

Colleges

College of Agriculture

Dean: *To be appointed*

Office in Agricultural Science 223, (435) 797-2215

Associate Dean for Academic Programs and Extension: *Ralph E. Whitesides*

Associate Dean for International Programs: *James H. Thomas*

Associate Dean for Research and Director, Agricultural Experiment Station: *H. Paul Rasmussen*

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The College of Agriculture includes the following departments:

Agricultural Systems Technology and Education (ASTE)
Animal, Dairy and Veterinary Sciences (ADVS)
Economics (Econ)¹
Nutrition and Food Sciences (NFS)²
Plants, Soils, and Biometeorology (PSB)

Degrees and curriculum options are listed in the *Instructional Units and Programs* section of this catalog. In addition to programs in the departments, the MS and PhD degrees in toxicology involve more than one department.

Agriculture today is a dynamic, rapidly changing industry. It includes more than farming or producing food and fiber. It embodies all the occupations connected with the production, processing, marketing, and distribution of farm products.

Agriculture is the nation's largest industry. Of the 131 million people employed in the United States, about 21 million (16 percent) work in agriculture. This includes about half a million scientists who serve agriculture directly or indirectly. The agricultural industry is the biggest buyer, seller, and borrower in the United States, and it has the largest investment of any industry.

Today's agriculture offers graduates challenging opportunities in a highly technological and competitive society. Students must be prepared to interact in such a society when they complete their formal education.

The success of various curricula in agriculture is manifest by the achievements of the graduates. They are setting new standards for agricultural production and in positions as professional specialists, teachers, research investigators, and leaders in agriculture and related industries locally, nationally, and internationally.

Education in agriculture includes fundamental science as well as applied business and technology. Many graduates continue their education for advanced degrees and other specialized education and training.

Admission Requirements

Undergraduate students accepted in good standing by the University are eligible for admission to the College of Agriculture.

¹Jointly administered with the College of Business.

²Jointly administered with the College of Family Life.

Facilities and Equipment

The Agricultural Science Building houses the administrative offices of the College of Agriculture, the Agricultural Experiment Station, University Extension, and the Plants, Soils, and Biometeorology Department. The Animal, Dairy and Veterinary Sciences Department personnel are housed in the Agricultural Science Building, the Animal Sciences Building, and the Veterinary Science Building. The Agricultural Systems Technology and Education Department is located in the Agricultural Systems Technology and Education Building. Economics is housed in the Business Building. The Department of Nutrition and Food Sciences is housed in the Nutrition and Food Sciences Building. Some classes and laboratories are located on Agricultural Experiment Station facilities near the campus, where research and teaching interact. Research units located in more distant areas of the state provide research opportunities for graduate students and faculty members.

Curricula in Agriculture

Students may work toward the Bachelor of Science degree in any of the departments of the College of Agriculture. Pre-veterinary training is offered in the Department of Animal, Dairy and Veterinary Sciences.

There are three basic curricula offered by most departments: (1) science, (2) general or production, and (3) business. Departmental listings detail the requirements for earning a degree in these curricula.

Science. Students who choose the science curriculum are taught the fundamentals of physical and biological sciences that are significant to agriculture. In the basic science courses, students prepare themselves for graduate work and eventually research and teaching careers in the natural sciences. Graduates in science curricula are also prepared to do research or technical work in agriculturally oriented businesses such as farm chemicals, livestock health, feed processing and marketing, crop breeding, water use, and food processing.

Science curricula are offered in the Departments of Animal, Dairy and Veterinary Sciences; Nutrition and Food Sciences; and Plants, Soils, and Biometeorology.

General or Production. This curriculum is designed to educate students to meet the special demands of today's agriculture. Successful modern agricultural production requires an under-

standing of the latest scientific knowledge and an ability to apply the information. The production curriculum will satisfy the needs of a student who plans to be involved in production agriculture, to be a farm manager, or to work directly with farm operators as a businessman or as a government or farm organization employee.

This curriculum is offered in the Departments of Agricultural Systems Technology and Education; Plants, Soils, and Biometeorology; and in animal and dairy majors of the ADVS Department.

Business. The businesses and industries that buy from, sell to, and provide service for people involved in production agriculture are expanding the need for employees educated in agriculture. These enterprises include feed, fertilizer, machinery, and chemical firms that supply the producer's needs, as well as marketing firms that assemble, process, ship, and merchandise agricultural products. Managers of large-scale farm enterprises also profit from the kind of education provided by the business curriculum. Students who want to capitalize on their agricultural background while pursuing a business or industrial career should consider the business option.

This curriculum is offered in the Departments of Economics; Agricultural Systems Technology and Education; Nutrition and Food Sciences; Plants, Soils, and Biometeorology; and in the animal and dairy majors of the ADVS Department.

Interdepartmental and intercollege cooperation has and will continue to facilitate the development of various other curricula. Students should not hesitate to inquire about the possibilities of

following a curriculum that would allow for special needs. Advisors in each department are available and should be consulted for guidance in scheduling classes and in planning careers.

Financial Support

The College of Agriculture and the agricultural industry in the Intermountain West annually sponsor over 100 scholarships, internships, and assistantships. The college and the local agribusinesses also support many students through work experience programs. For further information, contact the College of Agriculture Dean's Office (Agricultural Science 223) and/or individual department offices.

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 safety precautions 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.

College of Business

Dean: *David B. Stephens*
Office in Business 212, (435) 797-2272

Senior Associate Dean: *David H. Luthy*
Associate Dean for Business Relations: *Ross E. Robson*
Associate Dean for International Programs: *Steven H. Hanks*
Associate Dean for Graduate Programs: *C.R. Michael Parent*
Director of Development: *Alta L. Markeson*
Director of the Small Business Development Center: *Franklin C. Prante*
Director of the Student Service Center: *Ruth C. Harrison*

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Academic Departments. The College of Business includes the following academic departments. Information about degrees and curriculum options are listed in the departmental sections of this catalog.

Accountancy, School of
Business Administration
Business Information Systems
Economics¹
Management and Human Resources

Interdisciplinary/College Programs. The College of Business offers the following programs in addition to those offered by academic departments. Detailed descriptions of these programs are provided in this section of this catalog and in the separate *Master of Business Administration (MBA)* section.

Business Minor
Dual Major and Second Bachelor's Degree in Business
International Business Minor
Master of Business Administration (MBA)

Nondegree and Other Programs. A wide variety of seminars and development programs are sponsored by academic departments and other units of the college. For example, *Business Relations* offers annual seminars in accounting, banking, customer service and marketing, human resources, international business, management information systems, and quality and productivity. The *Management Institute* meets the unique continuing education needs of a specialized segment of the population: supervisors, managers, and executives who provide leadership and direction for both private and public sector organizations. The *Small Business Development Center* provides a variety of specialized diagnostic, consultative, manpower development, and industrial development services to individual businesses.

Accreditation. All bachelor's and master's degree programs in business are accredited by AACSB International—The Association to Advance Collegiate Schools of Business. This association is the professional accrediting agency in business. Accreditation by AACSB International facilitates transferability of credits to other institutions and acceptance of the credentials of graduates by the business community.

¹Jointly administered with the College of Agriculture.

Objectives

The college is engaged in the following three primary areas of activity: **education, outreach, and research.**

The college's **educational objectives** emphasize preparation for professional careers in business. The managerial and technical skills associated with such preparation may also lead to careers in other types of organizations, such as health service, government, and education. This preparation is directed at both entry-level and mid-career qualifications. Thus, students can be immediately productive on a new job assignment and at the same time have the depth and breadth of education to assume increasing responsibilities. Additionally, experienced managers and business people can learn needed new capabilities and renew their educational backgrounds with college programs. An extensive offering of vocationally oriented programs in clerical and technical fields is also provided. Besides its career orientation, the College of Business educational objectives include a commitment to enhancing the lifelong learning opportunities for responsible citizenship and personal satisfaction where economic and business dimensions are critical ingredients.

In implementing its **outreach objectives**, the college extends its resources and services to off-campus patrons by offering distance education programs and classes, participating in Continuing Education Centers, and by conducting on-site visits to individual firms and organizations, thereby enhancing the quality of life and economic well-being of citizens of the state.

The college is committed to an aggressive program of basic and applied **research** to insure the continued enlargement of the base of understanding about business, government, and other complex institutions; about the processes of managing; and about the economic foundations upon which they function.

Undergraduate Programs

Admission and Graduation Requirements

New freshmen admitted to USU in good standing qualify for admission to the College of Business. Students with 1-46 semester hours of credit, who transfer to the College of Business from other institutions or from other colleges at USU, are required to have a minimum overall GPA of 2.20. Students who transfer with 47 or more semester hours of credit 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 major field. The College of Business Student Service Center, located in Business 308, provides initial counseling and guidance until such time as a student qualifies for unconditional Advanced Standing. Students may declare a major upon admission, but will receive advisement through the Student Service Center, Business 308, while preparing for Advanced Standing. Nondegree-seeking students and Associate of Applied Science students will bypass the Prespecialization Unit and work directly with the selected program administrators within departments of the college.

Enrollment Restrictions. Admission to the college does not insure access to the 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 credits are required for admission into Acct 3110, 3120, 3310, 3410; BA 3080, 3400, 3500, 3700; BIS 3000, 3100, 3330, 3500; 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 51 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.

University Studies Requirements. All freshmen-level students who enter USU Fall of 1998 and thereafter will be required to meet the University Studies requirements. Students who have received an Associate of Arts/Science degree from a college or university in the Utah System of Higher Education or from a school with which USU or the College of Business has an articulation agreement will be considered to have fulfilled the General Education portion of the University Studies requirements, *but must still complete the Depth Education portion*. It is recommended that all business students visit with an advisor in the Student Service Center, Business 308, to clarify their specific requirements in this area. Additional information about these requirements is available on pages 56-63 of this catalog.

Advanced Standing. All degree-seeking students in the college are required to complete the following Prespecialization Core program prior to being granted unconditional Advanced Standing: Acct 2010 and 2020 (6 credits); BIS 2450 and 2550 (6 credits); Econ 1500 and 2010 (6 credits); Math 1050 and 1100 (7 credits), Stat 2300 (4 credits); MHR 2990 (3 credits); Psy 1010 or Soc 1010 (3 credits); and one of Acct, BIS, BA, Econ, or MHR 1000 (0.5 credits). Prerequisites to these courses must be completed before enrollment will be permitted.

In addition, the following requirements must be met before unconditional Advanced Standing is granted.

1. A total of 52 semester credits of college-level courses (or equivalent), including the college Prespecialization Core program, must be completed with a cumulative GPA of 2.50 or better. This includes all transfer credits. The current semester registration may be included in the 52 credits; however, final approval of Advanced Standing is contingent upon successful completion of the current semester with the required grades.

