalization in postcolonial societies. Examines changing livelihoods, patterns of spatial incorporation and societal evolution, and emergent policy problems associated with rapid socioeconomic change. Also taught as Anth 6650/5650 and Geog 6650/5650. (3 cr) (F)

**Soc 6700. Advanced Rural Sociology.** Analysis of major developments in the study of rural society and rural communities. Emphasis on rural social changes related to economic, demographic, organizational, and technological trends at societal and global levels. (3 cr) (F)

**Soc 6730. Gender and International Development.** Examines gender issues in economic and social development. Focuses on theory and methodologies for gender analysis. (3 cr) (Sp)

**Soc 6800. Seminar in Sociology.** Seminars in various areas of sociology: (a) theory, (b) methodology, (c) demography, (d) social organization, (e) social deviance, (f) social psychology, (g) social problems, (h) international development, (i) domestic development, (j) rural sociology, (k) environmental sociology, (l) other. (1-3 cr) (F,Sp,Su) ®

**Soc 6900. Independent Readings in Sociology.** Independent readings in various areas of sociology: (a) theory, (b) methodology, (c) demography, (d) environmental/natural resource sociology, (e) sociology of development, (f) social problems. (1-3 cr) (F,Sp,Su) ®

**Soc 6970. Thesis Research.** (1-12 cr) (F,Sp,Su) ®

**Soc 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

**Soc 7010. Issues in Sociological Theory.** Contrasts key contemporary theorists and schools of theory with respect to macro and/or micro approaches to sociological issues and concerns such as social organization, social inequality, and social change. Focal issues vary by instructor. (3 cr) (F)

**Soc 7100. Survey and Field Research.** Examines and compares procedures for conducting social science research using structured survey questionnaires and qualitative field research/ethnographic methods. (3 cr) (F)

**Soc 7110. Advanced Sociological Analysis.** Provides review of several quantitative approaches utilized in contemporary social research. Students undertake small-scale analytical exercises in topics including, but not limited to, log-linear and structural equation modeling, logistic regression, and event history analysis. (3 cr) (Sp)

**Soc 7210. Teaching Sociology.** Provides a learning opportunity for graduate students who will be graduate instructors or teaching assistants. Reviews teaching strategies (meeting a class for the first time, teaching a large lecture class) and course development (constructing a syllabus, developing tests and writing assignments). (3 cr) (F)

**Soc 7250. Advanced Seminar in Social Demography.** Detailed comparative and multilevel examination of substantive and methodological issues in the study of nuptiality, fertility, morbidity and mortality, migration, and social mobility. Covers theories, data collection strategies, measurement issues, and analytical techniques. (3 cr) (Sp)

**Soc 7400. Social Problems Perspectives.** Examines major theoretical and methodological approaches to social problems. (3 cr) (F)

**Soc 7620. Sociology of Environmental Hazards and Risks.** Focuses on how individuals and organizations respond to environmental hazards and risks resulting from either natural events or human technological and industrial processes. (3 cr) (Sp)

**Soc 7640. Population and Environment.** In-depth exploration of relationship between human populations and their environment. Heavy emphasis placed on developing an understanding of contemporary research in this area, especially with regard to the association between environmental factors and population organization, change, and growth. (3 cr) (Sp)

**Soc 7800. Topical Seminar in Sociology.** Seminars in various areas of sociology: (a) theory, (b) methodology, (c) demography, (d) environmental/natural resource sociology, (e) sociology of development, (f) social problems. (3 cr) (F,Sp) ®

**Soc 7900. Independent Study.** Independent study in sociological areas emphasizing (a) theory, (b) methodology, (c) demography, (d) environmental/natural resource sociology, (e) sociology of development, (f) social problems. (1-3 cr) (F,Sp,Su) ®

**Soc 7970. Dissertation Research.** (1-12 cr) (F,Sp,Su) ®

**Soc 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

## Social Work Courses (SW)

**SW 1050. Introduction to Social Welfare.** Foundation course to facilitate development of an approach to thinking about social welfare. Explores broad common base of social work professional values, knowledge, skills, social policies, and programs. (3 cr) (F,Sp)

**SW 2400. Social Work with Diverse Populations.** Examines characteristics of various populations, including patterns, dynamics, and consequences of discrimination, economic deprivation, and oppression. Emphasis placed on empowerment of groups and individuals, as well as the accumulation of multicultural competence. Prerequisite: SW 1050. (3 cr) (F,Sp)

**SW 2500. Human Behavior in the Social Environment.** Interrelatedness of social, cultural, and environmental factors that combine with biological and psychological components to mold human behavior. Relevance of these factors to generalistic social work practice. Prerequisite: SW 1050. (3 cr) (F,Sp)

**SW 3050. Practice I.** Introduction of generalist social work framework as integrative tool, with special attention shown to strengths and empowerment perspective. Individuals as targets for change. Prerequisite: Admission to social work bachelor's program, SW 1050, 2400, 2500. (3 cr) (F)

**SW 3350. Child Welfare.** Developments in programs for meeting such needs of children as substitute parental care, adoptions, delinquency problems, mental retardation, and unmarried motherhood. Prerequisites: SW 1050, 2400, 2500. (3 cr) (Sp) ©

**SW 3360. Adolescents: Theories, Problems, and Issues.** Focuses on major social problems confronting youth today: teenage pregnancy, substance abuse, unemployment, education, and mental health. Investigation of theories explaining these problems and society's efforts to resolve these problems. Prerequisites: SW 1050, 2400, 2500. (3 cr) (F)

**SW 3450.<sup>2</sup> School Social Work.** Overview of social work practice in an educational setting. (3 cr) (Sp)

**SW 3550.<sup>2</sup> Social Gerontology.** Overview of field of aging and its connection to the practice of social work. (3 cr) (F)

**SW 3650. Mental Health.** Services offered for the prevention and treatment of mental illness and the feasibility of social action programs on a community level. Prerequisites: SW 1050, 2400, 2500. (3 cr) (Sp)

**SW 3750. Medical Social Services.** Introduction to role of social worker in health settings. Emphasizes definition of health and disease, patient rights, and consumer participation. Examination of basic health programs, major trends in health planning, and alternate models of health delivery. Prerequisites: SW 1050, 2400, 2500. (3 cr) (F)

**SW 4100. Social Work Research.** Survey of qualitative and quantitative scientific methods of research in social work. Articulation of research with practice and policy. Prerequisites: SW 1050, 2400, 2500. (3 cr) (F)

**SW 4150. Practice II.** Introduction to generalist social work practice at the micro level. Emphasizes study of skills from a strengths and empowerment perspective

with individuals, families, and small groups. Special attention paid to ethical issues and working with diverse population. Prerequisite: SW 3050. (3 cr) (Sp)

**SW 4160. Practice III.** Introduction to generalist social work practice at the macro level. Emphasizes study of skills from a strengths and empowerment perspective with groups, organizations, and community systems. Special attention paid to ethical issues and working with diverse populations. Prerequisite: SW 4150. (3 cr) (Sp)

**SW 4870. Beginning Field Practicum.** Practical experience in a social service agency. Seminar integrates field work experiences and academic knowledge. Emphasizes use of self and integration of knowledge, values, skills, and methods of practice, with special emphasis given to the code of ethics. Prerequisite: Instructor's permission and by application. (6 cr) (F) ©

**SW 4900. Topical Issue Seminar.** Advanced seminar, designed as a forum for students from varied social science disciplines. Seminars may include issues involved in social work values and ethics, diversity, promotion of social and economic justice, and/or populations-at-risk. The following topics are offered: school social work, crisis intervention strategies, special topics in aging, and occupational and environmental health. Prerequisites: SW 1050, 2400, 2500, and permission of instructor. (3-6 cr) (F,Sp) ©

**SW 4950. Directed Readings.** Independent readings in various areas of social work: practice, policy, HBSE, research, populations-at-risk, values and ethics, social and economic justice, and diversity. Prerequisite: Instructor's permission and a plan for study. (1-5 cr) (F,Sp) ©

**SW 5350 (CI). Social Welfare Policy.** Introduction to policy making in social welfare. Principles of social and economic justice used to analyze selected social policies and programs within a historical and contemporary context. Attention given to differential impact on at-risk populations. Prerequisites: SW 1050, 2400, 2500. (3 cr) (F)

**SW 5870. Advanced Field Practicum.** Supervised social work practice and projects. Provides opportunities for advanced social work students to apply classroom learning in a field setting. Minimum of 240 hours in a social service agency required. Prerequisite: Instructor's permission and SW 4870. (6 cr) (Sp) ©

## *Anthropology Courses (Anth)*

**Anth 1010 (BSS). Cultural Anthropology.** Role of cultural concepts within discipline of anthropology. Relationship of cultural concepts to survival and adaptation, society and social life, ideology and symbolism, and cultural change and diversity. Applications to contemporary world problems. (3 cr) (F,Sp) ©

**Anth 1020 (BLS). Biological Anthropology.** Survey of multidisciplinary field of biological anthropology. Includes study of fossil and living primates, fossil evidence for human evolution, bioarchaeology, contemporary human variation and adaptation, principles of evolutionary theory, and introductory population genetics. (3 cr) (F)

**Anth 1030 (BSS, CI). World Archaeology.** Surveys archaeology and the means by which inferences about the past are made. Examines major processes shaping humans, including world colonization, our foraging legacy, origins of agriculture and civilization, and implications of our past for the present and future. (3 cr) (F,Sp)

**Anth 1710 (BHU). Introduction to Folklore.** Introduction to major genres of folklore (folk narrative, custom, folk music and song, vernacular architecture and arts), folk groups (regional, ethnic, occupational, familial), and basic folklore research method (collecting and archiving). Also taught as Engl 1710 and Hist 1710. (3 cr) (F,Sp)

**Anth 2100 (BSS). Peoples of the Contemporary World.** Introduces different ways of life, rural and urban, from the world's major culture areas. Focuses on how con-

temporary societies have evolved in ecological, historical, and political context. Introduces problems arising from third world social change. (3 cr) (Sp)

**Anth 2720. Survey of American Folklore.** Principal ethnic, regional, and occupational folk groups in America. Relations between folklore and American history, literature, and society. Key genres in American folklore (narrative, art, song, etc.) and their role in American culture. Also taught as Engl 2720 and Hist 2720. (3 cr) (Sp)

**Anth 3110.<sup>2</sup> North American Indian Cultures.** Introduces ethnography of native cultures found within the USA and Canada, documenting their pre-contact adaptations and their interactions with changing national policies leading to today's resurgence of native peoples. (3 cr) (F)

**Anth 3120<sup>5</sup> (CI, DSS). Peoples of the Pacific.** Introduces several perspectives, including: scientific analyses of the settlement and early ecology of the Pacific; impact on Pacific cultures of European contact, especially during the Age of Exploration; ethnographic classic studies of societies such as Trobriands; and briefly, the contemporary scene. Prerequisites: Anth 1010 or permission of instructor. (3 cr)

**Anth 3130<sup>5</sup> (CI). Peoples of Latin America.** Survey of Latin American cultures, past and present. Emphasis on culture as a dynamic, adaptive system and on contemporary issues in rural and urban Andean South America, Amazonia, and Mesoamerica. Appropriate for both majors and nonmajors. (3 cr)

**Anth 3150.<sup>2,3</sup> Field-Methods and Career Options in Anthropology.** Introduces students to the range of field-methods used in cultural anthropology. Provides opportunity for students to use these field-methods to identify career options in all anthropology sub-disciplines. (3 cr) (Sp)

**Anth 3160 (DSS). Anthropology of Religion.** Cross-cultural description and theoretical analysis of religion and its functional relationships to human psychology, society, and the natural environment. (3 cr) (F)

**Anth 3170.<sup>2,4</sup> (DSS, CI). Symbol Systems and the Origins of Writing and Literacy.** Discusses four broad themes: (1) humans as symbol-makers; (2) the development of writing systems; (3) the decipherment of ancient scripts; and (4) social construction of literacy. Specific topics include: cave art and myth, decipherment of Egyptian and Mayan hieroglyphics, and the place of literacy in society. Prerequisites: Any one of USU 1320, Anth 1030, Anth 3350, Hist 1040, Hist 3110, or permission of instructor. (3 cr) (F)

**Anth 3180<sup>5</sup> (DSS, CI). Ecology in Anthropology.** Details how relationships between cultural form and environmental structure and variation have been examined in anthropology. In-depth study of main perspectives, including cultural ecology, cultural materialism, and contemporary evolutionary ecology. Explores relevance for current and future human-environment issues. (3 cr)

**Anth 3200 (DSS, CI). Perspectives on Race.** Study of the processes of racial differentiation, the basis of biological differences found among existing human groups, the influence of biology and culture on human variation, and the influence of social context on perceptions of race. (3 cr) (Sp)

**Anth 3250.<sup>3</sup> Osteology.** Detailed hands-on study of human skeleton, including component of comparative vertebrate skeletal anatomy. Applications to fields of archaeology, forensic science, paleopathology, and zoology. Includes methods component. (3 cr) (F)

