GENERAL CATALOG

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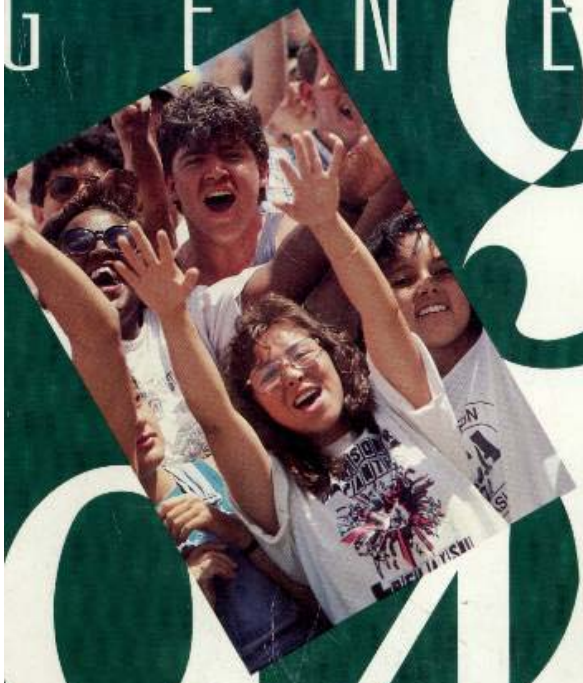

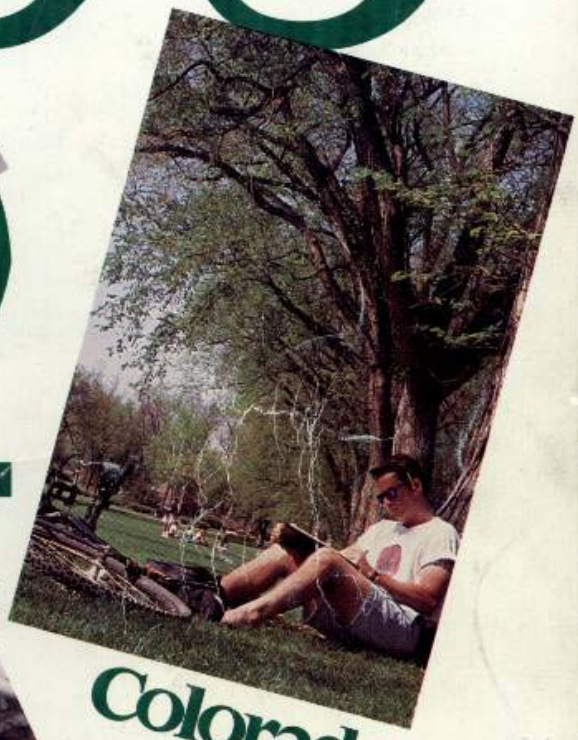

Colorado State University

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COLORADO STATE UNIVERSITY
1993-95

PRESIDENT'S MESSAGE

Welcome to Colorado State University!

This is an exciting time at our University- a time when we're renewing our commitment to undergraduate education and celebrating excellence in teaching and advising. Colorado State draws a diverse student body with a wide range of interests, ambitions, and life experiences. Our goal is to help all students pursue their individual dreams and realize their potential as educated citizens.

This catalog can provide insight into the breadth and depth of the educational offerings at our University. But descriptions of courses and majors only tell part of the story. The educational experience Colorado State offers involves mare than just what students learn in the classroom. It also involves a rich variety of academic, cultural, and research experiences that prepare students to confront the challenges of a complex and demanding world.

Colorado State is known worldwide for its first-rate research programs in such .fields as engineering, water resources, forestry, agricultural sciences, atmospheric sciences, veterinary medicine. and more. Such expertise generates outstanding opportunities for students to work with top scholars and gain hands-on experience in their fields.

One area of particular interest for many students is the diverse education Colorado State offers in environmental studies. Against the backdrop of the magnificent Rocky Mountains, students and faculty work together to understand and preserve our world's precious natural resources. While we offer some of the finest programs anywhere in forestry and natural resources, opportunities for students interested in the environment aren't limited to the sciences. At Colorado State. scientists work hand in hand with philosophers, writers. sociologists, political scientists. economists, and historians to provide students with a broad, well-rounded perspective on the world we inhabit.

This emphasis is in keeping with our University's philosophy of making vital connections. At Colorado State. faculty, staff, and students are committed to reaching out and making a difference in the lives of others. This spirit of making connections has always been a hallmark of our University. It was one of the reasons Colorado State was an ideal environment to help launch the Peace Corps in the early 1960s. It's one of the reasons our student volunteernetwork has been recognized as among the finest in the nation. And it's one of the reasons we welcome you to our University and encourage you to take advantage of all it has to offer.

Sincerely,

Albert C Yates President

DIRECTORY
Note: All numbers are in area code 303. The general telephone number for Colorado State is 491-1101.