2. All College of Business majors must complete the college Prespecialization Core program with a minimum GPA of 2.50.

3. An Application for Advanced Standing must be filed with the College of Business Student Service Center in Business 308. Deadlines for filing the application are published each semester by the Business Student Service Center, Business 308.

Upon completion of the Prespecialization Core program, students who choose not to enter a major field program, or who do not qualify for advanced standing within a major field, may receive counseling regarding alternative courses of action.

USU Courses and Business Courses. At least 30 credits presented for the bachelor's degree must have been completed at USU. This includes credits earned through classes offered at the Logan campus, at designated centers, or by USU's distance education programs. Ten of the required USU credits must be included within the last 40 credits presented for the bachelor's degree. At least 50 percent of the business credits required for a business degree must be taken at USU. Finally, at least 60 credits presented for a business degree must have been taken in courses outside the College of Business. For this requirement, 9 credits in Economics courses and 6 credits in Statistics courses may be counted among those taken outside the College of Business.

Optional P/D+, D, F Grade Restriction. This option (see the USU "Grading Policy," page 19) is not available for any required courses for majors and minors in the College of Business.

College of Business Stop-out Policy. Students having a break in attendance of College of Business programs in excess of one year will be subject to the college and departmental requirements in effect at the time of their return. However, if a student has received unconditional Advanced Standing under a previous set of requirements, this will be honored even though Advanced Standing requirements may have changed.

Graduation. Students must satisfy all University, college, and departmental major requirements to be eligible for graduation. Refer to appropriate sections of this catalog for details.

Minor in Business

The college offers a minor for nonbusiness majors consisting of the five courses listed below. This minor is designed to develop a general background and perspective in business. Completion of this minor will acquaint students with each business discipline. Advisement for the minor in business is through the College of Business Student Service Center in Business 308. An overall minimum GPA of 2.50 is required for the five courses. Students are responsible to complete prerequisite courses where applicable. Required courses for the minor in business include Acct 2010; BA 3400 or 3460; BA 3500; MHR 3110; and one of the following courses: Econ 3400, MHR 2990, or BIS 3100.

Minor in International Business

Both College of Business majors and nonmajors are eligible to receive the International Business Minor. This minor is designed to develop a general background and perspective in business. All students who plan to pursue this minor receive academic advisement from the College of Business Student Service Center in Business 308. This minor consists of four courses selected from a group of six courses (listed below) and completion of either a Language Competency Option or a Regional Studies Option. Four of the following seven courses are required as part of this minor: BA 4300 (International Finance), BIS 4550 (Principles of International Business Communications), BIS 5700 (Internet Management and Electronic Commerce), Econ 3400 (International Economics for Business), Econ 5150 (Comparative Economic Systems), MHR 3820 (International Management), and MHR 4890 (Business Strategy in a Global Context). Information about the Language Competency and Regional Studies Options is available in the Student Service Center, Business 308.

Minors in Other Business Subjects

Minors are available in other business subjects, as indicated in departmental sections of this catalog.

Dual Major and Second Bachelor's Degree

The College of Business offers both a dual major and a second bachelor's degree—Bachelor of Science (BS) or Bachelor of Arts (BA)—in Business. This particular option requires a broad course distribution among the departments of the college. It is, therefore, administered by the college, rather than by a specific department. Requirement information is available in the College of Business Student Service Center, Business 308.

For requirement information concerning other second bachelor's or dual major degrees having specialization within the college, see departmental sections of this catalog.

Professional Organizations

The following student organizations are available for membership, depending upon student objectives and qualifications.

American Marketing Association (AMA): Organization for marketing and marketing education majors.

American Production and Inventory Control Society (APICS): Professional society for production majors.

Beta Alpha Psi: Honorary professional accounting fraternity.

Beta Gamma Sigma: Honorary business fraternity. (See page 42 for further information.)

Association for Systems Management (ASM): Organization for students planning careers in information processing and information systems management.

Delta Pi Epsilon (DPE): National graduate honorary fraternity in business education.

Delta Epsilon Chi (DEX): Co-curricular organization for marketing education and marketing majors.

Economics Club: Organization for students majoring in economics.

Finance Club: Organization for students majoring in finance.

Institute of Management Accountants (IMA): Organization designed for accounting majors.

MBA Association: Organization for MBA graduate students.

Phi Beta Lambda (PBL): Organization designed for business or business information technology and education majors.

Sigma Iota Epsilon (SIE): National honorary and professional management fraternity.

Society for Human Resource Management (SHRM): Organization for majors in fields of personnel and human resource management.

Scholarships, Fellowships, and Assistantships

A number of scholarships and assistantships are available to College of Business students at both the undergraduate and graduate levels. See *Financial Aid and Scholarship Information* catalog section (pages 29-30), as well as the *Graduate Financial Assistance* section (pages 71-72). There are also opportunities for employment in research projects and other activities. Assistantships for graduate students are available for both teaching and research. Applications for undergraduate scholarships may be made directly to the Student Service Center, Business 308.

College of *Education*

Dean: *Gerard R. Giordano*

Office in Emma Eccles Jones Education 109, (435) 797-1437

Associate Dean for Teacher Education, Graduation, and Educator Licensing: *Francine Fukui Johnson*

Associate Dean for Education Extension: *Michael K. Freeman*

Associate Dean for Research: *Carol J. Strong*

Website: <http://www.coe.usu.edu>

The College of Education has the following departments:

Communicative Disorders and Deaf Education
Elementary Education
Health, Physical Education and Recreation
Instructional Technology
Psychology
Secondary Education
Special Education and Rehabilitation

The College of Education provides preparation programs for prospective teachers, for counselors and other professional personnel in education, and for professionals in the human services area and in corporate settings. Students are urged to refer to the more detailed descriptions of programs, majors, and areas of specialization contained in this catalog.

Accreditation. Utah State University is a member of the American Association of Colleges for Teacher Education and is accredited by the National Council for the Accreditation of Teacher Education and the Utah State Board of Education. Students who are licensed to teach in the state of Utah may qualify for licensure in other states and the District of Columbia.

University Studies Requirements. All students graduating from the College of Education must complete the USU University Studies requirements (see pages 56-63).

Admission Requirements to Teacher Education. Students wishing to enter the Teacher Education Program at Utah State University must formally apply for admission and be approved by the Office of the Associate Dean of Education, as well as by the department where the teaching major is being offered. All applicants are required to submit a record of their ACT scores, pass the Teacher Education Writing Exam, and take a speech and hearing test. Students are not permitted to enroll in the education professional core classes prior to being admitted to the Teacher Education Program.

Detailed information about admission to the Teacher Education Program should be obtained from a departmental advisor or from the Office of the Associate Dean for Teacher Education, Graduation, and Educator Licensing.

Application for admission to professional curricula should be made before the end of the sophomore year, or earlier if possible. Transfer students who have had one year of collegiate work may apply during their first semester at USU.

Teacher Licensing. The Dean, College of Education is assigned responsibility for the development, approval, and administration of Teacher Licensing requirements for students.

The College of Education currently offers preservice teacher preparation leading to licensure in 31 different areas. In addition, advanced programs leading to professional licensure are available for administrators, supervisors, school counselors, school psychologists, school library media specialists, speech pathologists and audiologists, educators of the deaf, and specialists in special education.

Specific requirements for each license may be obtained from the Office of the Associate Dean for Teacher Education, Graduation, and Educator Licensing or from the department in which the major work is offered. All students who desire licensure must complete a criminal background check.

For the early childhood, elementary, or secondary license, a closely supervised program of student teaching is conducted in selected schools throughout the state. Students should be financially prepared to live off campus during the semester selected as their professional semester of student teaching.

The Bachelor of Science degree with a major in elementary education, secondary education, or special education is designed for students preparing to teach in any of these fields. Students majoring in other departments of the University who wish to prepare for teaching are admitted to teacher education curricula as heretofore described. An endorsement in middle education is also available.

Dual Licensing. A student desiring to obtain early childhood and elementary education, elementary and secondary, special education and elementary, elementary and deaf education, or special education and secondary education licenses should consult with an advisor in the education departments early in his or her program. Ordinarily, dual licensure will require at least one additional semester of work.

Teacher Placement Service. The Teacher Placement Service functions as an integral part of the University Placement Center. Students may register with the service, which will help in compiling the proper credentials to be used in placement interviews. Application for placement services should be made prior to student teaching whenever possible. No fee is charged for joining the center.

Facilities. The College of Education Edith Bowen Laboratory School is a functioning elementary school on the University campus, serving as a research, demonstration, and teacher training center.

The Center for Early Childhood Education provides educational experiences and resources for teachers and parents that reflect the most current understanding of the social, emotional, physical, and cognitive needs of children in pre-kindergarten, kindergarten, and the primary grades.

The Center for the School of the Future strives to determine what children should be taught and how they can learn it most effectively.

The Center for Persons with Disabilities is a multi-discipline training, research, and service center where students engage in activities of observing, tutoring, practicums, interning, and working individually with materials designed especially for disadvantaged youth and adults.

Graduate Study

Programs at the graduate level, leading to advanced professional degrees and/or licensure, are available in the administrative, supervisory, human services, clinical, library media, and counseling areas. The MEd, MS, and MA degrees are offered in most departments. An Educational Specialist (sixth-year) program is available in Communicative Disorders, Instructional Technology, and Special Education. Interdepartmental Doctorate of Education (EdD) and Doctorate of Philosophy (PhD) degrees are available with specializations in Business Information Systems, Curriculum and Instruction, and Research and Evaluation. The Interdepartmental EdD also has a specialization in Special Education. PhD degrees in Instructional Technology, Psychology, and Special Education are also offered.