**Anth 3300<sup>2</sup> (DSS). Archaeology in North America.** Prehistoric and historic archaeology of the North American continent. Explores initial colonization and Native American origins; variability among foraging adaptations; spread of farming; cultural complexity in Midwest, Southwest, and West Coast; Indian-environment relationships; European contact; depopulation; and historic archaeology of Euro-Americans. (3 cr) (Sp)

**Anth 3310<sup>2,3</sup> (CI). Introduction to Museum Studies.** Explores all aspects of museum work, from the acquisition and storage of collections to fundraising and educational programs. As part of course requirements, students tour area museums and get first-hand perspectives on the challenges and rewards of museum work from professionals in the field. (3 cr) (F)

**Anth 3350<sup>2</sup> (DSS). Archaeology of Ancient Civilizations.** Surveys primary states in antiquity, including Mesopotamia, China, Egypt, South America, and Mesoamerica. In-depth study of the process of their formation and theories of their origins. Emphasis is anthropological and scientific to complement the classical and humanistic. (3 cr) (Sp)

**Anth 3990.<sup>4</sup> History and Theories of Anthropology.** Traces history of anthropology, main currents of theoretical thought shaping claimed anthropological knowledge, and major figures associated with the discipline. Conceptualizes anthropology among the social sciences, life sciences, and humanities. Prerequisite: Anth 1010. (3 cr) (F)

**Anth 4100. The Study of Language.** Investigates ways in which human languages are structured, how they change, how they reflect the cultures in which they are used, and how they are learned. Also taught as Ling 4100. (3 cr) (F,Sp)

**Anth 4110<sup>2</sup> (DSS) (d6110). Southwest Indian Cultures, Past and Present.** Reviews past and present Indian cultures of greater southwest region. Examines the prehistoric Anasazi, the Pueblos, the canyon and desert peoples, the Utes, and the Navajos. Interprets these cultures in ecological, historic, and political contexts. (3 cr) (F)

**Anth 4120<sup>2,3</sup> (CI). Ethnography of Childhood.** Focuses on ethnographic methods and the anthropological study of childhood. Students design and carry out ethnographic study of children in school, family, or other setting. Readings of ethnographic studies of childhood from the U.S. and abroad. Includes methods component. (3 cr) (F)

**Anth 4130<sup>2,3</sup> (DSS). Medical Anthropology: Matter, Culture, Spirit, and Health.** Examines the bio-ecological (matter) and socio-cultural aspects of disease/illness in human populations and examines "spiritual" dimensions of health in cross-cultural context. Includes methods component for anthropology majors and serves as a Liberal Arts and Sciences cluster capstone course. (3 cr) (Sp)

**Anth 4250.<sup>2,3,4</sup> Problems in Bioarchaeology.** Examines various approaches to the study of human biocultural adaptation through the analysis of human remains from archaeological sites. Includes methods component. Prerequisite: Anth 3250 or permission of instructor. (3 cr) (Sp) ®

**Anth 4350.<sup>2,3,4</sup> Archaeological Method/Theory and Cultural Resource Management.** Examines contemporary theories, as well as methods used by archaeologists to address questions arising from theory. Also considers contributions of cultural resource management to meeting anthropological and public concerns. Includes methods component. Prerequisite: Anth 1030. (3 cr) (Sp)

**Anth 4360<sup>2,4</sup> (DSS). Ancient Desert West.** Prehistoric to historic human ecology and paleoenvironments of the Great Basin, Southwest, and southern California deserts. Emphasizes perspective of human evolutionary ecology and detailed examination of the archaeological record in conjunction with paleoenvironmental data. For classroom work only, 3 credits are granted. For 4 credits, one or more weekend field trips are required. Prerequisite: Anth 1030 or permission of instructor. (3-4 cr) (F)

**Anth 4800. Topics in Anthropology.** Focuses on special topics in anthropology. Topics and course format vary. (1-3 cr) ®

**Anth 5100<sup>2</sup> (DSS) (d6100). Anthropology of Sex and Gender.** Increases awareness of sexuality and gender, and of feminist perspectives about social problems related to

gender and sexuality that cross-cut cultural boundaries. Emphasizes gender-related social problems in contemporary world societies. (3 cr) (Sp)

**Anth 5120<sup>2</sup> (d6120). Applied Rural Development.** Reviews development anthropology for practitioners. Examines human dimensions of planned policy, program, and project interventions. Examines how rural development occurs and how it is analyzed and managed in selected real-world cases. Includes methods component. (3 cr) (Sp)

**Anth 5160<sup>2</sup> (DSS) (d6160). Cities and Development.** Examines role of emergent urban areas in national development. Employs ethnographic case studies of selected cities, coupled with a policy perspective on problems of hyperurbanization in both poor and more advanced societies. Includes methods component. (3 cr) (Sp)

**Anth 5190.<sup>3,4</sup> Applied Anthropology Practicum.** Supervised projects in applied anthropology for advanced students. Integrates academic knowledge and field technique. Minimum contact hours, requirements, and credits available vary. Includes methods component. Prerequisite: Application and instructor approval. (1-5 cr) ®

**Anth 5210.<sup>3,4</sup> Physical Anthropology Lab.** Laboratory experience enabling participation in analysis/reporting stages of physical anthropology projects. Includes methods component. Prerequisite: Permission of instructor. (1-3 cr)

**Anth 5300.<sup>3,4</sup> Archaeology Field School.** Internship on archaeological field project, including survey, excavation, recording, mapping, and scientific conduct of archaeological problem solving. Application process begins in March. Additional field support fee required. Prerequisites: Anth 1030 and instructor's permission. (1-5 cr) (Su) ®

**Anth 5310.<sup>3,4</sup> Archaeology Lab.** Laboratory experience enabling participation in analysis/reporting stages of archaeology projects. Includes methods component. Prerequisite: Permission of instructor. (1-3 cr) ®

**Anth 5650<sup>2</sup> (DSS) (d6650). Developing Societies.** Reviews how sociology, cultural geography, and economic anthropology analyze processes of globalization in postcolonial societies. Examines changing livelihoods, patterns of spatial incorporation and societal evolution, and emergent policy problems associated with rapid socioeconomic change. Also taught as Geog 5650/6650 and Soc 5650/6650. (3 cr) (F)

**Anth 5700. Folk Narrative.** Forms and functions of folk narrative genres: myth, legend, folktale, memorate, and ballad. Also taught as Engl 5700 and Hist 5700. (3 cr)

**Anth 5800.<sup>3,4</sup> Museum Development.** Apprenticeship in the USU Museum of Anthropology to learn the operation of a small museum, including artifact curation and exhibit development. Written proposal of planned work is required prior to the semester that this course is taken (consult with instructor). Prerequisites: Instructor's permission and minimum of three anthropology courses. (1-3 cr) ®

**Anth 5900. Independent Studies.** Customized study or readings for upper-division or graduate students on topics not covered in regular courses. Prerequisite: Approval, prior to registration, of proposal written by student in consultation with instructor. (1-3 cr) ®

**Anth 5980. Senior Project.** Develops advanced research and writing skills in a specialty area, and results in a research project/report. Must register in combination with a 4000- or 5000-level anthropology course, in consultation with instructor and subject to approval. (1 cr)

**Anth 5990.<sup>2,4</sup> Contemporary Anthropological Theory and Method.** Capstone course in anthropological theory and method, required for all majors. Prerequisite for

majors: Anth 3990. Graduate students may enroll only at instructor's discretion, and must enroll for extra weekly meeting. (3 cr) (Sp)

**Anth 6100<sup>2</sup> (d5100). Anthropology of Sex and Gender.** Increases awareness of sexuality and gender, and of feminist perspectives about social problems related to gender and sexuality that cross-cut cultural boundaries. Emphasizes gender-related social problems in contemporary world societies. (3 cr) (Sp)

**Anth 6110<sup>2</sup> (d4110). Southwest Indian Cultures, Past and Present.** Reviews past and present Indian cultures of greater southwest region. Examines the prehistoric Anasazi, the Pueblos, the canyon and desert peoples, the Utes, and the Navajos. Interprets these cultures in ecological, historic, and political contexts. (3 cr) (F)

**Anth 6120<sup>2</sup> (d5120). Applied Rural Development.** Reviews development anthropology for practitioners. Examines human dimensions of planned policy, program, and project interventions. Examines how rural development occurs and how it is analyzed and managed in selected real-world cases. Includes methods component. (3 cr) (Sp)

**Anth 6160<sup>2</sup> (d5160). Cities and Development.** Examines role of emergent urban areas in national development. Employs ethnographic case studies of selected cities, coupled with a policy perspective on problems of hyperurbanization in both poor and more advanced societies. Includes methods component. (3 cr) (Sp)

**Anth 6650<sup>2</sup> (d5650). Developing Societies.** Reviews how sociology, cultural geography, and economic anthropology analyze processes of globalization in postcolonial societies. Examines changing livelihoods, patterns of spatial incorporation and societal evolution, and emergent policy problems associated with rapid socioeconomic change. Also taught as Geog 6650/5650 and Soc 6650/5650. (3 cr) (F)

**Anth 6900. Independent Studies.** Customized study or readings for graduate students on topics not covered in regular courses. Prerequisite: Approval of proposal written by student in consultation with instructor. (1-3 cr) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

<sup>2</sup>This course is taught alternating years. Check with department for information about when course will be taught.

<sup>3</sup>This course may be used to satisfy the methods component requirement for the anthropology major.

<sup>4</sup>This course has one or more prerequisites. Check with the department for details.

<sup>5</sup>This course is offered infrequently. Check with department for information about when course will be taught.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

*Department of*  
***Special Education and Rehabilitation***  
*College of Education*

**Head: Professor** *Charles L. Salzberg*, applied behavioral analysis, single-subject research design, research on teacher training, employment preparation for persons with disabilities, video assisted training programs, paraeducator training, and students with disabilities in higher education

Office in Emma Eccles Jones Education 313A, (435) 797-3243

**Undergraduate Program Coordinator: Associate Professor** *Benjamin Lignugaris/Kraft*, secondary special education, social/vocational skill training, behavioral analysis, instructional design and program development

**E-mail:** lig@cc.usu.edu

**Distance Undergraduate Programs Coordinator: Extension Assistant Professor** *Ronda R. Menlove*, special education teacher education, distance education, public school leadership

**Advising and Student Teaching Coordinator:** *Darcie L. Peterson*

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**Graduate Program Coordinators:**

**Special Education Master's Programs:**

**Associate Professor** *Pamela J. Hudson*, adolescents with mild disabilities, mathematics

**E-mail:** phudson@cc.usu.edu

**Doctoral Programs:**

**Associate Professor** *Timothy A. Slocum*, reading, mild/moderate disabilities, behavior analysis, research methods

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**Rehabilitation Counseling Program: Professor** *Julie F. Smart*, rehabilitation counseling, disability studies, Hispanics with disabilities, Spanish translation of rehabilitation instruments, multicultural rehabilitation

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**Multi-university Consortium in Sensory Impairments Coordinator: Associate Professor** *Judith M. Holt*, early childhood and visually impaired

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**WWW** <http://sped.usu.edu>

**Professors** *Alan M. Hofmeister*, technology; *Sarah Rule*, early intervention, developmental disabilities, technology and teacher education; *Richard P. West*, behavior analysis in education, computer-based decision making, parent training, school organization and administration; *Karl R. White*, research and evaluation, early intervention; **Professors Emeritus** *Garth M. Eldredge*, rehabilitation counseling; *Marvin G. Fifield*, evaluation of persons with emotional disturbances; **Associate Professor** *Robert L. Morgan*, behavior analysis/transition; **Associate Professors Emeritus** *Hyrum S. Henderson*, teacher training; *Devoe C. Rickert*, vocational training; **Assistant Professors** *Hal M. Cain*, rehabilitation counseling; *Timothy N. Tansey*, rehabilitation, counseling, administration, employment training; **Research Assistant Professors** *C. Jill Morgan*, special education, teacher education, paraeducator training and supervision; *Cynthia J. Rowland*, distance education, speech and language development, naturalistic instructional methods, early literacy, assistive technology; **Adjunct Assistant Professors** *David W. Bush*, clinical/counseling psychology, school counseling, community mental health, private practice; *Marilyn Likens*, alternative teacher preparation for provisionally licensed teachers; *Sharon Neyme*, educational leadership in the areas of strategies for at-risk students, diversity, and school culture; **Clinical Instructors** *Barbara J. Fiechl*, preschool and infant service delivery; *Greg E. Gerard*, chronic illness, assistive technology, instructional technology, distance education; **Adjunct Clinical Instructors** *Kirk Allen*, emotionally disturbed, special education administration; *Martin E. Blair*, distance education teacher training and special education; *Marlene Deer*, special education, preschool disabilities, and severe disabilities; *Danelle Keith*, special education, moderate to severe disabilities, emphasis in early childhood literacy; *Patricia B. Willis*, learning disabilities; **Clinical Instructor Emeritus** *Joan F. Forsgren-White*

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), Master of Education (MEd), Educational Specialist (EdS), and Doctor of Philosophy (PhD) in Special Education; Master of Rehabilitation Counseling (MRC); the Special Education and Rehabilitation Department participates in the Interdepartmental Doctor of Education (EdD)

**Undergraduate emphases:** *BS, BA*—Mild/Moderate Disabilities, Severe Disabilities, Early Childhood Special Education; **Graduate specializations:** *MEd, MS, EdS, PhD*—Behavioral Disorders, Early Childhood Special Education, Mild/Moderate Disabilities, Severe Disabilities, Transition/Special Education. **Licensure** is available for teachers in early childhood special education, mild/moderate disabilities, and severe disabilities. At the postbachelor's level, licensure is available for teachers in vision and hearing impairments. Special Education dual licensure programs are available with the departments of Secondary Education, Elementary Education, and Family and Human Development.

## Undergraduate Programs

### Objectives

The undergraduate programs in the Department of Special Education and Rehabilitation offer educational and training opportunities for teachers and support personnel working with exceptional children and adults with disabilities. The programs prepare students to work with individuals with mild, moderate, and severe disabilities and with early childhood special education. Students who are majoring in other teaching fields (i.e., elementary education, secondary education) are encouraged to pursue a second endorsement by taking those courses which lead to a special education license. Teacher education programs in the department are accredited by the State of Utah and nationally by NCATE.

**Areas of Emphasis.** The Department of Special Education and Rehabilitation offers training programs for individuals who want to work with children and adults with disabilities. A student fulfilling the undergraduate course requirements will qualify for a BS or BA degree in special education and be eligible for a license to teach students with mild/moderate disabilities, students with severe disabilities, or young children with disabilities. The severe and mild/moderate endorsements allow graduates to teach pupils with disabilities from kindergarten through 12th grades. The early childhood special education license allows graduates to teach children with disabilities from birth to five years old. In addition, the department offers dual teaching majors with the departments of Secondary Education, Elementary Education, and Family and Human Development. Students completing the dual major requirements in secondary education will be eligible for teacher licensure in one of the special education endorsement areas and their secondary education content major. Students completing the dual major requirements in elementary education will be eligible for teacher licensure in one of the special education endorsement areas and elementary education. Students interested in teaching preschool children with disabilities may receive an early childhood special education license for ages 0-5, in addition to a K-12 special education endorsement.

### Requirements

**Admission Requirements.** Students are admitted to the Department of Special Education and Rehabilitation as Pre-Special Education majors by meeting the Utah State University minimum requirements (see pages 48-51). To become a Special Education major, a student must make written application to the department after meeting the following prerequisites: (1) completion of at least 40 attempted semester credits with a cumulative GPA of 2.75 or higher; and (2) completion of admission requirements to the College of Education Teacher Education Program (see page 86). Students should apply to the department during fall semester of their sophomore year. Admission to the department is competi-

tive based on several factors. These include: (1) the student's current GPA; (2) the number of credit hours completed by the end of fall semester; (3) completion of premajor classes (such as Stat 1040 and FHD 1500); and (4) the student's career goals and experiences.

**GPA Requirement.** A minimum GPA of 2.75 is required to apply for admission, to remain in good standing, and to graduate from the program. All required special education classes must be completed with a grade of C or better.

**Bachelor's Degree in Special Education.** Undergraduate study leads to the Bachelor of Science or Bachelor of Arts degree in Special Education with licensure to teach students with mild/moderate disabilities, severe disabilities, or early childhood special education. The degree requires a total of **120 credits**. The requirements are as follows:

**1. University Studies Requirements.** Competency Requirements (9-13 credits), Breadth Requirements (18 credits), and Depth Education Requirements (5 courses). For more information, see pages 56-63.

**2. Professional Education.** 15-18 credits.

**3. Special Education Major.** 42-60 credits. Coursework includes: human growth and development; applied behavior analysis; introduction to systematic instruction (task analysis, curriculum-based measurement, behavioral objectives, contingent reinforcement); designing curriculum; Individualized Educational Programs (IEP); educational assessment, analysis, and adaptation of instructional materials; intervention strategies for academic and social behaviors; and parent involvement. Additionally, each endorsement area includes practicum work with exceptional children or youth. Finally, all students must complete student teaching with students with disabilities.

**4. Professional Depth.** 15 credits. The emphasis area is designed to enhance the Special Education major's background. Areas recommended include communicative disorders, psychology, sociology, family and human development, recreation, and physical education.

**5. Electives.** 7-20 credits.

### Additional Information

For more information concerning Bachelor of Science or Bachelor of Arts requirements and the sequence in which courses should be taken, see major requirement sheets available from the Department of Special Education and Rehabilitation (Education 313) or the Special Education Advising Office (Education 107).

## **Financial Support**

Scholarships, assistantships, grants-in-aid, and work-study programs are available through the University. In addition, there are some endowed scholarships available through the department and, sometimes, there are stipends available from federal grants.

## **Graduate Programs**

### **Admission Requirements**

Admission decisions are made by the department's Graduate Program Committee. Admission requirements are based upon those of the School of Graduate Studies (see pages 72-73). In addition, the committee considers experience, academic record and curriculum, formal recommendations, and test scores. To be considered for admission to the master's degree programs, applicants may submit either GRE or Miller Analogies Test scores. Doctoral program admission requires GRE scores. Students applying for admission to special education graduate programs, who do not have an undergraduate special education background, may be required to complete selected undergraduate courses prior to admission as fully-matriculated graduate students.

Applicants are screened throughout the year by the Graduate Program Executive Committee. Review of applications begins on April 1. Applications received after this date will be considered, but opportunities for financial assistance may be limited. No applications will be considered until all required information arrives at the School of Graduate Studies office.

### **Teaching Licenses**

The department prepares students for licensure as teachers of students with mild/moderate disabilities, students with severe disabilities, and preschool-age students with disabilities. Licensure may also be obtained in visual and/or hearing impairments through a multi-university consortium program. Licensure may be obtained as part of the graduate degree program or without a graduate degree.

### **Degree Programs**

**Master of Science in Special Education (MS).** The department offers programs leading to the MS. The MS degree program is designed for persons with special education experience who desire to improve their teaching skills and who contemplate pursuing an advanced degree beyond the master's degree. A minimum of 36 credits, including a thesis, is required for the MS degree.

**Master of Education in Special Education (MEd).** The department offers programs leading to the MEd. The MEd program is designed for persons who desire a graduate program that will help them improve their competencies as educators. A minimum of 36 credits, including a creative project, is required for the MEd degree.

**Master of Rehabilitation Counseling (MRC).** The Master of Rehabilitation Counseling prepares persons with the basic competencies to provide rehabilitation counseling to a broad range of individuals with disabilities in a variety of settings, such as state rehabilitation agencies, independent living centers, rehabilitation hospitals, private rehabilitation facilities and agencies, employment assistance programs, and private industry. The degree is a

48-credit program consistent with the requirements of the Council on Rehabilitation Education (CORE). The Rehabilitation Counseling Program has a limited number of scholarships funded through the U.S. Department of Education, Rehabilitation Services Administration. These scholarships require a postgraduate commitment to work for a not-for-profit agency serving the needs of individuals with disabilities for two years for every year of scholarship received.

**Educational Specialist Program (EdS).** The educational specialist degree is designed for advanced graduate students seeking instruction beyond a master's degree. Programs are individually planned to address specific student needs. Completion of the EdS program is based on completion of required coursework, submission of a research proposal to a supervisory committee, and satisfactory defense of the research project.

**Doctor of Philosophy Program (PhD).** The PhD program prepares leadership personnel for positions in research and university programs.

Completion of the PhD program certifies competence in the three following areas: (1) mastery of the theoretical and applied content required for providing appropriate education for persons with disabilities (infants and toddlers, children, youth, and/or adults), (2) ability to conduct independent research with particular emphasis on those research techniques in behavioral analysis, and (3) ability to effectively teach audiences of varying sophistication and expertise and to supervise the delivery of special education or rehabilitation services.

**Doctorate of Education (EdD).** The department participates in the College of Education Interdepartmental Doctorate of Education (EdD) degree program. The general purpose of the special education emphasis area of the EdD program is to prepare leadership personnel for positions in administration, supervision, curriculum development, and teacher training. For information about areas of specialization, emphases of study, research sponsored, admission requirements, procedures to follow, and other information, see pages 211-212 of this catalog.

### **Financial Assistance**

Acceptance of a student to a graduate program is independent of financial aid. Financial assistance available through the School of Graduate Studies includes University fellowships, scholarships, and fee waivers. Further, federal grants to the faculty members often provide stipends and assistantships for doctoral students.

### **Additional Information**

Graduate handbooks outlining the graduate programs, policies, and procedures in the Department of Special Education and Rehabilitation may be obtained from the department office in room 313 of the Education Building.

For more information about graduate requirements and the sequence in which courses should be taken, see major requirement sheets, available from the department.

Graduation requirements described in this catalog are subject to change. Students should check with the department concerning possible changes.

Because the Special Education and Rehabilitation graduate programs occasionally undergo fine-tuning and updating, prospective students are advised to check the departmental website at:

**<http://sped.usu.edu>**

## **Special Education Courses (SpEd)**

**SpEd 1000. Principles of Effective Peer Teaching.** High school peer tutors are given university credit for tutoring low readers for one hour each day. Tutors are taught a systematic tutoring and mentoring process. In addition, specific criteria are included to evaluate tutors' instructional performance. (2 cr) (F,Sp) ®

**SpEd 1010 (BSS). Disability in the American Experience.** Discussion of definitions and types of disabilities, ethical issues, society's prejudice and discrimination against people with disabilities, and the individual's adjustment to the disability experience. Disability as a natural part of life. Also taught as Reh 1010. (3 cr)

**SpEd 2010. Effective Behavior Management Practices for Paraeducators.** Teaches paraeducators to apply effective behavior management practices to individuals with disabilities in a variety of settings. Introduction to proactive behavior management strategies, basic concepts of behavior management, and the application of intervention plans. (1-3 cr) ®

**SpEd 2150. Introductory Experience with Students with Disabilities.** Introductory seminar and practicum from which students learn basic instructional techniques from videodisc simulations, then apply them in public schools. (1-4 cr) (F,Sp,Su) ®

**SpEd 2790. Special Topics.** (1-4 cr) ®

**SpEd 3030. Educational and Multicultural Foundations.** Explores historical and cultural aspects of schooling and the inclusion of students with disabilities and bilingual students in general education classrooms. Examines how schooling practices change from elementary to high school and commonalities that bind the teaching profession. (3 cr) (Sp)

**SpEd 4000. Education of Exceptional Individuals.** Characteristics of all types of exceptional children with emphasis on the educational and psychological implications of these conditions to the development of the child. (2 cr) (F,Sp,Su)

**SpEd 4790. Special Topics.** (1-4 cr) ®

**SpEd 4910. Undergraduate Research and Creative Opportunities.** Individually directed study at the undergraduate level. Permission of instructor required. (1-4 cr) (F,Sp,Su) ®

**SpEd 4970H. Honors Thesis.** Provides an opportunity for honors students in the Department of Special Education and Rehabilitation to interact with other honors students in the College of Education and explore an interdisciplinary area of interest. A written paper will be required. (1-6 cr) (F,Sp,Su) ®

**SpEd 5010 (QI). Applied Behavioral Analysis 1: Principles, Assessment, and Analysis.** Methods of collecting data, using data to make decisions, analyzing data, graphing data, and applying principles of behavior management and instruction to children and youth. Prerequisite: Admission to special education major or permission of instructor. (3 cr) (F)

**SpEd 5040. Foundations of Effective Assessment and Instructional Practices.** Principles of standardized and curriculum-based assessment. Foundations for designing effective instructional programs to help students achieve mastery and proficiency. Prerequisite: Admission to special education major and SpEd 5010 or permission of instructor. (3 cr) (F)

**SpEd 5050. Applied Behavioral Analysis 2: Applications.** Expands knowledge of basic applied behavior analysis principles. Develops skills for remediating behavior problems using functional behavioral assessment. Prerequisite: Admission to special education major or permission of instructor. (3 cr) (Sp)

**SpEd 5060. Consulting with Parents and Teachers.** Provides strategies for communicating with parents and teachers, as members of a multidisciplinary team, to as-

sist parents and other teachers in collaborative problem solving. Prerequisite: Admission to special education major or permission of instructor. (3 cr) (Sp)

**SpEd 5070. Policies and Procedures in Special Education.** Provides an understanding of federal and state laws for persons with disabilities and procedures for organizing a special education classroom and auxiliary staff. Prerequisite: Admission to special education major or permission of instructor. (1-3 cr) (F) ®

**SpEd 5200 (CI). Student Teaching in Special Education.** Prerequisite: Admission to special education major or permission of instructor. (3-15 cr) (F,Sp,Su)

**SpEd 5210 (CI). Student Teaching in Special Education: Dual Majors.** Undergraduate student teaching for dual majors. (3-15 cr) (F,Sp,Su)

**SpEd 5220. Special Education Student Teaching Seminar.** Weekly seminar taken concurrently with student teaching (SpEd 5200 or 5210). Focuses on problems arising during student teaching and the development of a teaching portfolio. Prerequisites: Admission to teacher education and completion of the SpEd sequence. (3 cr) (F,Sp,Su)

**SpEd 5300. Orientation to Teaching Students with Mild/Moderate Disabilities.** Provides preservice teachers with overview of information and resources, examples, and practice in applying effective instructional and behavior management strategies in their classrooms. Emphasizes things to know and do on their first day(s) and first week of school. (2 cr) (Su)