Education Courses (Educ)

Educ 5000H. Senior Honors Seminar. For students in the College of Education to explore an honors interdisciplinary theme selected by the Honors Committee as a culmination of an honors experience. (2 cr) (Sp)

Educ 5560. Special Topics. (0.5-4 cr) (F,Sp,Su) ®

Educ 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. (3 cr) (F,Sp)

***Educ 6080. Leadership and the School Principal.** Focuses on leadership and communication skills in educational organizations. Covers role of the principal in curriculum, instruction, and administration of human resources. Emphasizes school leadership functions and knowledge of local, state, and national educational organizations. (3 cr) (F,Sp,Su)

***Educ 6100. Theories of Instructional Supervision.** Principles and theoretical base of supervision as they relate to improving instructional practices. Emphasizes research findings and recommended practices. (2 cr) (F,Sp)

Educ 6240. Introduction to Student Development Theory. Helps students gain an overall understanding of student development theories and how these theories should influence and inform practice. Students will be able to identify theories and suggest ways to apply them to enhance students' development. Course requirement for the Master of Social Sciences degree program in Human Resource Management. (3 cr) (Sp)

Educ 6250. History and Development of Higher Education and Student Services. Introduces students to the history and development of higher education and the student personnel field by acquainting them with the history of the profession, some of the profession's theoretical and organizational foundations, and basic issues faced by student services professionals. Course requirement for the Master of Social Sciences degree program in Human Resource Management. (3 cr) (F)

Educ 6260. Law and Higher Education: A Guide for Student Services Personnel Administrators. Helps students to become familiar with and gain a working knowledge of education law in postsecondary education, court litigation, scope of authority, liability risks, students' rights and responsibilities, discipline codes, risk

management, federal laws affecting university programs, etc. Course requirement for the Master of Social Sciences degree program in Human Resource Management. (3 cr) (Sp)

Educ 6270. Organizational Administration/Strategies in Student Services. Explores university governance models, resource acquisition and allocation, financial management, and administrative leadership. Critically examines history, current issues, and present trends in the field of student services organizational administration. Course requirement for the Master of Social Sciences degree program in Human Resource Management. (3 cr) (F)

Educ 6410. Educational Foundations. Examines current educational issues and trends within contexts of history, philosophy, and cultural foundations. (2 cr) (F,Su)

Educ 6550. Research for Classroom Teachers. Assists teachers in applying measurement issues and research methods to classroom problems; in locating, interpreting, and using research reports; and in writing research-related papers on teaching. (3 cr) (F,Sp,Su)

Educ 6560. Special Topics. (0.5-4 cr) (F,Sp,Su) ®

Educ 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. (3 cr) (F,Sp,Su)

Educ 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. (3 cr) (F,Sp)

Educ 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. (3 cr) (Sp,Su)

Educ 6700 (d7700).¹ Single-Subject Research Methods and Designs. Examines single-subject research methodology for applied research in schools, including measurement, design, and analysis issues. (3 cr) (F)

Educ 6710. Diversity in Education. Provides educators with background and techniques for more effectively addressing the needs of students in culturally and linguistically diverse society. Diversity topics also include religion, socioeconomic class, ability differences, gender, and sexual orientation. (3 cr) (Sp,Su)

***Educ 6740. School Law.** Acquaints students with legal issues relating to public education. Considers rights and responsibilities of students, teachers, and educational practitioners. Relates these rights to school programs and operations as determined by state and federal laws and court decisions. (3 cr) (F,Su)

Educ 6770. Qualitative Methods I. Introduction to qualitative research, including foundations; research designs and strategies of inquiry (case studies, ethnography, phenomenology, grounded theory, biographical, historical, participative inquiry); sampling; fieldwork and data collection; and analysis. Prerequisite: Educ/Psy 6570. (3 cr) (F)

Educ 6780 (d7780). Qualitative Methods II. Builds on and applies concepts covered in Educ 6770, emphasizing analysis of data, critique of qualitative research, and design and implementation of qualitative research. Students registered for 7780 conduct a qualitative research project. Prerequisite: Educ 6770. (3 cr) (Sp)

Educ 6930. Supervision and Administrative Internship—Elementary. Jointly (with Educ 6940) provides experience in supervision and administration in elementary school settings as they relate to the performances of the six Interstate School Leaders Licensure Consortium (ISLLC) Standards for School Leaders. (3 cr) (F,Sp,Su)

Educ 6940. Supervision and Administrative Internship—Secondary. Jointly (with Educ 6930) provides experience in supervision and administration in secondary school settings as they relate to the performances of the six Interstate School Leaders Licensure Consortium (ISLLC) Standards for School Leaders. (3 cr) (F,Sp,Su)

Educ 6950. Leadership Portfolio Development. Creation of leadership portfolio as culminating activity for completion of Administrative/Supervisory Endorsement. Portfolio includes leadership vision, educational philosophy, and professional resume. (1 cr) (F,Sp,Su)

Educ 7080. Theories of Organizational Leadership in Education. Introduces prospective school administrator to theories of organizational behavior and practices of managing and leading people within the context of the school organization. (3 cr) (F,Sp,Su)

***Educ 7100. Practices of Instructional Supervision.** Application of instructional supervisory theories and practices of supervisory behaviors as they relate to improvement of instruction. Prerequisite: Educ 6100. (3 cr) (Sp,Su)

Educ 7150. Curriculum Theory. Examines the role interpretist/phenomenological, political, cultural, and theoretical perspectives play in the development of school curriculum. Prerequisite: EIEd/ScEd 6150. (2 cr) (Sp)

Educ 7300. Historical, Social, and Cultural Foundations of Education. Examines relationship of modern school in terms of historical, cultural, and social foundations of education. (3 cr) (F)

Educ 7310. Teaching-Learning Foundations in Education. Seminar in which learning theories and teaching models/skills are demonstrated, critically examined, and integrated. Prerequisite: Graduate course in educational psychology or equivalent. (3 cr) (Sp)

***Educ 7320. Instructional Leadership.** Emphasizes application of theory, research, and effective practice to instructional and curricular improvement. Examines educational change. (3 cr)

***Educ 7500. Public School Finance.** Background and understanding of public school finance. Principles and practices utilized in collecting, distributing, and managing district and school revenues, with emphasis on Utah. Collective bargaining practices and capital facilities development also emphasized. (3 cr) (F,Su)

Educ 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. (1 cr) (F,Sp,Su)

Educ 7700 (d6700). Single-Subject Research Methods and Designs. Examines single-subject research methodology for applied research in schools, including measurement, design, and analysis issues. (3 cr) (F)

Educ 7780 (d6780). Qualitative Methods II. Builds on and applies concepts covered in Educ 6770, emphasizing analysis of data, critique of qualitative research, and design and implementation of qualitative research. Students registered for 7780 conduct a qualitative research project. Prerequisite: Educ 6770. (3 cr) (Sp)

Educ 7970. Dissertation Research. Dissertation research for students in the Research and Evaluation specialization. (1-18 cr) (F,Sp,Su) ®

¹Parenthetical 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 taught during alternate years. For information about when it will be taught, contact the College of Education.

College of Engineering

Dean: *A. Bruce Bishop*

Office in Engineering Class 110, (435) 797-2775

Associate Dean: *Alma P. Moser*

Associate Dean: *Ronald L. Thurgood*

Academic Advisor: *Kathleen E. Bayn*

Academic Advisor: *Janet Karren*

Industry and Professional Relations Director: *Robert L. Davis*

Research Program Development and Marketing Director: *Colleen A. Riley*

Engineering Design and Technology Center Director: *Stephen S. Reed*

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WWW http://www.engineering.usu.edu

The College of Engineering includes the following academic departments:

Biological and Irrigation Engineering

Civil and Environmental Engineering

Electrical and Computer Engineering

Industrial Technology and Education

Mechanical and Aerospace Engineering

The College of Engineering includes the following research units:

Anderson Center for Wireless Teaching and Research: *Cynthia M. Furse*, Director

Center for Profitable Uses of Agricultural Biproducts: *Conly L. Hansen*, Director

Center for Self-Organizing and Intelligent Systems: *Kevin L. Moore*, Director

Center for Smart Sensors: *Cynthia M. Furse*, Director

Center for Space Engineering: *Frank J. Redd*, Director

Engineering Experiment Station: *Alma P. Moser*, Director

Huntsman Environmental Research Center: *Maurice G. Thomas*, Director

Institute for Natural Systems Engineering: *Thomas B. Hardy*, Director

International Irrigation Center: *L. Humberto Yap-Salinas*, Director

National Center for Design of Molecular Function: *Linda S. Powers*, Director

Utah Center for On-Site Wastewater Treatment: *Judith L. Sims*, Director

Utah Transportation Center: *Anthony Chen*, Acting Director

Utah Transportation Technology Transfer Center: *Doyt Y. Bolling*, Director

Utah Water Research Laboratory: *Ronald C. Sims*, Director

Some of the recent areas of research in the Engineering Experiment Station include water management, toxic and hazardous waste management, solid waste recycling, risk assessment, transportation, structural systems, geotechnical analysis and buried structures, CAD/CAM, robotics and automation, thermal and cryogenic systems, image processing and compression, computer networking, parallel computing, neural networks, and virtual reality.

The College of Engineering has the major involvement in:

Utah State University Research Foundation: *David G. Norton*, CEO

Space Dynamics Laboratory: *Allan J. Steed*, President

Manufacturing Extension Partnership: *Stephen S. Reed*, Director

Mission

The overall mission of the College of Engineering is to (1) prepare engineers and technologists to work in a complex technological world and create a better future by solving today's problems; (2) engage in research and development that will improve engineering design and practice; and (3) extend knowledge and research to industry and government.

Goal

The goal of the academic programs of the College of Engineering is to provide engineering and technical education enabling engineering students to:

1. develop as ethical professionals who understand engineering and technology in its societal context;

2. learn modern engineering/science and technology principles and their application in conducting experiments and analyzing data;

3. gain experience in working on engineering problems and designing solutions to meet desired needs;

4. acquire skills in communicating effectively and working on teams; and

5. understand the importance of life-long professional development and learning.

The college strives to create a brighter future by working with students, employers, industry, and government research partners to achieve this objective.

Programs

The undergraduate engineering BS degree programs offered by USU, which are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET), include: Biological Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Environmental Engineering, Manufacturing Engineering, and Mechanical Engineering.

At the graduate level, Master of Engineering (ME), Master of Science (MS), and Doctor of Philosophy (PhD) degrees are offered in these specific majors, along with the Civil Engineer (CE) and Electrical Engineer (EE) degrees.

The Industrial Technology and Education Department offers BS degrees in Technology and Industrial Education, Aviation Technology—Maintenance Management, Aviation Technology—Professional Pilot, Computer Electronics Technology, and Welding Engineering Technology, as well as an MS degree in Industrial Technology. An Associate of Applied Science (AAS) degree is available in Aircraft Maintenance Technician—Airframe, Aircraft Maintenance Technician—Powerplant, and Computer Aided Drafting and Design. Admission and academic requirements for the ITE Department are considerably different than those for the other engineering departments. For details, see the Industrial Technology and Education section of this catalog (pages 295-302).

For details about the various majors and specialties offered by departments and programs within the College of Engineering, see the respective departmental sections in this catalog.

Assessment

The College of Engineering is committed to assessing the quality of its academic departments and programs, in order to assure that the desired educational outcomes will be achieved. Faculty members within the college strive to assure that their students obtain the skills and abilities needed for success in their chosen fields.

The college uses a variety of tools and methods to gather information and data to evaluate progress in meeting the college's program goals and objectives, and to take actions to continually improve the quality of students' educational experience.

Undergraduate Programs

Objectives

The objectives of the engineering curriculum are: (1) to provide students with professional competence enabling them to enter and progress rapidly in their professional careers, (2) to provide an understanding of the physical and social world in which they live and work, and (3) to provide a basis for continued intellectual growth, professionally and socially.