**SpEd 5310. Teaching Reading and Language Arts to Students with Mild/Moderate Disabilities.** Curriculum, instructional methods, assessment, and data-based decision making related to teaching reading and language arts to students with mild/moderate disabilities. (2-4 cr) (F)

**SpEd 5320. Teaching Content Areas and Transition to Students with Mild/Moderate Disabilities.** Students learn to teach content area material, learning strategies, and transition-related skills to students with mild/moderate disabilities. Also includes assessment and decision making strategies related to these curricular areas. (3 cr) (Sp)

**SpEd 5330. Eligibility Assessment for Students with Mild/Moderate Disabilities.** Choosing and administering eligibility assessment tests for students who may have mild/moderate disabilities. Interpretation of test results and applying results to decisions regarding students' eligibility for special education services. (1 cr)

**SpEd 5340. Teaching Math to Students with Mild/Moderate Disabilities.** Explains procedures for teaching mathematics to students with mild/moderate disabilities, so that each progresses as fast as his or her capabilities will allow. Prerequisite: Admission to special education major or permission of instructor. (3 cr) (Sp)

**SpEd 5350. Teaching Students with Mild/Moderate Disabilities I.** Provides students with information and skills in the area of classroom and individual behavior management procedures. Emphasizes research-validated strategies that students will apply to everyday instructional situations. Prerequisite: Admission to the Alternative Teacher Preparation Licensure Program. (3 cr) (F)

**SpEd 5360. Teaching Students with Mild/Moderate Disabilities II.** Provides students with instructional and management skills. Through case studies and classroom simulations, students learn research-validated instructional and management skills. Prerequisite: Admission to the Alternative Preparation Licensure Program. (3 cr) (Sp)

**SpEd 5410. Practicum: Direct Instruction Reading and Language Arts for Students with Mild/Moderate Disabilities.** Students learn to use Direct Instruction techniques, positive management, curriculum-based assessment, and data-based decision-making to teach reading and language arts to children with mild/moderate disabilities. Students placed in a classroom, where they teach a group of children daily. (1-3 cr) (F)

**SpEd 5420. Practicum: Teaching Mathematics to Students with Mild/Moderate Disabilities.** Use of effective instructional techniques, positive management, curricu-

lum-based assessment, and data-based decision making to teach mathematics content to children with mild/moderate disabilities. Students placed in a classroom, where they teach one or more group(s) of children daily. (4 cr) (Sp)

**SpEd 5430. Field-Based Applications for Students with Mild/Moderate Disabilities.** Designed to help students acquire and consistently demonstrate effective teaching practices to aid students with mild/moderate disabilities. Teaches students to analyze and solve instructional and management problems. Prerequisite: Admission to the Alternative Teacher Preparation Licensure Program. (3 cr) (F)

**SpEd 5510. Curriculum for Students with Severe Disabilities.** Provides information about commercially available curricular materials, as well as how to plan for and design functional academic curricula, for persons with severe disabilities. Prerequisite: Admission to Special Education major or permission of instructor. (1-3 cr) (F)

**SpEd 5520. Curriculum for Secondary-Level Students with Severe Disabilities.** Provides information on developing and implementing secondary-level classroom, community, domestic, leisure, and transition instructional programs. Prerequisite: Admission to Special Education major or permission of instructor. (3 cr) (Sp)

**SpEd 5530. Assistive and Adaptive Technology for Persons with Disabilities.** Trains students to assess needs for augmentative/alternative communication devices, and to select, program for, maintain, repair, and build adaptive devices. Prerequisite: Admission to Special Education major or permission of instructor. (2 cr) (Sp)

**SpEd 5540. Issues in Educating Persons with Severe Disabilities.** A seminar to discuss current topics and research trends affecting persons with severe disabilities. (1 cr)

**SpEd 5560. Practicum in Improving School System Programs.** Practicum or seminar providing information/experience in public school instruction. Permission of instructor required. (1-4 cr) ®

**SpEd 5600. Practicum: Introduction to Instruction of Students with Severe Disabilities.** A field-based class providing experience in observing and teaching functional academic curricula to students with severe disabilities. Prerequisite: Permission of instructor. (3 cr) (F)

**SpEd 5610. Practicum: Advanced Systematic Instruction of Students with Severe Disabilities.** Provides opportunity to assess students' needs and to design programs for community, domestic, leisure, and transitional skills. Prerequisite: Permission of instructor. (4 cr) (Sp)

**SpEd 5710. Young Children with Disabilities: Characteristics and Services.** Provides information about young children with disabilities, including historical development of services, skill areas, family involvement, teaming, and the array of service environments. Prerequisite: Admission to Special Education major or permission of instructor. (3 cr) (Sp)

**SpEd 5720. Behavior Analysis Practicum.** Students receive supervised training in applying behavior analysis principles in community, school, and institutional settings. Either SpEd 5050 or Psy/SpEd 5720 fulfill part of practicum requirement for Behavior Analysis track. Prerequisite: Permission of instructor. Also taught as Psy 5720. (3 cr)

**SpEd 5730 (d6260).<sup>1</sup> Intervention Strategies for Young Children with Disabilities.** Provides information on curricula, instructional strategies, service environments, and staffing roles for teachers of young children (0-5) with disabilities. (3 cr) (F)

**SpEd 5790. Special Topics.** (1-4 cr) (F,Sp,Su) ®

**SpEd 5810. Seminar and Field Experiences with Infants and Families.** Participation with an infant and family in both the home and early intervention setting. Seminar topics include infant medical issues, health, safety, syndromes, and low incidence characteristics. (4 cr) (Sp)

**SpEd 5820. Preschool Practicum with Young Children with Disabilities in Community Environments.** Students participate in variety of environments serving pre-

schoolers with disabilities, assist in developing a family service plan, and teach other staff to implement techniques. (4 cr) (F)

**SpEd 5830. Seminar Working with Peers on Multidisciplinary Teams.** Seminar for discussion of topics pertaining to how teams work with children, with and without disabilities, in a practicum. Students are assigned to a team for planning and problem solving throughout the semester. Also taught as FHD 5830. (1 cr) (F,Sp)

**SpEd 5840. Seminar: Preschool Practicum with Young Children with Disabilities.** Students participate in variety of environments, problem solving and teaming about their experiences. Must be taken concurrently with SpEd 5820. (2 cr) (F)

**SpEd 5900. Independent Study.** Permission of instructor required. (1-3 cr) (F,Sp,Su) ®

**SpEd 5910. Independent Research.** Permission of instructor required. (1-3 cr) (F,Sp,Su) ®

**SpEd 6010. Interventions for Parents and Families.** Explores special challenges faced by parents and families of at-risk students and students with disabilities. Emphasizes intervention strategies, supportive resources, and parent programs. (2 cr)

**SpEd 6020. Design and Evaluation of Instruction.** Presents curriculum in which diagnosis and instruction are welded as a unit into the regular teaching procedures. (3 cr) (Sp)

**SpEd 6030. Clinical Practicum: Student Teaching.** Supervised practicum in a clinical teaching setting. Prerequisite: Permission of instructor. (2-12 cr)

**SpEd 6040. Functional and Augmentative Communication Approaches and Technology.** Theory and methods of symbolic and nonsymbolic communication acquisition, especially for students with dual sensory impairments. Application of instruction and systems within natural routines. (3 cr) (F)

**SpEd 6050. Issues with the Delivery of Services for Students with Dual Sensory Impairments.** In-depth presentation of best practices for educational services for students with dual sensory impairments. (2 cr) (F)

**SpEd 6060. Legal Issues in Special Education.** Provides knowledge of a wide range of legal issues concerning the provision of special education services to students with disabilities. (3 cr) (Sp)

**SpEd 6070. Infusing Mobility and Communication for Students with Dual Sensory Impairments.** Reviews methods for providing orientation and mobility training to students with dual sensory impairments. Provides methods for infusing these and communication objectives into normal age-based routine activities. (2 cr) (Sp)

**SpEd 6080. Collaboration and Management of Services for Students with Dual Sensory Impairments.** Reviews methods of planning and coordination of services for students with dual sensory impairments (e.g., transition, lifestyle planning, transition team coordination). Service management addressing issues of scheduling, monitoring, and training of staff and peers. (2 cr) (Sp)

**SpEd 6090. Curriculum and Environmental Variations and Management.** Presents instructional and curricular strategies to promote utilization of residual vision or hearing skills. Overviews tactile cuing and movement-based approaches, with emphasis on integration within natural context and functional activities. Review of model delivery methods. (2 cr) (Sp)

**SpEd 6100. Introduction to the Education of Students with Visual Impairments.** Explores theory and practice within the field of visual impairments, including historical and philosophical influences, methodologies, issues, and trends. Identifies support agencies, resources, and service providers available for visually impaired individuals and their families. Examines roles of various professionals within the field and available delivery models. (2 cr) (F)

**SpEd 6110. Social and Psychological Implications of Visual Impairment.** Explores attitudes and beliefs related to visual impairment and blindness. Emphasizes impact of vision loss on the psychosocial functioning of individuals and their families. Studies self-concept, self-esteem, and strategies to enhance these areas in visually impaired children. (2 cr) (Su)

**SpEd 6120. Ocular Disorders and Examinations Techniques/Utilization of Low Vision.** Students demonstrate the ability to identify the important parts of the visual system, to understand and interpret eye reports, and to translate the information into an educational plan. Participants also conduct and supervise vision screening clinics. In addition, participants demonstrate a basic understanding of approaches and practices of low-vision services. Includes low-vision aids, optics, and environmental modifications. (4 cr)

**SpEd 6130. Literary Braille Codes and Braille Technologies.** Focuses on reading and writing literary braille. Includes literary braille contractions, short-form words, punctuation, and rules of usage for basic Grade 2 braille, using the Perkins Braille Writer. Emphasizes accuracy, beginning formatting, and ability to apply the rules. Using a slate and stylus, as well as computerized braille writers, students learn to write literary braille. (4 cr) (F)

**SpEd 6140. Nemeth Braille Codes and Braille Technologies.** Transcription of print mathematical symbols into appropriate formats, using Nemeth Braille Code of Mathematics. Computation skills using adapted abacus for basic mathematical operation. Explores braille music, foreign language braille, computer braille, and Grade 3 braille. Emphasizes literary braille in more extended writing projects. (2 cr) (Sp)

**SpEd 6150. Teaching Learners with Sensory Impairments and Multiple Disabilities.** Provides basic understanding of the needs of learners (ages 0-22) having sensory impairments with multiple disabilities. Includes role and characteristics of the transdisciplinary team, learning environments, resources, assessment procedures, and instructional strategies. Identifies inclusion procedures, transitional issues, and methods of encouraging parental involvement. (3 cr) (Su)

**SpEd 6160. Introduction to Orientation and Mobility.** Introduces students to orientation and mobility, as well as basic assessment techniques. Students learn to use the results of these assessments, along with specific teaching techniques in pre-cane orientation and mobility skills, in teaching children with visual impairments. Students also become familiar with basic indoor (non-cane) mobility techniques, learn to identify and teach orientation cues in the environments, and develop lesson plans to teach concepts necessary for future cane travel. (2 cr) (Su)

**SpEd 6170. Instructional Management for Students with Visual Impairments (0-21).** Emphasizes best practices for instructional management of children with visual impairments in early intervention settings, preschool programs, and early elementary grades. Also addresses practices for older students in upper elementary through high school grades. Explores strategies for development of basic concepts, socialization skills, emergent literacy, effective braille reading and writing, daily living skills, career understanding, and recreational and leisure skills. Focuses on understanding agency and community resources, family collaboration, modification and adaptation of materials and environments, and adapted technology. (4 cr) (F)

**SpEd 6180. Field Studies in Visual Impairments.** Participants work with visually impaired students in a variety of educational sites. Emphasizes use of adapted technology, implementation of teaching activities, student assessment, and modification of educational materials. (1-2 cr) (F)

**SpEd 6190. Advanced Support Specialists Training for Early Childhood Sensory Impairments.** Prepares personnel for service to young children with sensory impairments and their families. Students synthesize information received through previous specialization coursework in Special Education Early Childhood, Visual Impairments. Emphasis on provision of intervention and support in a collaborative, culturally sensitive, family-centered manner. Families of children with sensory impairments participate as co-instructors. (2 cr) (Su)

**SpEd 6220. Characteristics of Children with Emotional and Behavioral Disorders.** Explores characteristics of children and youth with emotional and behavioral disorders. Covers definitions, prevalence and incidence, classification, causal factors, and facets of disordered behavior. (3 cr)

**SpEd 6230. Education of Students with Emotional and Behavioral Disorders.** Methods of teaching students with emotional and behavioral disorders, including educational strategies and behavioral treatments. (2 cr)

**SpEd 6260 (d5730). Intervention Strategies for Young Children with Disabilities.** Provides information on curricula, instructional strategies, service environments, and staffing roles for teachers of young children (0-5) with disabilities. (3 cr) (F)

**SpEd 6280. Instructional Leadership for At-Risk Students.** Examines theories and practices of instructional leadership for at-risk students. Instructs students in services and programs available for at-risk students. (3 cr) (Sp)