In the engineering programs, the curricula begin with studies in mathematics, basic science, introductory engineering, and introductory engineering design. These basic science and engineering skills are coupled with communication skills, as well as courses in humanities and social sciences. The professional engineering programs continue with engineering science, engineering design, and computer utilization. Engineering design activities started during the freshman and sophomore years progress in-depth during the junior and senior years as the student's proficiency increases. The design experience culminates with a capstone design sequence, which builds upon the fundamentals of engineering, communication skills, science, mathematics, humanities and social sciences, economics, ethics, safety, reliability, aesthetics, and social impact.

The expected outcomes of the professional engineering programs are: (1) to unite engineering sciences and computer skills with engineering design to enhance the practical problem-solving abilities, decision-making proficiency, and creativity of the engineering student; (2) to provide for an understanding and appreciation of professional responsibility and ethics; (3) to expand a sensitivity to the economic, legal, and social dimensions of engineering decisions; and (4) to provide the foundation and help instill a desire for life-long learning.

Studies in the humanities and social sciences serve not only to meet the objectives of a broad education, but also to meet the objectives of the engineering profession. In the interest of making engineers fully aware of their social responsibilities and better able to consider related factors in the decision-making process, the College of Engineering requires coursework in the humanities and social sciences as an integral part of the engineering program. To satisfy this requirement, courses selected must provide both breadth and depth and be planned to fulfill an objective appropriate to the engineering profession.

Admission Requirements

Engineering Requirements. In addition to the policies of the University concerning admission of students, the following regulations apply to the engineering programs:

1. In order to complete an engineering curriculum in four years, high school students must complete at least two years of algebra, one year of geometry, one-half year of trigonometry, four years of English, and courses in computers, chemistry, and physics. If these courses are not taken in high school, they must be taken in college prior to starting the regular engineering programs. Students with deficiencies in several areas will probably require five years to fulfill graduation requirements.

Students can earn university credits in English, humanities, and social sciences by receiving appropriate scores on the College Level Examination Program (CLEP) tests. Advanced placement (AP) credit may be obtained in calculus, chemistry, English, history, and physics.

2. Transfer students from other colleges or universities will be referred to the Engineering Admission Committee for evaluation.

Criteria considered in admission decisions for transfer students include resources available in the requested department and the transfer GPA, along with an evaluation of the program of the former college or university. Decisions concerning academic standing once the student is admitted to USU will be based solely on USU grades.

3. Students registered on campus (including General Registration) must be approved by the Engineering Admission Committee before transferring to the College of Engineering. Students in this category must have demonstrated, by courses taken at USU, a potential to succeed in the major of their choice.

Professional Engineering Program

Introduction. The purpose of the Professional Engineering Program (PEP) is to provide a quality education for engineering students by (1) requiring that students be fully prepared for upper-division engineering coursework by having satisfactorily completed all required preprofessional courses and (2) limiting enrollment in upper-division courses consistent with resources available within the departments and the college.

Policy. Enrollment in upper-division engineering courses (3000-level and above) is available *only* to students who have been accepted into the PEP or an appropriate graduate program or have a nonengineering major which requires a specific engineering class for which the student has passed the prerequisite courses.

Application Requirements. Current PEP applications listing the required PEP courses and admission standards are available from the various departments and the office of the Dean of Engineering. The minimum requirements a student must satisfy in order to be eligible to apply for admission to a professional program are:

1. The student must be in good academic standing in the University and the college.
2. The student must achieve a grade of *C-* or better in every required preprofessional course. The *P/D+*, *D*, *F* grading option may not be used except in freshman English Composition.
3. The student must achieve an overall grade point average of 2.3 or better for all required preprofessional coursework completed at USU.

Repeated Coursework. A student can repeat no more than three of the required preprofessional courses in order to satisfy the PEP 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.

Transfer Credit. Transfer credit accepted by the department and the college may be applied toward meeting the requirements for admission into the PEP; however, the grades received will not be used in the USU GPA calculation. For students with transfer credits, a final decision on admission into the PEP will not be made until after the applicant has completed at least 12 semester credits of acceptable engineering, math, and science coursework at USU. Some of this coursework may include upper-division classes taken by permission.

Applications. Students should apply to the Professional Program midway through the semester in which they will complete all preprofessional courses. Students may request permission to take a limited number (not to exceed 15 credits) of upper-division courses if they are within 10 credit hours of completing the necessary requirements, have submitted a PEP application, and are registered for all remaining preprofessional courses. The final

decision on granting permission to take upper-division classes before admission to the PEP rests with the college academic advisor and the Academic Dean of Engineering.

Admission Procedures. Satisfying minimum eligibility requirements does not ensure that a student will be admitted to a PEP program in a specific department. The number of students accepted in the Professional Engineering Program of a department will be based upon the number of students that can be accommodated in upper-division classes. Applicants will be ranked and selected in order of their academic standing in the required preprofessional courses. Admission into a PEP program is for a period of three years. Students unable to complete graduation requirements during this time will be interviewed by the department head to determine whether special circumstances justify their continuance in the program.

Academic Requirements

The Dean's Office of the College of Engineering maintains a handout sheet giving current details of all academic regulations of the college. **It is the responsibility of the student to know the current regulations and to follow these regulations.**

Preprofessional Program. Students must maintain a USU GPA of 2.0 to remain in good standing both in the college and the University. Students in a preprofessional program who are not making satisfactory progress toward acceptance into a professional program or who become ineligible to enter a professional program will be suspended from the college. Students in good standing in a preprofessional program must still meet the entrance requirements for admission into a professional program.

Professional Program. For all engineering majors in the professional program the following academic regulations apply, in addition to University regulations:

1. A GPA of 2.0 or higher must be maintained in all engineering/math/science 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 10 hours of *D* or *D+* credit may be applied toward meeting graduation requirements in engineering/math/science 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+*, *D*, *F* grading option may not be used in required or elective courses completed as part of a professional program. (The *P/D+*, *D*, *F* grading option is approved for University Studies Courses.)
5. The academic regulations listed above (1-4) apply to required coursework and any elective engineering/math/science 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 an engineering/math/science course which could be used to satisfy graduation requirements for the chosen degree (see No. 5 above); (ii) have more than 10 hours of *D* credit (see No. 2 above); or (iii) have a GPA of less than 2.0 (see No. 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 10 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 engineering/math/science 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 each semester with the college academic advisor to work out a schedule having the primary goal of correcting the existing academic problems.

General Engineering

Engineering students are encouraged to select a major as soon as possible. Many of the courses taken during the freshman year are common to all engineering majors; however, there are significant differences in the courses taken during the sophomore year. Students who have not selected a specific major should meet with the college academic advisor for assistance in planning a personalized program. Students who choose to remain in general engineering must be prepared to meet the specific requirements of a professional program in the department of their choice.

Additional Engineering Information

Professional Societies. Faculty members of the departments hold memberships in various professional societies and organizations.

Student chapters or societies include Society for Engineering in Agricultural, Food, and Biological Systems, American Institute of Aeronautics and Astronautics, American Society of Civil Engineers, Chi Epsilon, Institute of Electrical and Electronic Engineers, American Society of Mechanical Engineers, American Water Resources Association, Tau Beta Pi, International Technology Education Association, National Intercollegiate Flying Association, Professional Flight Society, American Welding Society, Society of Environmental Engineering Students, and Society of Women Engineers. Students are encouraged to affiliate with appropriate student societies.

The Engineering Council is comprised of a student from each department, a representative from each student society, and a staff member from the Dean's office. The college senator is chairperson. The council meets regularly to provide effective student-staff-administration liaison.

ROTC. Many engineering students find satisfaction in serving their country in the Reserve Officer Training Program (ROTC) and as reserve officers after graduation. Junior and senior ROTC students receive compensation equivalent to a substantial scholarship. See the Department of Aerospace Studies section (pages 112-113) or the Department of Military Science section (pages 360-362) of this catalog.

Scholarships, Fellowships, and Assistantships. A number of scholarships and assistantships are available to College of Engineering students. Interested high school seniors are encouraged to write to Recruitment/Enrollment Services before February 1 of the year they wish to receive assistance. Continuing students, transfer

students, and returning students should contact the Dean's Office, College of Engineering for a scholarship application. Completed applications are always due February 1. See the *Financial Aid and Scholarship Information* section of this catalog (pages 22-41). There are also opportunities for employment on research projects and other activities.

Concurrent BS/Master's Program

Qualifications

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.

Procedures

Students must complete their junior year in engineering with a 3.0 GPA, both overall and during the last 60 semester credits. No later than the beginning of the first semester of the senior year, they must apply to the department offering their major and be accepted into the concurrent program. For application forms, students should contact their department office or the College of Engineering Advising Center (EL 241).

To prepare a two-year completion plan of study, students must meet with their approved faculty advisor. (Department head gives approval for advisor.) Students must take the GRE exam and submit scores to the School of Graduate Studies. (See major department for minimum GRE qualifying scores.)

Students must fill out an application for admission to the School of Graduate Studies, with departmental acceptance into the concurrent program indicated in the upper-right corner of the first sheet. A Split Registration Form, which also indicates departmental acceptance into the concurrent program, must be filled out and submitted for each semester the student is enrolled in the concurrent program.

Formal acceptance into the School of Graduate Studies is required. The student must select a graduate committee, which must be approved by the School of Graduate Studies. The proposed master's program must be approved by the committee, as well as by the School of Graduate Studies.

During the second year of the concurrent program, the student must pay graduate tuition. When the student is within 21 credits of completing both degrees, he or she will be coded as a graduate student. Thereafter, the student will pay graduate fees and will be eligible for loans, but *not* grants.

An application for graduation with a BS degree must be completed. The student must maintain a 3.0 or higher GPA in courses approved for his or her concurrent program.

Graduate Programs

For information about graduate programs, admissions, assistantships, and fellowships, see departmental sections of this catalog.

Research. The College of Engineering pursues an extensive program of research through the Engineering Experiment Station and the various research centers, institutes, laboratories, and departments. There are opportunities for graduate students to participate, and many undergraduates can find employment in research programs.

Engineering Experiment Station. The Engineering Experiment Station furthers engineering science, education, and practice through a variety of research programs to serve the needs of Utah and the nation. The experiment station especially encourages the development of interdisciplinary interdepartmental research. Major programs are conducted by the following:

- Anderson Center for Wireless Teaching and Research
- Center for Profitable Uses of Agricultural Byproducts
- Center for Self-Organizing and Intelligent Systems
- Center for Smart Sensors
- Center for Space Engineering
- Huntsman Environmental Research Center
- Institute for Natural Systems Engineering
- International Irrigation Center
- National Center for Design of Molecular Function
- Utah Center for On-Site Wastewater Treatment
- Utah Transportation Center
- Utah Transportation Technology Transfer Center
- Utah Water Research Laboratory

Utah Water Research Laboratory. The Utah Water Research Laboratory offers facilities and student support for water research, including surface and ground water resources management and use. Strong programs have been developed through multiple projects in weather modification, water quality control, waste water treatment, hydraulics, flood and erosion control, hydrology, groundwater modeling, salinity control, water use in energy development, water systems optimization, and the socioeconomic aspects of water resources planning. Studies are coordinated with academic programs in the departments of Civil and Environmental Engineering, Biological and Irrigation Engineering, and related departments in other colleges.