**SpEd 6290. Teaching Social Skills, Self-Management, and Values.** Discussion of current research and practices related to teaching social skills, self-management, and values. Explores teaching procedures and curriculum programs. (3 cr) (Sp)

**SpEd 6300. Collaboration Skills for Classroom Teachers.** Emphasizes knowledge, attitudes, and skills which special educators must possess to effectively collaborate with parents and professionals. (3 cr) (F)

**SpEd 6320. Seminars in Learning Characteristics of Students with Dual Sensory Impairments.** Investigates characteristics of dual sensory impairment, learning styles, and environmental demands. Awareness of eye and ear anatomy. Interpretation of formal assessments. Development of instructional strategies. (2 cr) (Su)

**SpEd 6410. Field Studies I: Analysis of Service for Students with Dual Sensory Impairments.** First of three field experiences for students in the DSI program. Emphasizes team-based review and analysis of services. (2 cr) (F)

**SpEd 6420. Field Studies II: Analysis of Service for Students with Dual Sensory Impairments.** Practicum in integrated programs for students with dual sensory impairments within the context of the model classroom. Emphasizes transdisciplinary methods for assessment, instructional design, and planning skills. (2 cr)

**SpEd 6430. Field Studies III: Analysis of Service for Students with Dual Sensory Impairments.** Advanced practicum in integrated programs for students with dual sensory impairments. Emphasizes an overall management of instructional environment and services. (2 cr)

**SpEd 6500. Interdisciplinary Workshop.** Series of self-instructional modules and videos and a variety of elective training. Module topics include developmental disabilities, legal aspects and issues, assessment, intervention, assistive technology, transition, and prevention/intervention for aggression and violence. (1-3 cr) (F,Sp,Su) ®

**SpEd 6550. Practicum in the Evaluation of Instruction.** Field-based research course contributing toward graduate degrees and supervisory licensure related to the assessment of an ongoing or newly proposed program of instruction. (1-4 cr) (F,Sp,Su) ®

**SpEd 6560. Improvement of Instruction.** Focuses on effective teaching methodologies, teaching performance, and curriculum decision making. (1-4 cr) (F,Sp,Su) ®

**SpEd 6700 (d7700). Single-Subject Research Methods and Designs.** Examines single-subject research methods for applied research, including measurement, design, and analysis issues. Also taught as Educ 6700/7700. (3 cr) (F,Su)

**SpEd 6720 (d7720). Advanced Behavior Analysis in Education.** Discussion of advanced topics and issues in behavior analysis, including rule-governed behavior, stimulus control, setting events, functional analysis, and verbal behavior. Topics integrated into educational practice. Prerequisite: SpEd 5050 or equivalent. (3 cr) (F)

**SpEd 6790. Special Topics.** (1-4 cr) ®

**SpEd 6810. Seminar in Special Education.** (1-3 cr) (F,Sp,Su) ®

**SpEd 6900. Independent Study.** Prerequisite: Permission of instructor. (1-2 cr) (F,Sp,Su) ®

**SpEd 6910. Independent Research.** Prerequisite: Permission of instructor. (1-2 cr) (F,Sp,Su) ®

**SpEd 6930. Internship in Special Education.** Professional and supervised intern experience for master's program. Prerequisite: Permission of instructor. (2-10 cr) (F,Sp,Su)

**SpEd 6960. Creative Project.** Culminating experience of MEd program. Prerequisite: Proposal approval by supervisory committee. (1-6 cr) (F,Sp,Su) ®

**SpEd 6970. Thesis.** Culminating experience of MS program. Prerequisite: Proposal approval by supervisory committee. (1-9 cr) (F,Sp,Su) ®

**SpEd 6990. Continuing Graduate Advisement.** (1-8 cr) (F,Sp,Su) ®

**SpEd 7050. Internship in Program Evaluation.** Guided experience in evaluation of educational programs in schools, treatment centers, homes, and communities. Prerequisite: Permission of instructor. (1-5 cr) (F,Sp,Su) ®

**SpEd 7060. Research Internship.** Guided experience in conducting educational research. Prerequisite: Permission of instructor. (1-5 cr) (F,Sp,Su) ®

**SpEd 7070. Grant Writing.** Guided experience in preparation of grant proposals. Permission of instructor required. (1-3 cr) (F,Sp,Su) ®

**SpEd 7330. Supervision Internship.** Guided experience in supervising undergraduate and master's students during practica, student teaching, and other field experiences. (1-5 cr) (F,Sp,Su) ®

**SpEd 7340. College Teaching Internship.** Guided experience in teaching university courses. (1-3 cr) (F,Sp,Su) ®

**SpEd 7500. Interdisciplinary Workshop.** Workshop on current interdisciplinary issues and topics in special education and related fields. (1-3 cr) (F,Sp,Su) ®

**SpEd 7700 (d6700). Single-Subject Research Methods and Designs.** Examines single-subject research methods for applied research, including measurement, design, and analysis issues. Also taught as Educ 7700/6700. (3 cr) (F,Su)

**SpEd 7710. Advanced Single-Subject Research Methods and Design.** Explores advanced concepts and procedures in within-subject research methods. Builds on knowledge and skills acquired in SpEd 7700 regarding scientific questions, measures, research designs, data analysis, and inference. Students analyze research and design, conduct, and report a scientific study. Prerequisite: SpEd 7700. (3 cr) (Sp)

**SpEd 7720 (d6720). Advanced Behavior Analysis in Education.** Discussion of advanced topics and issues in behavior analysis, including rule-governed behavior, stimulus control, setting events, functional analysis, and verbal behavior. Topics integrated into educational practice. Prerequisite: SpEd 5050 or equivalent. (3 cr) (F)

**SpEd 7800. Seminar: Issues in Special Education and Rehabilitation.** Critical analysis of variety of special education and rehabilitation issues and trends. Empirical and theoretical information presented in a seminar format. (1-3 cr) (F,Sp,Su) ®

**SpEd 7810. Research Seminar in Special Education and Rehabilitation.** Identification of research problems and discussion of research strategies and methods. Applications of research, data analysis, and statistical concepts. (1-3 cr) (F,Sp,Su) ®

**SpEd 7820. Seminar: Special Topics.** In-depth study of special topics in special education and rehabilitation. Seminars examine historical aspects, relevant research, and theoretical positions on selected topics. (1-3 cr) (F,Sp,Su) ®

**SpEd 7830. Special Education Personnel Preparation Methods.** Focuses on critical issues in preparing special education teachers. Includes teaching, supervision, and overall program development. Students demonstrate supervision and teaching competencies. (2 cr) (Sp)

**SpEd 7900. Independent Study.** Prerequisite: Permission of instructor. (1-3 cr) (F,Sp,Su) ®

**SpEd 7910. Independent Research.** Prerequisite: Permission of instructor. (1-3 cr) (F,Sp,Su) ®

**SpEd 7920. Doctoral Program Professional Seminar.** Orients new students to doctoral program, utilizing five goals: (1) familiarize students with requirements of the program and of the Graduate School, (2) acquaint students with the faculty and the resources available, (3) initiate a career planning process, (4) teach students some fundamental concepts underlying scientific research, and (5) teach students to conduct literature reviews. (2 cr) (F)

**SpEd 7930. Internship in Special Education.** Professional, supervised internship experience for doctoral students. Prerequisite: Permission of instructor. (1-12 cr) (F,Sp,Su) ®

**SpEd 7940. Journal Reading Group.** Seminar discussion of recent empirical and theoretical journal articles in special education and related fields. (1-2 cr) (F,Sp,Su) ®

**SpEd 7970. Dissertation.** Variable credit for dissertation project in connection with doctoral program in special education. (1-15 cr) (F,Sp,Su) ®

**SpEd 7990. Continuing Graduate Advisement.** (1-9 cr) (F,Sp,Su) ®

## Rehabilitation Counseling Courses (Reh)

**Reh 1010 (BSS). Disability in the American Experience.** Discussion of definitions and types of disabilities, ethical issues, society's prejudice and discrimination against people with disabilities, and the individual's adjustment to the disability experience. Disability as a natural part of life. Also taught as SpEd 1010. (3 cr)

**Reh 6100. Introduction to Rehabilitation Counseling.** Overview of history, philosophy, and legal basis of rehabilitation programs, both public and private. Independent living programs. Roles of the rehabilitation counselor and the process of rehabilitation. Skill development including literature use, writing, and professional organizations. (3 cr) (F)

**Reh 6110. Medical Aspects of Disability.** Overview of basic medical issues affecting employment and independent living for persons with disabilities. Explores basic anatomy and systems, as well as disorders and diseases of these systems. Covers medical terminology applicable to rehabilitation counseling. (3 cr) (F)

**Reh 6120. Psychosocial Aspects of Disability.** Explores psychological and sociological aspects of disabilities, including adjustment factors in living with disabilities (i.e., individual, family, sexuality, other service providers, etc.). Examines societal attitudes, women's issues, and deaf culture issues. Includes group counseling applications for persons with disabilities. (3 cr) (Su)

**Reh 6130. Rehabilitation Counseling Skill Development.** Utilizes role playing of simulated interviews and rehabilitation counseling sessions to develop the basic skills necessary to function as a human service helper. Must be taken concurrently with Reh 6140. Prerequisite: Permission of instructor. (2 cr) (Su)

**Reh 6140. Practicum in Rehabilitation.** Under faculty supervision, students receive minimum of 100 hours of firsthand experience working with persons with disabilities in rehabilitation agency or facility. Must be taken the first time concurrently with

Reh 6130. With faculty approval, may be repeated for credit. Prerequisite: Permission of instructor. (2 cr) (F,Sp,Su) ®

**Reh 6150. Case Studies in Rehabilitation.** Coordination of community resources, individual assessment information, ethical issues, eligibility determination, and development of individualized rehabilitation programs and independent living plans. Time, fiscal, and caseload management skills for rehabilitation professionals. Emphasizes client choice in rehabilitation planning. (3 cr) (Sp)

**Reh 6160. Job Analysis, Development, and Placement for Persons with Disabilities.** Applies career development theories to job placement. Presents job placement factors resulting in employment for persons with disabilities, including job analysis, job development and retention, advocacy, assistive technology, ADA, occupational information systems, and labor market analysis. (3 cr) (Sp)

**Reh 6170. Internship in Rehabilitation.** Direct supervised provision of rehabilitation services to persons with disabilities in a community facility or agency. Total of 300 hours of direct service required for each 6 semester credits. Repeatable for up to 12 credits. Prerequisite: Permission of instructor. (4-12 cr) (F,Sp,Su) ®

**Reh 6180. Rehabilitation of Persons with Severe Mental Illness, Substance Abuse, and Severe Learning Disabilities.** Overview of rehabilitation of persons with severe mental illness, including psychopharmacology, housing, case management, job placement, diagnosis (DSM IV), and social learning programs. Includes information on rehabilitation of persons experiencing substance abuse, dual diagnoses, and learning disorders. (3 cr) (Sp)

**Reh 6190. Vocational Assessment for Persons with Disabilities.** Addresses vocational assessment for persons with disabilities. Includes overview of traditional vocational assessment, but focuses on contemporary methodology developed for individuals with severe disabilities. Discussion of functional assessment, including client choice and ecological assessment issues. (3 cr) (F)

**Reh 6200. Theories of Counseling Applied to Persons with Disabilities.** Introduction to established counseling theories and their implications for providing services

to persons with disabilities. Discussion of individual and group counseling paradigms. Emphasizes development of students' individual counseling philosophies. (3 cr) (F)

**Reh 6210. Vocational Evaluation Principles and Systems.** Introduction to vocational evaluation principles and their application in using commercially available vocational evaluation systems. Actual practice with the systems (including integrated report writing) in the rehabilitation services clinic. (2 cr) (Su)

**Reh 6220. Culturally Valid Rehabilitation Practices.** Analysis of the effect of cultural/ethnic/racial/linguistic background in the rehabilitation counseling setting, including acceptance/perception of disability, and successful application, process, and rehabilitation outcome. Practice applications include provision of culturally sensitive counseling, vocational evaluation, and job placement. (2 cr) (Su)

**Reh 6230. Introduction to Rehabilitation Research.** Provides introduction to research methods in rehabilitation and disability studies, including the various types of research designs and the use of statistical methods. Introduces students to empirical research journals in rehabilitation. (3 cr) (Sp)

**Reh 6560. Special Topics in Rehabilitation.** Opportunity to provide specialized training in topics unique to rehabilitation. Topics cover many disability, employment, and independent-living issues. (1-4 cr) (F,Sp,Su) ®

**Reh 6900. Independent Study.** Prerequisite: Permission of instructor. (1-3 cr) (F,Sp,Su) ®

**Reh 6910. Independent Research.** Prerequisite: Permission of instructor. (1-3 cr) (F,Sp,Su) ®

**Reh 6990. Continuing Graduate Advisement.** (1-3 cr) (F,Sp,Su) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

## Department of

# Theatre Arts

## College of Humanities, Arts and Social Sciences

**Head: Professor** *Colin B. Johnson*, theatre history and criticism, film  
Office in Chase Fine Arts Center 232A, (435) 797-3046

**Graduate Program Coordinator: Associate Professor** *Nancy E. Hills*, costume history and design

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**E-mail** [luannh@hass.usu.edu](mailto:luannh@hass.usu.edu)

**WWW** <http://www.usu.edu/theatre>

**Professor Emeritus** *Sidney G. Perkes*, scene and costume design; **Associate Professors** *Mark L. Damen*, playwriting, history; *Kevin Doyle*, acting, directing; *Bruce L. Duerden*, technical theatre, lighting; *Dennis Hassan*, scene design; *Lynda Linford*, acting; *David E. Sidwell*, interpretation, storytelling, theatre education; **Associate Professor Emeritus** *Arthur Y. Smith*, interpretation, theatre education; **Assistant Professors** *Anne Berkeley*, theatre education, theatre history and theory; *Adrienne Moore*, voice and acting; *Kirstie G. Rosenfield*, theatre history and criticism; **Temporary Lecturer** *Robbin C. Black*, theatre education

**Degrees offered:** Bachelor of Arts (BA), Bachelor of Fine Arts (BFA), Master of Arts (MA), and Master of Fine Arts (MFA) in Theatre Arts

**Undergraduate programs:** *BA*—General Theatre Arts Studies (History and Dramatic Literature); *BFA*—Acting, Theatre Design and Technology (costume design, lighting design, scenic design, stage management/technical, theatre technology), Theatre Education; **Graduate specializations:** *MFA*—Advanced Technical Practice, Design (scenery, costume, lighting)

## Undergraduate Programs

### Objectives

The primary mission of the Department of Theatre Arts is to offer a flexible program with the following objectives:

1. To teach appreciation and service courses contributing to the University Studies Program;
2. To teach foundational and advanced specialized courses leading to professional preparation in performance, various types of theatre design, and technical practice with producing theatre organizations;
3. To train students for careers as theatre instructors in secondary schools and to provide service courses in support of the language arts curriculum of the State of Utah for elementary education majors;
4. To prepare students for advanced study and training;
5. To sponsor public performances in which students can practice the art and craft of theatre and interpretive/narrative performance. These productions will enhance the cultural life of the University community and region.