International Irrigation Center. The International Irrigation Center conducts an extensive program of irrigation training and technology transfer through multi-lingual courses and through research. The center contributes significantly to improve irrigation

practice, water management, and food production through these activities.

USU Research Foundation and Space Dynamics Laboratory. The research laboratories comprising the USU Research Foundation are located near the USU campus at Logan and at Bedford, Massachusetts. The faculty members of these laboratories hold academic appointments as appropriate in the Electrical and Computer Engineering, Mechanical and Aerospace Engineering, and Physics departments, and working assistantships are available for good undergraduate and graduate students in these and closely related departments. The faculty and staff specialize in upper-atmospheric and space measurements using electro-optical and electrodynamic instrumentation flown on rockets, satellites, aircraft, and balloons. A recent project flew a cryogenically cooled interferometer spectrometer aboard the space shuttle.

Graduate Study. The college offers graduate study programs leading to the ME, MS, CE, EE, and PhD degrees. For further information and details, see individual departmental sections of this catalog.

General Engineering Courses (Engr)

Engr 1010. Introduction to Engineering Design. Introduction to engineering design, problem solving, and computer application skills. Orients students to college programs, academic advising, student services, professional societies, ethics, and engineering careers. A background in trigonometry is strongly recommended. (2 cr) (F,Sp)

Engr 2000. Engineering Mechanics Statics. Force and position vectors; equilibrium of particles; rigid bodies; equivalent system of forces; equilibrium; free body diagrams; static analysis of trusses, frames, and machines; centroids and centers of gravity; friction; and moments of inertia. Prerequisites: Math 1210, 1220. (2 cr) (F,Sp)

Engr 2020. Engineering Mechanics Dynamics. Equations of motion, kinetics of particles, kinetics of rigid bodies, work and energy, impulse and momentum, three-dimensional kinematics, and vibrations. Prerequisites: Engr 2000, Math 1210, 1220. (3 cr) (F,Sp)

Engr 2040. Strength of Materials. Stress, strain, and deflection due to axial loads; moment and torsion; shear and moment diagrams; and equations of equilibrium and compatibility. Prerequisite: Engr 2000. (2 cr) (F,Sp)

Engr 2200. Engineering Numerical Methods I. Introduction to use of digital computers and elementary numerical analysis, with emphasis on practical applications and software development using FORTRAN. Prerequisites: Math 1220 and Engr 1010; Math 2250 (taken concurrently). (3 cr) (F)

Engr 2210. Engineering Numerical Methods II. Numerical solution techniques for solving ordinary and partial differential equations, emphasizing practical applications and software development using FORTRAN. Prerequisite: Engr 2200. (2 cr) (Sp)

Engr 2930. Special Problems. Independent or group student study of engineering problems not covered in regular course offerings. (1-18 cr) (F,Sp,Su)

College of *Family Life*

Interim Dean: *Von T. Mendenhall*
Office in Family Life 203B, (435) 797-1538

Associate Dean for Academic Affairs: *Ann M. B. Austin*
Associate Dean for Extension: *Georgia C. Lauritzen*

FAX (435) 797-3845
E-mail marilyn@cc.usu.edu
WWW <http://www.usu.edu/familife/>

The College of Family Life has the following departments and areas of specialization:

Family and Human Development
Family and Human Development
Family/Community Services Emphasis
Human Development Emphasis
Deaf Education Emphasis
Early Childhood Education¹
Gerontology Certificate

**Human Environments: Apparel and Textiles
Interior Design, Consumer Sciences, and
Family and Consumer Sciences Education**
Family and Consumer Sciences Education
Family and Consumer Sciences
Family Finance Emphasis
Apparel and Textiles
Interior Design

Nutrition and Food Sciences²
Nutrition and Food Sciences, with emphases in Food Science,
Food Technology Management, Dietetics, Nutrition
Science, and Culinary Arts/Food Service Management

Vision and Mission

The College of Family Life is recognized as a leader in responding to society-relevant challenges using multidisciplinary approaches that assist individuals and families in interacting effectively with their environments.

The mission of the College of Family Life is to assist individuals and families in optimizing healthy lifestyles, developing meaningful relationships, and increasing productivity while living in diverse and changing environments.

The College of Family Life has the following goals:

1. To provide professional programs of teaching, research, extension, and service with a focus on the interaction of human beings with their near environments, emphasizing in-depth study of reciprocal effects (physical, biological, social, psychological, economic, cultural, and aesthetic).

¹Jointly administered with the Department of Elementary Education in the College of Education.

²Jointly administered with the College of Agriculture.

2. To provide quality professional preparation for students enrolled as majors within the college.

3. To provide courses of general educational value to University students interested in improving their ability to function effectively as individuals, consumers, marital partners, homemakers, parents, and family members in a variety of environments.

4. To provide programs that will enhance lifetime health and quality of life.

5. To undertake research that will increase knowledge, improve technology, and strengthen marriage/family life, and to enhance human dignity and the quality of life for many diverse social groups.

6. To provide research-based educational programs through Utah State University Extension to meet the needs of Utah citizens.

7. To provide lifelong and continuing education opportunities, which extend and apply across the life span, to the citizens of Utah.

8. To add an international dimension to the college's programs and courses; to promote participation of faculty in those areas in which their expertise and knowledge can provide significant input into the solution of world problems affecting individuals, families, and environments.

9. To participate in University and national programs related to diversity, pluralism, and equal opportunity.

Although the college's programs have evolved to meet the ever-changing demands of individuals and families in diverse environments, the goals remain the same: to optimize healthy lifestyles, and to promote meaningful relationships and productive lives. Graduates of the College of Family Life, whether they become interior designers, apparel and textiles professionals, financial and housing counselors, food scientists, dietitians, culinary artists, or family and human development specialists, or are prepared to teach in the public schools and other settings, know how to make a difference in their families and communities. The College of Family Life is accredited by the American Association of Family and Consumer Sciences.

Degrees

Degrees offered in the College of Family Life include the Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), and Doctor of Philosophy (PhD) in Nutrition and Food Sciences; and PhD in Family Life. The Family Life PhD can be earned with a specialization in Family and Human Development or in Human Environments.

Admission Requirements

Students accepted in good standing by the University are eligible for admission to the College of Family Life.

Academic Requirements

The USU University Studies requirements include 6 credits of Communications Literacy. This requirement may be filled by completing Engl 1010 and Engl 2010. The 1000-level requirement is waived if the student scores 29 or higher on the English section of the ACT Exam, receives a 3 or higher on the English Advanced Placement Exam, or scores 500 or higher on the English section of the CLEP test.

Academic requirements vary as a function of each department's standards and policies. It is the responsibility of the student to be informed about departmental requirements and

regulations. For complete information, consult with departmental advisor.

The number of credits required for a major will be specified by area of concentration, subject to minimum University requirements.

Graduate Programs

All departments within the College of Family Life offer a graduate program. For more detailed information, see the *Graduate Programs* sections included in this catalog with the text for each of the Family Life departments.

Family Life Course (FL)

FL 1100. Critical Issues in Family Life. This on-line course offers an introduction to the departments and areas of study in the College of Family Life. Emphasizes how scholars in the individual areas, working together, address critical social issues. (2 cr) (Sp)

College of

Humanities, Arts and Social Sciences

Dean: *Elizabeth S. Grobsmith*, Office in Main 338, (435) 797-1195

Associate Dean; and Co-director, Center for International Studies: *R. Edward Glatfelter*, (435) 797-1196

Associate Dean: *Nicholas E. Morrison*, (435) 797-7151

Co-director, Center for International Studies: *Yun Kim* (on foreign assignment)

Director, Science/HASS Advising Center: *Mary E. Leavitt*, Office in Student Center 302, (435) 797-3883

Liberal Arts and Sciences Program: Contact Office of the Provost, Main 142, (435) 797-1706

WWW <http://www.hass.usu.edu>

The College of Humanities, Arts and Social Sciences has the following departments and programs:

Aerospace Studies

Art

Asian Studies

English

History

Intensive English Language Institute

Journalism and Communication

Landscape Architecture

and Environmental Planning (LAEP)

Languages and Philosophy

Liberal Arts and Sciences Major

(jointly administered with the College of Science)

Military Science

Music

Political Science

Sociology, Social Work and Anthropology

Theatre Arts

Undeclared

A listing of majors and degrees can be found under each department or program.

Within the College of Humanities, Arts and Social Sciences are found those departments which provide career preparation in some of the most interesting and vital academic fields. The study of society, the governing of society and its history, communication in a number of languages, the various aspects of culture—all these appeal to an increasing number of undergraduate and graduate students. Many train for careers in these fields; more—scientists, engineers, etc.—take courses to broaden their horizons and add interest to their lives.

It is probably fair to say that the social trend is toward an awareness that while material things are important they are not enough for a full life. For this, the individual may turn to literature, art, music, and theatre. Concern with environmental problems may lead the student to an investigation of landscape architecture. The complexities of modern life necessitate an understanding of the social sciences and history. It is within the College of Humanities, Arts and Social Sciences that these needs may be met.

Admission and Graduation Requirements

Students accepted in good standing by the University are eligible for admission to the College of Humanities, Arts and Social Sciences. Because of limitations of faculty and/or space, a few departments within the college, such as Art, LAEP, and Sociology, Social Work and Anthropology, limit enrollment in their profes-

sional programs. See the departmental sections in this catalog and the department head for information regarding these limitations and/or requirements in addition to the University graduation requirements.

Undeclared

Coordinator: *Mary E. Leavitt*

Office in Student Center 302, (435) 797-3883

The chief function of the Undeclared program is the advisement of students who have not yet decided upon a major or area of specialization. Students in the Undeclared program typically work on their University Studies requirements while exploring major options. This allows them to make progress toward overall degree requirements and provides them with extra time to make wise, informed decisions. Undeclared students are advised by counselors in the Science/HASS Advising Center until they choose a major.

Students who are enrolled in another department but feel they have chosen their major unwisely may transfer to the Undeclared program upon receiving permission from the dean of the College of Humanities, Arts and Social Sciences.

No degree is offered through the Undeclared program. Most Undeclared students are freshmen or sophomores. Typically, by the junior year, most students have selected a major and are involved in taking major courses. Students do not usually remain in the Undeclared program beyond 60 credit hours or past the end of the sophomore year.