**Production Groups and Theatres.** The Theatre Arts Department sponsors the following production groups and divisions: Utah State Theatre, Old Lyric Repertory Company (summer), Studio/Conservatory Stage Series, Narrative Theatre, and Utah State Children's Theatre. Facilities used for performances by these groups include a 690-seat thrust stage in the Chase Fine Arts Center, the 380-seat proscenium Lyric Theatre in downtown Logan, and the flexible 90-seat Studio Stage. Facilities also include a costume shop, scenery shop, sound studio, design studio, dance and movement laboratory, and storage areas.

### Requirements

**Departmental Admission Requirements.** Admission requirements are the same as those described for the University on pages 48-51. Students in good standing may apply for admission or transfer to the program. Students transferring from other institutions must have a minimum 2.5 GPA (on a scale of 4.0) regardless of credit amount transferred. Admission to specialized BFA programs by audition, interview, or portfolio review subsequent to admission to the department is explained below. Students must maintain an average 2.5 minimum GPA in all theatre classes required for graduation. No grade of less than a C- is accepted in any theatre class, and no required classes, regardless of department, may be taken on a *pass-fail* basis.

**Core Courses.** All Theatre Arts majors are required to complete the following core courses: Thea 1000, 1210, 1400, 1500, 2410, 3230. Entering and transfer students must complete a noncredit theatre orientation seminar. In addition, all students must complete a minimum of 5 credits of production practicum work.

### **Bachelor of Arts Degree**

**General Theatre Arts Studies Program (59 credits).** Requirements are as follows: core courses and production work (20 credits); performance courses (9 credits); design/technical courses (3 credits); dramatic literature/history courses (15 credits); university minor (12 credits). To obtain a Bachelor of Arts degree, a student must fulfill the foreign language requirement (see page 53). All students enter in this degree program.

### **Bachelor of Fine Arts Degree**

**Program Entrance Requirements.** Students seeking the BFA degree who choose the Acting Program or the Theatre Design and Technology Program will be admitted by audition *or* an interview and portfolio review. Periodic audition and review will be undertaken to assure good standing in these programs.

This degree is recommended for those students desiring more intensive preprofessional training in the discipline. It requires students to demonstrate a comprehensive mastery of acquired abilities in their emphasis area through periodic review of skills. Students in these programs also complete a capstone recital or project during their senior year.

**Acting Program (72 credits).** Candidates are accepted into this performance program through an audition and interview conducted by a BFA committee. Progress is monitored through periodic recitals/auditions before the same body, and students must normally maintain good status in the program for a minimum of two years. Transfer students are subject to the same acceptance process and progress review. Inquiries about specific requirements and expectations should be directed to the Theatre Arts Office.

Students seeking the BFA degree must work closely with advisors. Most University Studies courses and the core curriculum should be completed before the end of the sophomore year, as training is conducted in a manner adapted from conservatory practice. Individual needs, interests, and goals of the student are taken into consideration for selection of elective courses. The department maintains an updated course of study to aid the student in selecting courses in recommended sequence for the first two years of study. A student handbook describing the procedures is also available; these are designed to assist students who are presenting recitals, directing one-act productions, and preparing other projects.

**Theatre Design and Technology Program (70 credits).** Candidates are accepted into the design and technology program by interview and review of a portfolio by a BFA committee. The policies and recommendations for the acting program also apply to this program. Students may further specialize in costume design, lighting design, scenic design, stage management/technician, or theatre technology.

**Theatre Education Program (34 credits).** Candidates are accepted into the theatre education program by interview and a review of a portfolio by the theatre education committee. Requirements are as follows: core courses (15 credits); performance/directing courses (3 credits); theatre education/language arts courses

(6 credits); design/technical courses (4 credits); theatre history/literature courses (3 credits); performance and production practicum courses (3 credits). Students earning a secondary education license must complete 35 additional credits in the Secondary Teacher Education Program (STEP), as well as an academic minor approved by the College of Education. All majors desiring a teaching license must apply for admission to teacher education; it is recommended that this be done no later than the beginning of the sophomore year.

### **Theatre Arts Teaching Minor (20 credits)**

Candidates are accepted into the theatre education program by interview and a review of a portfolio by the theatre education committee. Requirements are as follows: core courses (15 credits); production or performance practicum courses (2 credits); theatre education/language arts courses, Thea 4330 or 4340 (3 credits). The requirements for this academic minor must be approved and monitored by the College of Education.

### **Academic Minor in Theatre Arts**

Generally, a student interested in a theatre arts minor will complete the core course requirements (see above).

### **Production Responsibilities**

Because the production programs of the department are some of the most important training tools of the discipline, all majors and teaching minors are required to participate in them. A permanent theatre participation record is maintained for each student, and successful completion of crew and performance assignments is a requirement for graduation.

As a capstone experience to their university careers, all majors in their senior year are required to complete a project or recital appropriate to their area of emphasis; except those in the General Theatre Studies BA program, who complete a minor.

### **Financial Support**

Scholarships, grants-in-aid, and work-study opportunities are available through the University. In addition, the department offers talent awards and tuition scholarships to its own majors. These are generally for one or two semesters of in-state tuition and may be renewed by reapplication for continuing students. Several auditions and interviews are scheduled during the year, both on-campus and at regional theatre conferences and festivals. The department offers special work grants through its production program for qualified, skilled students. There are a number of named scholarships awarded to students qualifying under specific conditions. See the *Financial Aid and Scholarship Information* section of this catalog (pages 35-37) for more information.

## **Graduate Programs**

### **Admission Requirements**

All students making application to the MFA program who cannot audition or interview with a member of the theatre arts faculty must submit a resume and a portfolio with renderings, designs, photographs appropriate to the specialization, and any special letters of reference not included with the formal application to the School of Graduate Studies.

The Miller Analogies Test (MAT) may be substituted for the more standard GRE, although the department does not recommend the MAT for international students.

Students who have received their undergraduate training at other institutions or in a discipline other than theatre will be expected to meet a proficiency equivalent to that of USU Theatre Arts graduates. This may require the student to complete the following minimum 20-credit program, which will not count toward the graduate degree: Thea 1400, 1500, 2410, 3230; 3 credits of Thea 4750; and 6 credits of elective Theatre Arts courses in one program area. The student will be given credit for any equivalent courses taken within seven years prior to the date of admission.

Students accepted into the program must begin during the fall semester. The nature of the discipline and the program require that students maintain a continuous residence at the campus during the first two years of study.

### ***Master of Arts***

The candidate for the 30 (minimum) credit MA degree will normally complete a thesis, but may, with the approval of the supervisory committee, present a thesis alternative Plan B (36 credits minimum required).

**Required courses (30 credits).** Requirements are as follows: Thea 6010, 6180, 6240, 6270; two advanced dramatic literature courses selected from the Theatre Arts, English, or Languages and Philosophy departments; three 5000- or 6000-level Thea courses, two of which must be in a single area; and up to 8 credits of Thea 6970 (Thesis). Under special circumstances, a Plan B option in this program is available, requiring 12 credits of special project work and no more than 3 credits of Thea 6970, for a total of 36 credits minimum.

In addition, the standard foreign language competency of 15 credits in one language is required for the MA degree (see page 77).

### ***Master of Fine Arts***

The candidate for the 60 (minimum) credit MFA must complete the Plan B program, and will undertake from three to five creative projects in the appropriate specialization. Under this plan, the required project reports customarily take the form of production books, journals, or a design or technical portfolio.

The normal residency is six semesters, including one or two summers in an established repertory or stock company or equivalent intern experience. Participation in the department's summer Old Lyric Repertory Company in Logan, Utah, satisfies this requirement. The nature of the discipline discourages credit by extension, large amounts of transfer credit, or numerous off-campus projects.

**Required Courses.** The program is completed in three phases, and while there may be considerable overlap between them, students undergo formal reviews before advancing to the next phase. The number of semesters given is approximate.

**First and Second Semester—Entry Phase.** Requirements are as follows: *fall semester:* Thea 6010, 6180, 6800; *spring semester:* Thea 6240, 6270, and advanced courses in the area of specialization.

Upon or during completion of this phase, the student will: (1) submit a petition to advance to the next phase; (2) identify two to four projects for the next phase; and (3) nominate a supervisory

MFA committee of at least three members for submission to the department head. A communication proficiency examination will be conducted at the conclusion of Thea 6180 when the student presents his or her project to the Graduate Study Committee.

All of the above coursework (with the exception of the BA proficiency requirement, as necessary) must be completed, with grades recorded, prior to entry into the next phase. A full-time student entering in the fall semester who does not complete the Entry Phase by the following summer will be subject to termination.

**Second to Fifth Semester—Project Phase.** During this phase, the student must complete two courses in advanced dramatic literature, along with additional advanced courses in the area of specialization; must complete a cognate skill, consisting of the equivalent of 10 semester credits outside the department, to develop a skill or increase knowledge in a field related to the specialization, subject to approval by the advisor and Graduate Study Committee; must participate in the summer Old Lyric Repertory Company (4 credits, repeatable) or its equivalent in a recognized stock or repertory program, with a letter of satisfactory performance from the company director submitted to the department; and must complete two to four projects in the field of specialization (approximately 6-12 credits).

Upon completion of this phase, the student will: (1) submit a petition to advance to the final phase, the date of this depending upon individual progress; (2) submit proof that projects and the written reports for them have been completed; and (3) submit a proposal and/or preliminary work for a major or culminating project: renderings, preliminary working drawings, blocking script, and so forth.

**Fifth and Sixth Semester—Culminating Phase.** Requirements are as follows: Thea 6920 (4 credits), 6970; execution of a final, culminating project; a maximum of 3 thesis credits, taken to complete all reports; and completion of two to four additional 5000- or 6000-level elective courses.

**Note:** Whenever possible, graduate projects are proposed and executed as part of the Utah State Theatre artistic season. The option to cancel a student project or to allow work to proceed, but disqualify it as an MFA project based upon insufficient preparation or validity, rests with the Graduate Study Committee, the student's supervisory committee chairperson (advisor), and the executive producer of Utah State Theatre. This rule is designed to protect the integrity of the production priorities of the department.

Upon completion of this phase, the student will: (1) assemble the supervisory committee for a final review in a defense of the student's graduate work; and (2) file a complete copy of all Plan B reports with the department, in accordance with the procedures of the School of Graduate Studies.

### ***Financial Assistance***

Teaching and general assistantships are awarded by the department. Assistantships are generally in the area of production, depending on theatre needs and the skills of applying students, and are renewable for up to three years. Application should be made directly to the department by February 1. Graduate students are not guaranteed financial assistance during their initial year of residence. In addition, several other grants and forms of support are available on a competitive basis.

## Career Opportunities

The MA degree is a general, nonterminal degree designed to train students for further doctoral work in the discipline and to serve as a career upgrade for secondary school teachers. Students interested in teaching dramatic literature and theatre history and criticism at the postsecondary level should plan to use the MA as a step toward further PhD studies. A few two-year colleges employ MA graduates in teaching positions; however, almost no four-year colleges do so.

The MFA is designed for students pursuing careers in educational, professional, and regional theatres, or, in some cases, further doctoral-level work. It is regarded by most university and college administrations as a terminal degree for individuals with academic appointments as acting coaches, designers, and technicians. The department makes no guarantee that its training will qualify its graduates to pass examinations administered by the theatrical trade unions or otherwise meet their requirements for membership. MFA graduates are qualified to seek employment with regional and professional theatres, regardless of the guild or trade union status of these organizations.