Women and Gender Studies

Co-directors: *Patricia Gantt*, Ray B. West 412A, (435) 797-2718,
Anne Shiffrer, Ray B. West 301C, (435) 797-2731

Women and Gender Studies at Utah State University is a multidisciplinary program focusing on the role of gender in the everyday experiences of women and men. Students are provided with opportunities to examine the diverse experiences, perspectives, and contributions of women in the past, present, and future, both nationally and internationally. Specific courses examine the processes of gender role socialization, and the resulting cultural beliefs and stereotyped images of women from a variety of disciplines. As a result, students gain appreciation for the role of gender and its practical implications in their basic life experiences, thus preparing them to understand current and future changes in the roles of women.

Each semester, Women and Gender Studies courses are taught by faculty members from several areas throughout the University, including Anthropology, Journalism and Communication, English, Fine Arts, Health and Physical Education, History, Natural Resources, Political Science, Psychology, Special Education, and Sociology. Throughout the year, several special topics courses are offered, and many courses also offer Honors and graduate sections. Internship hours are available for work related to women's issues. To meet student needs, new courses are continually developed and offered.

Students may enroll in individual courses or apply coursework toward either a minor in Women and Gender Studies or an Area Studies certificate.

Further information may be obtained from one of the co-directors or from the Science/HASS Advising Center (Student Center 302).

Mountain West Center for Regional Studies

Director: Carolyn Rhodes

Office in Main 303, (435) 797-3630

The Mountain West Center for Regional Studies gathers scholars, departments, and resources of Utah State University to facilitate an interdisciplinary approach to regional studies. The center is founded on three assumptions: that the humanities are essential to the fulfillment of the University's mission, that regional studies make possible a better understanding of the values and assumptions that shape society, and that such studies are strengthened by communication and cooperation among academic departments.

The center brings together scholars and students from history, folklife and folklore, anthropology, the fine arts, and literature. It develops programs, administers scholarships, and provides support for research on the Mountain West. It makes possible symposia, publication, interpretation, preservation, public outreach, and graduate student training in the humanities.

The cooperating programs of the center include American Studies, the David and Beatrice Evans Biography and Handcart Awards, the Fife Folklore Program and Archives, the Nora Eccles Harrison Museum of Art, the Ronald V. Jensen Living Historical Farm, the Merrill Library Special Collections, the Utah History Fair, the Utah State University Anthropology Museum, the Utah State University Press, *Western American Literature*, and the *Western Historical Quarterly*.

Science/HASS Advising Center

Director: Mary E. Leavitt

Assistant Director: Irene B. McInerney

Advisor: Lisa R. Hamblin

Advisor: Jill S. Hoffmann

Advisor: Sally B. Peterson

Advisor: Lynne M. Slade

Office in Student Center 302, (435) 797-3883

The Science/HASS Advising Center (SHAC) is a campus office designed to provide academic advising for students in the College of Science and the College of Humanities, Arts and So-

cial Sciences. Academic advisors counsel these students in the University Studies requirements.

Academic advising is provided through the center to all Liberal Arts and Sciences majors. Undeclared students also are advised in the center, with special emphasis on major exploration and career counseling.

Advising

College of HASS students receive advising concerning University and College of HASS policies and procedures, as well as in University Studies, the Liberal Arts and Sciences Program, graduation requirements and processes, and the USU Area Studies Certificate programs. In addition, students are advised concerning academic choices, low scholarship, and other problem resolution.

Academic Services

SHAC represents the dean in providing academic services to undergraduate students in the College of HASS. This includes requests for academic record changes and other documentation requiring the dean's signature. Coordination of academic problems, support, or referrals to other University services is also provided. Transcript evaluations, including international and transfer records, are made and approved in SHAC.

Graduation

All HASS graduation matters are processed through SHAC. Students should begin the graduation process *at least* one month prior to the graduation application deadline, and the application should be turned into SHAC *at least* two weeks prior to the deadline in order to avoid a \$10 late fee. A final review of University Studies (or other General Education programs) and other University graduation requirements will be made and the final approval signature added before the application is returned to the student for payment of the fee. If the student wishes to amend the application to substitute or drop courses that are listed on it, a Supplement Form must be submitted through SHAC.

The Area Studies Certificates are awarded at the time of graduation. Application for the certificate should be made through SHAC.

Liberal Arts and Sciences majors, Undeclared students, and all HASS students are welcome to explore the various services of the center.

Center for International Studies

Co-directors: R. Edward Glatfelter (HASS Dean's Office),

Main 333, (435) 797-1196; Yun Kim (on foreign assignment)

The Center for International Studies promotes and coordinates international academic exchanges between the University and institutions of higher education abroad. Major objectives of the center are: (1) to develop bilateral university linkage programs, (2) to facilitate faculty and student exchange programs, and (3) to promote collaborative research programs, joint seminars, workshops, and conferences. The center also serves as the University academic center for international studies curriculum offerings and the Certificate for International Development program.

Asian Studies Major and Minor

Program Co-directors: R. Edward Glatfelter
(HASS Dean's Office), Main 333, (435) 797-1196;
Jing Huang, Main 330C, (435) 797-0099

Major. To graduate with a BA degree in Asian Studies, students must complete a minimum of 27 credits approved by one of the Asian Studies program co-directors. The program must include a minimum of 9 credits selected from the Core Courses. Also, a minimum of 18 elective credits are required, which must include 8 credits chosen from the Asian Studies Electives, and 9 credits from the General Electives, selected after consultation with the Asian Studies program advisor. In addition to the core and elective courses, 16 credits of an Asian language are required for graduation.

Minor. For an Asian Studies Minor, students must complete a minimum of 9 credits selected from the Core Courses. Also, a minimum of 6 credits must be selected from the Asian Studies Electives. The remaining 9 credits must be chosen from the General Electives, after consultation with the Asian Studies program advisor. In addition, at least 8 credits of an Asian language are recommended.

Core Courses (required minimum of 9 credits): Art 5720, Hist 3460, Soc 4710 (Asian Societies), Econ 5400, Geog 4200 (when region covered is Asian), Phil 3710, PolS 3230, 4260, 4470.

Asian Studies Electives (minimum of 8 credits required for major): Hist 3480, Phil 4900 (when syllabus includes Asian philosophies), PolS 3250, 4220 (when syllabus includes Asian Conflicts), Soc 4730, Engl 3320 (when syllabus includes Asian literature).

General Electives. For a listing of general electives, consult the Asian Studies Major Requirement Sheet.

Asian Languages. For listings of Asian language courses, see the section for the Department of Languages and Philosophy in this catalog (pages 323-334).

British and Commonwealth Studies Minor

Program Coordinator: Nancy Warren (Department of English),
Ray B. West 301D, (435) 797-7100

The minor in British and Commonwealth Studies, sponsored jointly by the English and History departments, allows undergraduates to experience interdisciplinary study and broaden their international perspectives. Students engage in interdisciplinary study by doing extended work outside their home departments, while at the same time integrating their study around a single area. They enhance their international experience by deepening their knowledge of the British Isles and by expanding their knowledge of British culture through its contact with other world cultures in the imperial, Commonwealth, and post-colonial eras. This minor requires a minimum of 18 credits. The program selected must be approved by the coordinator of the British and Commonwealth

Studies Minor *at least one year prior to graduation*. Alternatives to this program are possible, but any alternative must be approved by the coordinator. **Courses used to fulfill requirements for the English or History majors may not** be used for the British and Commonwealth Studies minor.

All students must complete Engl/Hist 2040 (British and Commonwealth Cultures), and must then complete four courses from the following: Engl 2140, 2150, 3310, 4300, 4320; Hist 3510, 3720, 4210, 4250, 4390. Finally, they must take *either* Engl 5920 (Directed Study) or Hist 4930 (Directed Readings), in which they complete an individual project on a topic concerning Britain and/or the Commonwealth.

Minor in Classics

Coordination: Mark L. Damen, Susan O. Shapiro,
and Frances B. Titchener
Department of History, Main 323, (435) 797-1290

An academic minor is available in the field of **Classical Studies** with three areas of emphasis: **Classical Civilization**, **Latin Language**, and **Greek Language**. From the ancient civilizations of the Mediterranean area are derived our government, literature, sciences, and laws. The classical world is the backdrop of the modern world. In association with various majors, the Classics Minor is designed to enhance intellectual abilities and practical skills.

Requirements for the three emphasis areas are as follows:

Classical Civilization: At least 21 credits from an approved list of courses.

Latin Language: 7 credits in upper-division Latin (3000-level or above), plus 6 credits from an approved list of courses.

Greek Language: 7 credits in upper-division Greek (3000-level or above), plus 6 credits from an approved list of courses.

Approved courses for the various minors are listed in the brochure titled *Classical Studies*. Brochures are available from the Department of History, Main 323.

Minor in International Development

An academic minor is available in the field of International Development. Core courses consist of one specified course each from the Economics, Political Science, and Sociology course listings. Elective courses may be selected from a geographical area of interest or from a wide range of related fields. This minor is very flexible and is a useful preparatory tool for development work. Although a foreign language is not required for the minor, it is strongly recommended that a student who is seriously considering working abroad have capability in a foreign language.

Approved courses and academic advisors for the minor in International Development are listed in the brochure titled *Area Studies in International Development*. Courses must be approved by one of the co-directors of the Center for International Studies. For more information, contact R. Edward Glatfelter, Main 333, (435) 797-1196.

Nora Eccles Harrison Museum of Art

Director and Chief Curator: James M. Edwards,
(435) 797-0164

Education Curator: Victoria Rowe, (435) 797-0165

Staff Assistant: Linda L. Pierson, (435) 797-1414

Collections Manager and Registrar: Susanne L. Lambert,
(435) 797-0166

The Nora Eccles Harrison Museum of Art is the major center for the exhibition of the visual arts in northern Utah. Emphasizing the breadth of artistic expression and the history of art in the western United States, the Museum's permanent collections include Twentieth Century American sculpture, ceramics, paintings, graphic arts, photographs, and American Indian arts. Selections from the collection are always on view and are rotated periodically to reflect the continuing growth and refinement of the collection. In addition to installations of its permanent holdings, the Museum organizes temporary and traveling exhibitions and serves as a venue for exhibitions of national and international stature. Artist talks, films, docent tours, and educational activities are additional dimensions of the Museum's programs which are designed to interpret, present, and foster the development of the visual arts.

As a component of Utah State University, the Museum provides educational opportunities for undergraduate and graduate students pursuing professional careers in the museum field. Through on-the-job training, independent study, and internships, students participate in collections care and management, exhibition development, installation design, and educational programming. Research and publication are also integral parts of the Museum's educational offerings, and students, along with faculty and other scholars, pursue projects which are relevant to the permanent collections and exhibitions.