## Additional Information

Specific details about each of the foregoing programs are outlined in documents available through the department. Requirements are subject to change. Internet e-mail requests should be sent to: [luannh@hass.usu.edu](mailto:luannh@hass.usu.edu).

## Theatre Arts Courses (Thea)

**Thea 1000. Theatre Orientation for Majors.** Departmental policies, procedures, requirements, and philosophy. Introduction to fundamental audition and portfolio presentation techniques. (1 cr) (F)

**Thea 1010 (BCA). Understanding Theatre.** Survey of dramatic principles and structure, genre, and conventions for nonmajors. Functions and contributions of theatre artists and practices of the contemporary stage. (3 cr) (F,Sp,Su)

**Thea 1020 (BCA). Introduction to Film.** Study of elements of film narrative in fictional and nonfictional movies to provide a deeper understanding of content and film form. (3 cr) (F)

**Thea 1030 (BHU). Exploring Performance Through Aesthetic Texts.** Introduces concepts and practices of performance studies and oral language arts. Integrates interpretation, analysis, and performance of major literary genres and oral forms of communication that contain aesthetic qualities. Students learn theatre techniques to create original performance pieces. (3 cr) (F,Sp,Su)

**Thea 1210. Introduction to Playscript Analysis.** Introductory course focusing on plot, character, language, and thematic analysis of varied historical and modern performance texts in the context of contemporary staging practice. Enrollment limited to theatre majors and minors. (3 cr) (Sp)

**Thea 1400. Beginning Acting.** Demonstration of skills in actor awareness (personal and group), organic acting techniques, scene study with partners, and monologue preparation. Provides understanding of theories and methodologies. Skills demonstrated in areas of body movement, diction, observation, concentration, imagination, and "action." (3 cr) (F,Sp)

**Thea 1430. Stage Movement.** Develops self-awareness through self-discipline. Emphasizes tension/relaxation, postural correction, balance, strength, flexibility, breath

control, and spatial exploration. Study of realistic mime and Commedia dell'Arte gives students fundamental technique and enhances character study. (2 cr) (F,Sp)

**Thea 1450. Beginning Voice.** Training in basic vocal principles (Rodenburg, Linklater). Covers proper breath placement and support, physical alignment, projection, and resonance. Students learn basic warm-up to prepare the voice for performance. (3 cr) (F)

**Thea 1500. Stage and Costume Crafts.** Introduction to different physical theatre forms, standard stage equipment, and methods of staging plays. Basic practices in set construction, stage lighting, sound, and costume construction. (3 cr) (F,Sp)

**Thea 1530. Stage Makeup.** Emphasizes one-dimensional and three-dimensional illusionary work, focusing on knowledge and skills in "corrective" aging and period makeup, with introductions to related areas, such as hair, hands, and prosthetics. (2 cr) (F,Sp)

**Thea 2410. Directing.** Provides instruction and practice in play selection, script analysis, research, blocking, leadership, communication skills, conduct of rehearsals, self-awareness, production organization and operation, and personal organization for stage direction. Principles apply in professional, civic, and educational settings. Prerequisite: Thea 1400. (3 cr) (F,Sp)

**Thea 2420. Intermediate Acting: Scene Study.** Scene study from the modern and contemporary theatre using the principles studied in Thea 1400. Prerequisite: Thea 1400. (3 cr) (F,Sp)

**Thea 2430. Pantomime and Movement.** Theory and practice in stylized mime for the theatre. Emphasis on creative approach for projecting character, emotion, and mood through the use of the body. History and physical experience in Commedia dell'Arte. Prerequisite: Thea 1430. (1 cr) (Sp)

**Thea 2440. Musical Theatre Dance: Tap and Jazz Emphasis.** Prepares students in fundamental and technical skills of tap and jazz. Brief history of musical theatre included to emphasize styles. Prerequisite: Thea 1430. (2 cr) (Sp)

**\*\*Thea 2470. Movement: Stage Combat.** Techniques in stage combat. Prerequisite: Thea 1430. (2 cr) (Sp)

**Thea 2480. Intermediate Voice for Theatre.** Training in vocal technique, incorporating breath support, vocal range, power, and projection. Training in speech and articulation. Work in various vocal theories (Berry, Linklater, Hart). Instruction in the International Phonetic Alphabet. Prerequisite: Thea 1450. (3 cr) (Sp)

**Thea 2490. Intermediate Acting: Shakespeare.** Exploring language and techniques of playing Shakespeare through scene study and monologues. Prerequisite: Thea 1400. (3 cr) (Sp)

**Thea 2510. Scene Painting/Properties.** Instruction in scene painting techniques. Construction and alteration of stage properties. For theatrical technicians and designers. Demonstration and lab work included. Prerequisite: Thea 1500. (2 cr) (Sp)

**Thea 2540. Lighting Design.** Introduction to basic elements of lighting design. Demonstration of techniques used to create and execute a lighting design. Provides basic understanding of light energy, angle, color, and technology available for designing with this medium. (2 cr) (F)

**Thea 2550. Stage Management.** Provides problem-solving environment for students to acquire knowledge and skills necessary for becoming a competent stage manager. Discussion of organization, delegation, scheduling, and personnel management. Prerequisite: Thea 1500. (2 cr) (F)

**Thea 2560. Theatre and Studio Sound.** Sound recording, reinforcement, and control operation skills for theatrical production. (2 cr) (Sp)

**Thea 2740. Performance Practicum.** Specialized work in production performance. Prerequisite: Permission of instructor, granted following successful audition. (0.5-1 cr) (F,Sp) ®

**Thea 2750. Production Practicum.** Specialized crew work in ongoing Theatre Arts Department productions. Prerequisite: Permission of instructor. (1-2 cr) (F,Sp,Su) ®

**Thea 3050. Period Styles.** Intensive instruction in architecture, furniture, and interior design of major Western European periods from Egyptian to the present. Taught through lectures, slide presentations, and student-compiled source book with examples of major styles. (3 cr) (Sp)

**Thea 3230. Survey of Western Theatre.** History of performance traditions, theatre architecture, management systems, personnel, and written drama in the West from ancient Egypt to mid-20th Century. (3 cr) (F)

**Thea 3300. Clinical Experience in Teaching I.** Clinical apprenticeship consisting of teaching theatre in local schools. Includes observation, tutorial work, small group discussions, whole class instruction, and lesson/unit planning. (1 cr) (F,Sp)

**\*\*Thea 3430. Period Dance Styles.** Dances learned from different periods then "recoreographed" for stage practice. Prerequisite: Thea 1430. (2 cr) (Sp)

**Thea 3440. Musical Theatre Dance: Ballet and Modern Emphasis.** Introduces students to classical dance forms. Develops coordination, ease, and poise in handling the body. Focuses on dance as an art form, using the body as a means of expression. Prerequisite: Thea 1430. (2 cr) (F)

**Thea 3450. Dialects.** Review of International Phonetic Alphabet. Explores range of regional American and British dialects, as well as specific foreign language dialects. Prerequisite: Thea 1450. (3 cr) (F)

**Thea 3510. Scene Design.** Preparation for designing sets used in theatre. Development of skills in drafting, rendering, model-making, research, and portfolio development. Prerequisite: Thea 1500. (2 cr) (F)

**Thea 3520. Stage Costume Design.** Theory and practice in design and selection of costumes for nonrealistic, historical, and modern plays. Study of relationship of costume to character and production. Prerequisite: Thea 1500. (2 cr) (Sp)

**Thea 3570. Historic Costume for the Stage.** Historic survey of development of clothing from ancient Egyptians to the present day. (3 cr) (F)

**Thea 4030 (d6030).<sup>1</sup> Storytelling.** Reviews background and techniques of traditional telling. Explores psychological, educational, therapeutic, historical, and folkloric aspects of storytelling. For 6030 credit, graduate students must participate in microteaching sessions in areas of expertise, with additional storytelling research or service. (3 cr) (F,Sp,Su)

**Thea 4250. Playwriting.** Study of dramatic theory and sample plays, combined with practice in writing short plays. Minimum of three plays required. Prerequisite: Thea 1210. Also taught as Engl 4250. (3 cr) (F)

**Thea 4300. Clinical Experience in Teaching II.** Clinical apprenticeship of teaching theatre in local schools, including observation, tutorial work, small group discussions, whole class instruction, and lesson/unit planning. Prerequisite: Thea 3300. (1 cr) (F)

**Thea 4330 (d6330). Drama and Theatre for Youth: Elementary Grades.** Practical teaching strategies, tools, and performance techniques for using drama and theatre in the classroom and beyond. For 6330 credit, graduate students must participate in microteaching sessions with additional research, writing, and/or service assignments. (3 cr) (F,Su)

**Thea 4340 (d6340). Drama and Theatre for Youth: Secondary Grades.** Practical teaching strategies, tools, and performance techniques for using drama and theatre in the classroom and beyond. For 6340 credit, graduate students must participate in microteaching sessions with additional research, writing, and/or service assignments. (3 cr) (Sp)

**Thea 4400. Company Workshop.** Company workshop of theatrical productions emphasizing process and instruction. Supervised rehearsals, technical preparation, and public performances. Prerequisite: Permission of instructor. (3 cr) (F,Sp) ®

**\*Thea 4450. Advanced Voice for Theatre.** Advanced vocal training includes units in microphone technique, radio drama, classical Greek theatre, and vocal improvisation. Prerequisites: Thea 1450 and 2480. (3 cr) (Sp)

**Thea 4480 (d6480). Theatre Leadership and Management.** Explores legal and financial choices, market research and marketing plans, physical plant and season operations, consideration of union and management relationships, and various planning and budget control procedures. For 6480 credit, graduate students must participate in microteaching sessions with additional practicum, writing, or problem solving assignments. (3 cr) (Sp)

**\*\*Thea 4510 (d6510). Advanced Scene Design.** Preparation for graduate school or a career in design. Advanced instruction in drafting, rendering, model-making, technical skills, research, design principles, and portfolio development. For 6510 credit, graduate students must participate in microteaching sessions with additional rendering assignments. Prerequisites: Thea 1500 and 3510. (2 cr) (Sp)

**\*Thea 4520 (d6520). Advanced Costume Design.** Advanced theory and practice in the design and selection of costumes for nonrealistic, historical, and modern plays. For 6520 credit, graduate students must participate in microteaching sessions with additional research or practicum assignments. Prerequisite: Thea 3520. (2 cr) (Sp)

**\*Thea 4540 (d6540). Advanced Lighting Design.** Advanced training in elements of lighting design. Exploration of advanced techniques used to create and execute a lighting design. For 6540 credit, graduate students must participate in microteaching sessions with additional research or practicum assignments. Prerequisite: Thea 2540. (2 cr) (Sp)

**Thea 4740. Advanced Performance Practicum.** Specialized advanced work in production performance. (0.5-2 cr) (F,Sp) ®

**Thea 4750. Advanced Production Practicum.** Provides specialized practical experience in theatre production process, including advanced opportunities to work in directing, design, scene construction, costume construction, stage management, props, sound, and lighting, under the supervision of theatre arts faculty. (1-3 cr) (F,Sp) ®

**Thea 5240 (DHA) (d6240). Contemporary Theatre.** History and theory of a theatre movement since the 1960s, primarily in the English-speaking world, leading to a study of the theatrical world and its practices today. For 6240 credit, graduate students must participate in microteaching sessions with additional reading or writing assignments. Prerequisite: Thea 3230. (3 cr) (Sp) ®

**Thea 5250. Advanced Playwriting Workshop.** Continuation and extension of skills in a workshop environment. Course culminates in the staged reading of students' plays before an audience. Enrollment is contingent upon acceptance of a one-act play which serves as the basis for classwork. Prerequisite: Thea 4250. (3 cr) (Sp) ®

**Thea 5270 (d6270). Performance Theory and Criticism.** Topics in dramatic theory, including traditional Aristotelian analysis, comedy, tragedy, and modern and postmodern performance theories. For 6270 credit, graduate students must participate in microteaching sessions with additional research or writing assignments. (3 cr) (Sp) ®

**Thea 5290 (d6290). Special Topics in Theatre History and Literature.** Specialized topics in theatre history, performance, and dramatic literature. Sample topics include Classical Theatre of Greece and Rome, Golden Age Spanish Theatre, Elizabethan Theatre, Musical Theatre, Asian Theatre, and others. For 6290 credit, graduate students must participate in microteaching sessions with additional research or writing assignments. Prerequisite: Thea 3230. (2-3 cr) (Sp) ®

**Thea 5310. Theatre Mentorship and Service.** Clinical mentorship of teaching skills, including observation, instruction, and evaluation in specific areas of expertise. Projects may include developing and using drama and theatre practices for service in classroom or community settings. Prerequisite: Permission of instructor. (1-3 cr) (F,Sp,Su) ®

**Thea 5370. Methods in Teaching Theatre and Speech.** Development of materials and strategies for teaching secondary school speech and theatre. Team taught by Speech and Theatre Arts faculties. Prerequisite: Admission to teacher education. Also taught as Spch 5370. (3 cr) (F)