Named for its benefactor, the Nora Eccles Harrison Museum of Art was made possible through an insightful and generous gift from the Nora Eccles Treadwell Foundation. Designed by internationally acclaimed architect, Edward Larabee Barnes, the 20,000-square-foot structure includes offices, a workshop, library, storage facilities, and five exhibition galleries.

For more information, write or call: Nora Eccles Harrison Museum of Art, Utah State University, 4020 Old Main Hill, Logan UT 84322-4020, (435) 797-0163, FAX (435) 797-3423.

Humanities, Arts and Social Sciences Courses (HASS)

The College of Humanities, Arts and Social Sciences offers interdisciplinary courses which combine the humanities, arts, and social sciences and which are team taught, drawing faculty from among the departments of the college.

HASS 1250. Interdisciplinary Workshop. (1-5 cr) (F,Sp,Su) ®

HASS 2250. Introductory Internship/Co-op. Introductory-level educational work experience in an internship or cooperative education position approved by the department and/or the College of Humanities, Arts and Social Sciences. (1-5 cr) (F,Sp,Su) ®

HASS 4250. Advanced Internship/Co-op. Internship or cooperative education position of a more professional level, with increased complexity, approved by the department and/or the College of Humanities, Arts and Social Sciences. (1-15 cr) (F,Sp,Su) ®

HASS 4910. Study Abroad. A semester study abroad experience through a student exchange program. Prerequisite: Approval from the Study Abroad Office. (1-20 cr) (F,Sp,Su)

HASS 5250. Interdisciplinary Workshop. (1-5 cr) (F,Sp,Su) ®

HASS 6250. Graduate Internship/Co-op. Internship or cooperative education position approved by the department and/or the College of Humanities, Arts and Social Sciences. (1-15 cr) (F,Sp,Su) ®

HASS 6910. Study Abroad. A semester study abroad experience through a student exchange program. Prerequisite: Approval from the Study Abroad Office. (1-12 cr) (F,Sp,Su)

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

College of

Natural Resources

Dean: *F. E. "Fee" Busby*

Office in Natural Resources 108, (435) 797-2445

Associate Dean: *Raymond D. Dueser*

Academic Services Advisor: *Maureen A. Wagner*

FAX (435) 797-2443

E-mail nradvise@cc.usu.edu

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Notice: The College of Natural Resources has been reorganized, effective Fall 2002. Please be aware of changes to department names, course prefixes, and prerequisites, as well as new or deleted courses. The new departments, along with their course prefixes, are listed as: (1) *Aquatic, Watershed, and Earth Resources (AWER)*, (2) *Environment and Society (EnvS)*, and (3) *Forest, Range, and Wildlife Sciences (FRWS)*.

The College of Natural Resources has the following academic degree programs:

College of Natural Resources

Master of Natural Resources (MNR)

Aquatic, Watershed, and Earth Resources Department

Ecology (MS and PhD)

Fisheries and Wildlife (BS)

Fisheries Biology (MS and PhD)

Watershed Science (BS, MS, and PhD)

Environment and Society Department

Bioregional Planning (MS)

Environmental Studies (BS)

Geography (BS, BA, MS, and MA)

Recreation Resource Management (BS, MS, and PhD)

Forest, Range, and Wildlife Sciences Department

Ecology (MS and PhD)

Fisheries and Wildlife (BS)

Forestry (BS, MS, and PhD)

Rangeland Resources (BS)

Range Science (MS and PhD)

Wildlife Biology (MS and PhD)

A list of degree requirements, emphases, and specializations can be found in the catalog section for each department. For a description of the Master of Natural Resources (MNR) professional degree, see page 374.

Interdisciplinary Programs. Many of the degree programs listed above are interdisciplinary to some extent. However, both the Environmental Studies and Watershed Science programs offer students the opportunity to develop broad interdisciplinary programs to meet their interests. Watershed Science builds on a strong science base; Environmental Studies has a greater emphasis on management and policy.

Minors in Natural Resources. The college offers minors in the following areas:

Environmental Studies

Fisheries and Wildlife

Geography/Geography Teaching

Rangeland Resources

Recreation Resources

Watershed Science

Requirements for the minors are found in the appropriate departmental sections of this catalog. Students should also consult a faculty advisor for the minor.

Objectives

The College of Natural Resources provides programs of study and professional training in the use and management of natural resources and the environment. These programs deal with renewable land and water resources and the management of these resources and their ecosystems. Forests, rangelands, wildlife, fisheries, watersheds, and recreation resources comprise the natural resources and environmental areas in which the college has developed professional competence. The college's expertise in geography provides a link between the management of these resources and their value to our society and other cultures.

The College of Natural Resources programs and facilities provide exceptional opportunities for field experience. Forests and rangelands comprise more than 90 percent of the total Utah land area. The Wasatch-Cache National Forest and other areas of natural lands close to the USU campus provide unlimited study projects and opportunities for demonstration. Yellowstone and other national parks are within one day's driving distance.

Career Opportunities. The curricula of the college prepare men and women for positions with federal or state agencies, private-sector work in natural resources management and administration, and positions in education.

Summer Employment/Work Experience. Students are strongly encouraged to seek summer employment with faculty research projects or natural resource agencies to gain practical work experience and help refine career goals. Students should check with the College of Natural Resources dean's office in early January regarding summer employment opportunities.

Undergraduate Programs

Academic Policies

Admission. Freshmen accepted in good standing by the University are eligible for admission to the College of Natural Resources. Transfer students need a cumulative 2.5 GPA for admission to College of Natural Resources majors. Departments may impose additional requirements; refer to departmental sections for information.

Students will make more satisfactory progress in natural resources majors if they have had two years of high school algebra; have taken coursework in chemistry, physics, and biology; and have obtained basic computer skills. Four years of English are

also desirable. Prospective students should realize that natural resources fields are highly technical professions, requiring not just field ability, but also high aptitude for scholarship. Success is also correlated with an ability to work well with people.

Natural Resources—Undecided. Students who have not yet decided on a specific natural resources major may be admitted to the college as “undecided”. Many of the courses taken during the freshman year are common to all natural resources majors; however, students are encouraged to select a major as soon as possible. Students in the undecided category should meet with the college academic advisor for assistance in planning their educational program and selecting a major.

Changes in Graduation Requirements. Students who 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 at USU (or any revision of the University Studies requirements that has been in effect within seven years of their graduation) **and** (2) the major requirements in effect when they officially declared their major (or any revision of the major requirements that has been in effect within seven years of their graduation).

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.

Academic Responsibility. The departments publish current major requirement sheets each year. It is the student’s responsibility to know the current requirements and to consult with a faculty advisor in planning and completing his or her degree program.

Graduation Requirements. Students must satisfy all University, College of Natural Resources, and departmental major requirements for graduation. Except for the geography teaching major, college requirements include six core courses in natural resources science and management: Geog 1130 or Geol 1150, NR/Biol 2220, NR 3000, 3600, 4000; EnvS 2340. Students must also complete a series of basic lower-division courses, providing the disciplinary foundation for the natural resource and environmental professions, before advancing to professional coursework; foundation course requirements vary among the departments of the college. Equivalents of the foundation courses can be taken at many two- and four-year colleges. Some schools also offer versions of the lower-division core courses Geog 1130 and NR/Biol 2220. Students intending to transfer to a College of Natural Resources major should consult with a faculty advisor before registering for foundation courses at another school. Some foundation and core courses can be used to satisfy University Studies requirements. College requirements also include a grade point average of 2.5 or higher for all courses taught by the College of Natural Resources. Refer to the appropriate sections of this catalog for further details on graduation requirements.

Professional Organizations

Students are strongly encouraged to participate in professional organizations affiliated with their major. The College of Natural Resources has student chapters of the following professional societies:

American Fisheries Society
Gamma Theta Upsilon (Honorary Geography Society)
Society of American Foresters
Society for Range Management
The Wildlife Society

Financial Aid

Scholarships. A number of scholarships are available to students in the college. The S. J. and Jessie E. Quinney scholars program offers ten four-year, \$2,000 per year scholarships to entering and transfer undergraduate students in the College of Natural Resources. Interested high school seniors and transfer students are encouraged to write to the dean’s office regarding these scholarships.

There are also many \$250-\$2,500 per year scholarships for continuing students. For details, see the *Financial Aid and Scholarship Information* section of this catalog (pages 37-38) or contact the dean’s office.

Loan Funds. Several sources of funds are available on a loan basis to worthy upper-division students in the College of Natural Resources. Loans are made for short periods. Application should be made through the dean’s office.

Research

The College of Natural Resources maintains an extensive program of research through its academic departments and the affiliated Jack H. Berryman Institute, Center for Disturbance Ecology, USDA/APHIS Predator Behavior and Ecology Field Station, USDA Aquatic Ecosystem Monitoring Center, Utah Cooperative Fish and Wildlife Research Unit, and USU Ecology Center. Part-time employment opportunities are often available for undergraduates in college research programs.

Graduate Programs

The college offers graduate study programs leading to the MA, MNR, MS, and PhD degrees. See the appropriate departmental sections for information on their graduate programs.

Financial Assistance

Assistantships. Teaching or research assistantships are awarded through the departments. For further information, students should check with their department and major professor.

Fellowships. Fellowships and tuition waivers are awarded on a competitive basis. Incoming graduate students should apply through their major professor.

Loans. Short-term loans may be available to graduate students through the dean’s office.

Natural Resources Courses **(NR)**

NR 1010 (BSS). Humans and the Changing Global Environment. Introduction to historical nature and extent of human environmental transformation at global and regional levels. Examination of how socio-economic, political, and scientific factors influence past and current perceptions, use and conservation of natural environments in Western and other cultures, and future options available. (3 cr) (F,Sp)

NR 1020. Natural Resources Professional Orientation. Introduction and orientation to natural resource/environmental disciplines and related professional careers for natural resources majors. Education, curricula, faculty, professional societies, and employment opportunities. Taken in conjunction with NR 1010 during students’ initial fall semester. (1 cr) (F)

NR 2220. General Ecology. Study of the interrelationships among organisms, humans, 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 Biol 2220. (3 cr) (F,Sp)

NR 3000. Management of Natural Resources and the Environment. Addresses how people from diverse disciplines must integrate knowledge of biophysical, ecological, and socioeconomic processes to manage natural resources. Considers different approaches for managing the environment and emphasizes how diverse perspectives require interdisciplinary empathy, communication, and collaboration. Prerequisites: Geog 1130 or Geol 1150; Biol/NR 2220; and EnvS 2340. (4 cr) (F,Sp)

NR 3600 (QI). Quantitative Assessment for Natural Resources. Overview of methods used to collect, organize, and interpret natural resource data. Includes sampling principles for estimation of population parameters, attributes of geographical information systems, and hypothesis testing. Prerequisites: Stat 2000 or 3000; and Math 1050. Students must also receive a passing score on the Computer and Information Literacy (CIL) Exam *or* complete *both* FRWS 3500 and BIS 1400. (3 cr) (F,Sp)

NR 4000. Natural Resources Policy and Economics. Introduction to natural resource policy and economics. Policy components include models, processes, participants, laws, and tools for decision-making and policy implementation. Economics components include theory, interest calculations, financial analysis, nonmarket valuation, and regional impact analysis. (4 cr) (F,Sp)

NR 4440. Natural Resource and Environmental Policy Seminar. Year-long invited speaker seminar series on natural resource and environmental policy issues. Students register for only one semester, but attend the seminars until a required number has been met. Students also complete an assignment. (1 cr) (F,Sp) ®

NR 5000. Ecosystem Management. Project-based, capstone course for natural resources majors. Students work in interdisciplinary team to develop ecosystem management assessment for an actual landscape. Involves landscape scale planning and the integration of biological, physical, and human dimensions. Prerequisites: NR 4000 and senior standing. (3 cr) (Sp)

NR 6200.¹ How to Manage the NEPA Process and Write Effective NEPA Documents. Introduction to National Environmental Policy Act (NEPA) and the Council on Environmental Quality regulations. Explores various levels of NEPA documentation and the skills necessary to identify the actions needed for a thorough environmental analysis. (2 cr)

NR 6210.¹ Clear Writing for NEPA Specialists. Teaches how to identify the writing and editing requirements unique to NEPA documents, including making graphs, writing chapters, and reviewing documents for accuracy. (2 cr)

NR 6220.¹ Reviewing NEPA Documents. Focuses on how to review the full range of NEPA documents, including Environmental Impact Statements (EISs), Environmental Assessments (EAs), Findings of No Significant Impacts (FONISIs), and Records of Decisions (RODs). (2 cr)

NR 6230.¹ Risk Communication for NEPA Specialists: Strategies and Implementation. Explains meaning and application of risk communication. Explores full range of response communication, including development of a communication plan and strategy, standing before an audience, and responding to comments in writing. (2 cr)

NR 6260.¹ Cultural and Natural Resource Management. Teaches how to manage cultural and natural resources on public lands. Addresses pertinent laws and associ-

ated executive orders and regulations pertaining to the preservations of these resources and budget issues. (1 cr)

NR 6270.¹ Environmental Compliance Overview. Explores why environmental compliance is not only desirable and necessary, but is also a personal responsibility. Identifies key laws and regulations, with associated penalties affecting environmental compliance. (1 cr)

NR 6280.¹ Interdisciplinary Team Building. Teaches general principles of interdisciplinary team building. Explores how information flows and how this can impact the success of a team. Students work as a team to apply the principles learned to scenarios of day-to-day actions. (1 cr)

NR 6290.¹ Public Speaking for the NEPA Specialist. Explores how to design and deliver effective presentations to small and large groups, as well as to the media. Includes exercise techniques for planning and preparing presentations. Students required to prepare and deliver several types of presentations. (1 cr)

NR 6300.¹ Understanding and Preparing Statements of Work and Specifications. Presents a systematic approach to the writing and reviewing of environmental Statements of Works (SOWs). Providing hands-on experience, course includes case studies and examples applying to actual environmental projects. (1 cr)

NR 6310.¹ NEPA Writing for Technical Specialists. Designed to teach students how to use a "document management process" to become more efficient writers of NEPA documents. (1 cr)

NR 6370.¹ NEPA Capstone Experience. Consists of a project, internship, or comprehensive examination to be negotiated by the student, based upon opportunities available at the time and preferences of the student. Helps USU to certify that students receiving the certificate have basic mastery of the material presented in the program coursework. (1 cr)

NR 6420. Stegner Center Annual Symposium. Offered through the University of Utah College of Law. Topics vary each year, but always focus on natural resource policy-related issues. (1 cr) (Sp) ®

NR 6430. Natural Resource and Environmental Policy Cornerstone Seminar. Interdisciplinary, team-taught cornerstone course for the Natural Resource and Environmental Policy Graduate Certificate Program. Introduces different disciplinary perspectives for analyzing natural resource and environmental policies and decision-making processes. Helps students understand the role of science in policy-making and how to integrate information from contentious perspectives. (3 cr) (Sp)

NR 6440. Natural Resource and Environmental Policy Seminar. Year-long invited speaker seminar series on natural resource and environmental policy issues. Students are required to attend a minimum number of the seminars. Students also complete an assignment. This course is open to all USU students, but is required for NREPP students. (1 cr) (F,Sp) ®

NR 6450. Natural Resource and Environmental Policy Presentation. In their last year of graduate school, certificate candidates make a presentation on policy dimensions of thesis or dissertation, as part of this student seminar series. Students receive one semester credit for this presentation. (1 cr) (F,Sp)

¹This course, offered in a shortcourse format, is taught through Continuing Education outside of the regular semester calendar. For further information or to enroll, contact Continuing Education.

College of Science

Interim Dean: *Donald W. Fiesinger*

Office in Eccles Science Learning Center 245, (435) 797-2478

Associate Dean for Undergraduate Affairs:

Kandy D. Baumgardner

FAX (435) 797-3378

E-mail scido@cc.usu.edu

WWW <http://www.science.usu.edu>

The College of Science has the following departments and programs:

Biology
Chemistry and Biochemistry
Computer Science
Geology
Mathematics and Statistics
Physics
Cooperative Nursing Program
Liberal Arts and Sciences Program¹

Degrees, emphases, specializations, and program descriptions are listed with the departments and the Nursing Program. In addition, there is a Center for Atmospheric and Space Sciences (CASS) and three interdisciplinary programs which involve the college. There is a separate listing describing the activities of CASS on pages 467-468. The Interdepartmental Program in Molecular Biology consolidates and provides emphasis for research and teaching related to molecules in biological systems. Students in the college majoring in Biology or Biochemistry can receive graduate degrees with a molecular biology specialization. The Department of Biology participates in the Interdepartmental Graduate Program in Toxicology. This program offers research opportunities leading to MS and PhD degrees within several specialties of toxicology. The college also participates in an interdisciplinary, interdepartmental program in ecology which operates under the Ecology Center. The Ecology Center brings distinguished scientists to campus, fosters faculty research, and enhances graduate education in all areas of ecology.

Objectives

USU has always emphasized the sciences. Modern civilization is based on science, most facets of which are fundamental in a land-grant university.

Opportunities for rewarding careers are excellent in the fields of science. These opportunities exist in education, research, conservation, service, and industry.

The curricula of the science departments are designed to achieve five purposes:

First, they serve all students. No college graduate can be considered educated without an appreciation of scientific principles.

Second, the college trains teachers of science at all levels of education. Highly competent teachers are absolutely essential to the continued well-being and development of society.

Third, students are prepared to take positions in industry and business in a highly technological world.

Fourth, education is provided in the health fields both at the preprofessional and entry level. The college has excellent programs in pre dental and premedical education with an exceptional record of placing students in dental and medical schools. Undergraduate degrees in the various departments of the college can be tailored to include pre dental and premedical training. Other programs prepare graduates to enter the health profession directly upon graduation.

Fifth, the College of Science educates research scholars in many fields of science. This is accomplished by completing a sound undergraduate degree in the field, followed by years of graduate specialization.

Students planning to enter the sciences are urged to discuss their plans and goals early with advisors, who are available in each academic department. Basic coursework in mathematics, chemistry, physics, and computer science is essential to most areas of science.

Admission Requirements

Students accepted in good standing by the University are eligible for admission to all departments in the College of Science. Students majoring in Computer Science must qualify for advanced standing status on the basis of their academic performance. Specific details are given in the Computer Science section of this catalog (see page 197).

College of Science Core Requirements

Mathematics Requirement. All bachelor degree candidates in the College of Science must complete one year of calculus, consisting of Math 1210 and 1220. In some degrees or options within degrees, the second semester of calculus may be replaced by Stat 3000. The substitution will be for specific degree programs, and not by student choice.

Science Requirement. Every bachelor degree candidate in the College of Science must complete a year-long sequence outside of his or her major department. The approved sequences are: (1) Biol 1210, 1220; (2) Chem 1210, 1220; (3) Geol 1150, 3200; (4) Phyx 2110, 2120; and (5) Phyx 2210, 2220.

Science Major (Undeclared)

A beginning freshman student who wishes to major in science, but who has not selected a specific major, may register in the college as an Undeclared Science Major. A course of study will be developed that will attempt to maximize transfer into the various departmental majors in the college. Students in the Undeclared Science Major will be required to transfer to a departmental major after one year of study.

¹Jointly administered with the College of Humanities, Arts and Social Sciences.

Scholarships

Each year, the college offers a four-year scholarship to an outstanding freshman entering the University. The scholarship consists of up to 8 semesters of tuition waivers plus \$4,000 given over four years (\$1,000 per year). The scholarship is awarded on the basis of performance on a College of Science exam, ACT score, and grades received in high school. The College of Science Scholarship exam is given at the time of the University Club Scholars Competition. Other scholarships are available through some of the departments in the college (see pages 38-40).

Graduate Assistantships and Fellowships

Excellent graduate assistantships and fellowships are available in all departments. Assistantships are available both for teaching and research. Applications should be made directly to the department concerned. For more information, see the *Graduate Financial Assistance* section of this catalog (pages 71-72).

Graduate Programs

Graduate programs leading to the MS degree are available in each department in the college. In addition, the Department of Mathematics and Statistics offers a MMath (Master of Mathematics) degree. The departments of Biology, Chemistry and Biochemistry, Computer Science, Mathematics and Statistics, and Physics offer programs leading to the PhD degree. See the departmental sections in this catalog for more information on these programs.

Liberal Arts and Sciences Major

The College of Science, in cooperation with the College of Humanities, Arts and Social Sciences, sponsors a Liberal Arts and Sciences (LAS) Major. LAS promotes integrated learning across

the life sciences, humanities, physical sciences, arts, and social sciences. All USU students are welcome in LAS. The LAS Major is described on page 335.

Science/HASS Advising Center

The Science/HASS Advising Center is a campus office designed to provide academic advising for students in the College of Science and the College of Humanities, Arts and Social Sciences. Academic advisors counsel these students in the Area Studies Certificate in the Liberal Arts and Sciences Program (LASP).

Honors Program

Several departments in the college participate in the University Honors Program by offering special honors courses and by sponsoring an option for graduation with departmental honors.

Undergraduate Research

The sciences provide an ideal setting for research. Many departments within the College of Science provide opportunities for undergraduate students to participate in research activities. Interested students should discuss this option with their academic advisor.

Science Course (Sci)

Sci 4300. Science in Society. Investigation of interactions between current scientific topics and societal goals and concerns. Intended as a capstone course for science teaching majors. Prerequisite: Senior standing and consent of instructor. (2 cr) (F,Sp)