**Thea 5390. Student Teaching Seminar.** Focuses on problems arising during student teaching. Includes plans, procedures, adaptive classroom strategies, and evaluation. (2 cr) (F,Sp)

**\*Thea 5400. Advanced Acting: Turn of the Twentieth Century.** Scene study from turn of the century playwrights, including Ibsen, Chekhov, Shaw, and Wilde. Prerequisites: Thea 1400, 2420, and 2490. (3 cr) (Sp) ®

**Thea 5410 (d6410). Advanced Directing.** Provides instruction and practice in advanced techniques of script analysis, research outside the discipline, review of literature, awareness of thinking styles and values, and preparation for studio directing assignments. (3 cr) (F)

**\*Thea 5420. Advanced Acting: Absurdist.** Theatre absurdist: nontraditional acting approaches to nontraditional texts. Includes scene study from the plays of Pinter, Mamet, Brecht, and Ionesco. Prerequisites: Thea 1400, 2420, and 2490. (3 cr) (Sp)

**\*\*Thea 5430. Advanced Acting: Acting for the Camera.** Acting for the camera. Prerequisites: Thea 1400, 2420, and 2490. (3 cr) (Sp)

**\*Thea 5440. Advanced Acting: Musical Theatre Auditions.** Introduction to techniques of musical theatre. Prerequisites: Thea 1400, 2420, and 2490. (3 cr) (F)

**\*Thea 5450. Advanced Acting: Restoration and Greek.** Scene study from the Restoration and Greek playwrights, including Congreve, Euripides, Sophocles, and Vanbrugh. Prerequisites: Thea 1400, 2420, and 2490. (3 cr) (F)

**\*\*Thea 5470. Advanced Acting: Modern Methods.** Twentieth Century acting techniques, methodologies, and theories. Prerequisites: Thea 1400, 2420, and 2490. (3 cr) (F)

**Thea 5510. Computer-Aided Design for Theatre.** Computer-aided design applications for theatre. Drafting and rendering on computer for set, light, and costume design. Prerequisites: Thea 2540, 3510, 3520. (3 cr) (F)

**Thea 5590. Design Studies.** Actualization of a design from conception through completion with faculty supervision. Creation of all drafting, renderings, and/or models

by deadlines, handling complications, overseeing properties acquisition and set dressing, and documenting design for portfolio presentation. Prerequisite: Thea 3510. (3 cr)

**Thea 5740 (d6740). Repertory Theatre Performance.** Rehearsal, crew, and staff assignments. Performance of four plays in repertory. Company members selected through audition, based on ability and commitment to theatre. For 6740 credit, graduate students fulfill mentoring assignments and/or additional assignments in community service. Enrollment limited and by permission of Theatre Arts Department staff. (2-8 cr) (Su) ®

**Thea 5750 (d6750). Repertory Theatre Production.** Rehearsal, crew, and staff assignments. Performance of four plays in repertory. For 6750 credit, graduate students work with undergraduate students in mentoring situations. (2-8 cr) (Su) ®

**Thea 5900. Special Projects.** Directed individual research studies or creative projects in theatre. (1-4 cr) (F,Sp) ®

**Thea 5910. Senior Project.** Culminating project and/or recital in student's specified program. (2 cr) (F,Sp)

**Thea 6010. Introduction to Graduate Study in Theatre.** Bibliography, research methods, and writing. (2 cr) (F)

**Thea 6030 (d4030). Storytelling.** Reviews background and techniques of traditional telling. Explores psychological, educational, therapeutic, historical, and folkloric aspects of storytelling. For 6030 credit, graduate students must participate in microteaching sessions in areas of expertise, with additional storytelling research or service. (3 cr) (F,Sp,Su)

**Thea 6180. Theatre Production Portfolio.** Creation of a design portfolio for a single production. An integrative, diagnostic course. (3 cr) (F)

**Thea 6240 (d5240). Contemporary Theatre.** History and theory of a theatre movement since the 1960s, primarily in the English-speaking world, leading to a study of the theatrical world and its practices today. For 6240 credit, graduate students must participate in microteaching sessions with additional reading or writing assignments. Prerequisite: Thea 3230. (3 cr) (Sp) ®

**Thea 6270 (d5270). Performance Theory and Criticism.** Topics in dramatic theory, including traditional Aristotelian analysis, comedy, tragedy, and modern performance theory. Includes preparation for review and adjudication of performance. For 6270 credit, graduate students must participate in microteaching sessions with additional research or writing assignments. (3 cr) (Sp) ®

**Thea 6290 (d5290). Special Topics in Theatre History and Literature.** Specialized topics in theatre history, performance, and dramatic literature. Sample topics include Classical Theatre of Greece and Rome, Golden Age Spanish Theatre, Elizabethan Theatre, Musical Theatre, Asian Theatre, and others. For 6290 credit, graduate students must participate in microteaching sessions with additional research or writing assignments. Prerequisite: Thea 3230. (2-3 cr) (Sp) ®

**Thea 6330 (d4330). Drama and Theatre for Youth: Elementary Grades.** Practical teaching strategies, tools, and performance techniques for using drama and theatre in the classroom and beyond. For 6330 credit, graduate students must participate in microteaching sessions with additional research, writing, and/or service assignments. (3 cr) (F,Su)

**Thea 6340 (d4340). Drama and Theatre for Youth: Secondary Grades.** Practical teaching strategies, tools, and performance techniques for using drama and theatre in the classroom and beyond. For 6340 credit, graduate students must participate in

microteaching sessions with additional research, writing, and/or service assignments. (3 cr) (Sp)

**Thea 6480 (d4480). Theatre Leadership and Management.** Explores legal and financial choices, market research and marketing plans, physical plant and season operations, consideration of union and management relationships, and various planning and budget control procedures. For 6480 credit, graduate students must participate in microteaching sessions with additional practicum, writing, or problem solving assignments. (3 cr) (Sp)

**\*\*Thea 6510 (d4510). Advanced Scene Design.** Preparation for graduate school or a career in design. Advanced instruction in drafting, rendering, model-making, technical skills, research, design principles, and portfolio development. For 6510 credit, graduate students must participate in microteaching sessions with additional rendering assignments. Prerequisites: Thea 1500 and 3510. (2 cr) (Sp)

**\*Thea 6520 (d4520). Advanced Costume Design.** Advanced theory and practice in the design and selection of costumes for nonrealistic, historical, and modern plays. For 6520 credit, graduate students must participate in microteaching sessions with additional research or practicum assignments. Prerequisite: Thea 3520. (2 cr) (Sp)

**\*Thea 6540 (d4540). Advanced Lighting Design.** Advanced training in elements of lighting design. Exploration of advanced techniques used to create and execute a lighting design. For 6540 credit, graduate students must participate in microteaching sessions with additional research or practicum assignments. Prerequisite: Thea 2540. (2 cr) (Sp)

**Thea 6740 (d5740). Repertory Theatre Performance.** Rehearsal, crew, and staff assignments. Performance of four plays in repertory. Company members selected through audition, based on ability and commitment to theatre. For 6740 credit, graduate students fulfill mentoring assignments and/or additional assignments in commu-

nity service. Enrollment limited and by permission of Theatre Arts Department staff. (2-8 cr) (Su) ®

**Thea 6750 (d5750). Repertory Theatre Production.** Rehearsal, crew, and staff assignments. Performance of four plays in repertory. For 6750 credit, graduate students work with undergraduate students in mentoring situations. (2-8 cr) (Su) ®

**Thea 6790. Seminar in Drama.** Flexible service topics course covering a range of topics according to individual student need and/or visiting instructors, independent study, etc. (1-4 cr) (F,Sp) ®

**Thea 6800. Graduate Studies in Theatre.** Research and preparation for graduate practicum projects in theatre. (1-6 cr) (F,Sp) ®

**Thea 6900. Research Studies.** Directed individual research studies or creative projects in theatre. (1-4 cr) (F,Sp,Su) ®

**Thea 6920. Graduate Projects in Theatre.** Studio practicum in support of projects in stage directing, design, and technical practice. (2-3 cr) (F,Sp) ®

**Thea 6970. Thesis.** (1-4 cr) (F,Sp) ®

**Thea 6990. Continuing Graduate Advisement.** (1-2 cr) (F,Sp) ®

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<sup>1</sup> Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

\*Taught 2002-2003.

\*\*Taught 2003-2004.

## Interdepartmental Program in *Toxicology*

**Director: Professor Roger A. Coulombe, Jr.**, molecular toxicology, cancer chemoprevention, natural product toxicology (ADVS)  
Office in Animal Science 213, (435) 797-1600

**FAX** (435) 797-1601

**E-mail** rogerc@cc.usu.edu

**WWW** <http://toxicology.usu.edu>

**Professors** *Anne J. Anderson*, plant toxicology (Biology); *Ann E. Aust*, metal-induced carcinogenesis (Chemistry and Biochemistry); *Steven D. Aust*, biochemical toxicology and bioremediation (Chemistry and Biochemistry); *William A. Brindley*, insecticide toxicology (Biology); *Howard M. Deer*, pesticides and occupational health (ADVS); *William J. Doucette*, fate of environmental chemicals, phytoremediation (CEE); *R. Ryan Dupont*, biological waste treatment (CEE); *William J. Popenorf*, occupational toxicology and industrial hygiene (Biology); *Ronald C. Sims*, environmental engineering (CEE); **Research Professor** *Darwin L. Sorensen*, aquatic toxicology (CEE); **Associate Professor** *Paul R. Grossl*, soil chemistry and phytoremediation (PSB); **Assistant Professor** *Jeffery O. Hall*, veterinary toxicology (ADVS). **Collaborators at USDA Poisonous Plants Laboratory** *Dale R. Gardner*, natural product chemistry; *Kip E. Panter*, poisonous plants (USDA); *James A. Pfister*, behavioral toxicology; *Bryan L. Stegelmeier*, veterinary pathology.

**Degrees offered:** Master of Science (MS) and Doctor of Philosophy (PhD) in Toxicology

**Specialization:** Molecular Biology

### *Graduate Programs*

Established in 1963, USU's Interdepartmental Graduate Program in Toxicology is one of the first degree-granting graduate toxicology programs in the country. More than 130 students have received MS and PhD degrees in a research-intensive interdisciplinary environment. Students affiliate with the program through one of several departments: Animal, Dairy and Veterinary Sciences (ADVS); Biology; Chemistry and Biochemistry; Civil and Environmental Engineering (CEE); or Plants, Soils, and Biometeorology (PSB). The Utah Water Research Laboratory and the USDA Poisonous Plants Laboratory also provide facilities and research projects for study. A specialization in toxicology/molecular biology is available.

#### *Admission Requirements*

Students with a degree in life sciences, physical science, medical science, or engineering and with adequate preparation in chemistry, biology, physics, and/or mathematics are eligible. Admission to the program requires compliance with the general admission requirements of the University, a faculty sponsor, and acceptance into the sponsoring professor's home department. Applicants should have a GPA of 3.5 or higher from completed degree programs. The GRE exam is required, and a score above the 55th percentile for the verbal, quantitative, and analytical sections is desirable. International students must receive a score of 600 or higher on the TOEFL exam.

#### *Major Research Areas*

**Molecular and Biochemical Toxicology.** Modern molecular biological techniques are used to determine the mechanisms of toxicity and carcinogenesis by examining how various natural and synthetic compounds interact with DNA. Resultant mutations in oncogenes and tumor suppressor genes are being investigated. The mechanisms of free-radical toxicity, specifically by iron and other transition elements, are also important research topics. Other ongoing studies examine the mechanisms of cancer chemoprevention, chemical metabolism, effects of toxicants on macromolecular syntheses, and metabolic intermediates. The toxicity of poisonous plants is another program emphasis.

**Environmental Toxicology.** Utah State University has a comprehensive research program in several aspects of environmental toxicology. Specifically, Utah State University faculty pioneered the use of white-rot fungi for the biodegradation of environmental contaminants. Models are developed and tested for dealing with the migration of chemicals in the environment, especially those with potential routes for human exposure. Basic biological, chemical, and physical methods are explored for hazardous waste management programs.

#### *Course Requirements*

Students in the **MS program** are required to complete the following core courses: ADVS 6350, 6400, 6600\*, 6810; Chem 5700, 5710; Stat 5200.

Students in the **PhD program** are required to complete the following core courses: ADVS 6350, 6400, 6600\*, 6810; Biol 5620; Chem 5700, 5710; Stat 5200.

Additional coursework is determined by the supervisory committee, and depends on the area of emphasis. Approximately one-third of the MS and one-half of the PhD work consists of research necessary to complete a thesis or dissertation.

### ***Financial Assistance***

Graduate students are eligible for competitive fellowships, teaching assistantships, and research assistantships. Out-of-state fees are waived, and in many cases, in-state fees are also waived.

Hourly employment, which often permits waiver of out-of-state fees, is also available.

The Toxicology Graduate Program participates in the WICHE Western Regional Graduate Degree Program (WRGP). Students who are not Utah residents, but who are from the WICHE region, except California, qualify for registration at the Utah resident tuition rate. (WICHE participant states include Alaska, Arizona, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming.) To facilitate this process, applicants should inform the Toxicology Program of their WRGP status upon application.

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\*This course is taught alternate fall semesters.