Academic Computing and Networking Services	491-5133
Academic Vice President's Office	491-6614
Accounting and Taxation Department	491-5102
Accounts/Loans Receivable	491-6466
Activities Center	491-6626
Administrative Services Vice President's Office	491-5257

Admissions Office	491-6909
Aerospace Studies Department	491-6476
Agricultural and Chemical Engineering Department	491-5252
Agricultural and Resource Economics Department	491-6325
Agricultural Experiment Station	491-5371
Agricultural Sciences College	491-6272
Agronomy Department	491-6517
Alumni Relations	491-6533
Anatomy and Neurobiology Department	491-5847
Animal Sciences Department	491-6672
Anthropology Department	491-5447
Applied Human Sciences College	491-6331
Art Department	491-6774/6775
ASCSU (Associated Students of Colorado State University)	491-5931
Asian American Students' Services	491-6154
Asian Interdisciplinary Studies Program	491-1714
Athletics, Intercollegiate	491-5300
Atmospheric Science Department	491-8360
Biochemistry Department	491-5602
Biology Department	491-0649
Biotechnology Interdisciplinary Studies Program	491-7051
Black Student Services	491-5781
Bookstore	491-0546
Business College	491-6471
Career Development Program	491-1756/0506
Career Services Center	491-5707
Cashier's Office	491-6413
Cell and Molecular Biology Program	491-0241
Chemistry Department	491-6381
Civil Engineering Department	491-5048
Clinical Sciences Department	491-1274
Colorado Cooperative Fish and Wildfire Research Unit	491-5396
Colorado Institute for Irrigation Management	491-2868
Colorado State Forest Service	491-6303
Colorado Water Resources Research Institute	491-6308
Communication Disorders Department	491-6981
Computer Information Systems Department	491-6203
Computer Science Department	491-5792
Conference Services	491-6222
Conservation Biology Interdisciplinary Studies Program	491-6714/5502
Continuing Education Division	491-5288
Cooperative Extension	491-6281
Cooperative Institute for Research in the Atmosphere	491-8448
Counseling Center, University	491-6053
Criminal Justice Interdisciplinary Studies Program	491-5421
Degree Requirements	491-7159
Design, Merchandising, and Consumer Sciences Department	491-1629
Disabled Students Resources	491-6385
Earth Resources Department	491-5661
Ecology Interdisciplinary Studies Program	491-6817
Economics Department	491-6324
Electrical Engineering Department	491-6600
Employment Services, Student	491-5714
Engineering College	491-6603
English Department	491-6428
Entomology Department	491-7860
Environmental Health Department	491-7038
Equal Opportunity Office	491-5836
Exercise and Sport Science Department	491-5081
Exercise Science and Nutrition Interdisciplinary Studies Program	491-5081/5093

Facilities	491-0099
Finance and Real Estate Department	491-5062
Financial Aid Office	491-6321
Fishery and Wildlife Biology Department	491-6930
Food Science and Human Nutrition Department	491-5093
Forest Sciences Department	491-6911
Gerontology Interdisciplinary Studies Program	491-7975
Graduate School	491-6817
Graduation Requirements	491-7159
Health Service, University	491-7121
HELP/Success Center	491-7095/0525
Hispanic Student Services/El Centro	491-5722
Hispano-American Interdisciplinary Studies Program	491-1477
History Department	491-6335
Honors Program	491-5679
Horticulture Department	491-7019
Housing and Food Services	491-6511
Human Development and Family Studies Department	491-5558
Immunization	491-6548
Industrial Sciences Department	491-7353
Information Systems	491-5491
Instructional Services	491-1325
Insurance, Student Health	491-5118
International Programs	491-6817
Education & Training/Student Services	491-5917
Research and Development	491-7223
Journalism Department, Technical	491-6310
KCSU	491-7611
Languages and Literatures Department, Foreign	491-6141
Latin American Interdisciplinary Studies Program	491-7428
Legal Services, Student	491-1482
Liberal Arts College	491-5421
Libraries, University	491-1841
Management Department	491-5323
Marketing Department	491-5063
Mathematics Department	491-6327
Mechanical Engineering Department	491-6558
Microbiology Department	491-1815
Military Science Department	491-6506
Music, Theatre, and Dance Department	491-5529
National Computer Center	498-1500
Native American Student Services	491-1332
Natural Resources College	491-6675
Natural Sciences College	491-1300
Neuronal Growth and Development Program	491-0425
Nontraditional Student Office	491-5288
Occupational and Educational Studies School	491-6316
Occupational Therapy Department	491-6253
Ombudsman, University	491-7165
Orientation/PREVIEW	491-6011
Parking Management Office	491-7041
Pathology Department	491-6144
Philosophy Department	491-6315
Physics Department	491-6206
Physiology Department	491-6187
Plant Pathology and Weed Science Department	491-5261
Political Science Department	491-5156
President's Office	491-6211
Provost/Academic Vice President's Office	491-6614
Psychology Department	491-6363
Radiological Health Sciences Department	491-5222

Range Science Department	491-6677
Records, Student	491-7148
Recreation Center	491-6359
Recreation Resources Department	491-6591
Registration	491-7148
Religious Interdisciplinary Studies Program	491-5421
Research Vice President's Office	491-7194
Residency Requirements	491-7168
Rocky Mountain Forest and Range Experiment Station	498-1100
Russian and East Central European Interdisciplinary Studies Program	491-5369
Scholastic Standards	491-0525/7095
Social Work Department	491-6612
Sociology Department	491-6044
Speech Communication Department	491-6140
Sports Intramural	491-6671
Sports Recreational	491-6359
State Board of Agriculture	491-7707
Statistics Department	491-7277
Student Affairs Vice President's Office	491-5312
Student Center, Charles A. Lory	491-6395
Summer Session	491-5288
Testing Service, University	491-6498
Transcripts	491-7148
Transfer Evaluation	491-7147
University Advancement Vice President's Office	491-7530
Veterans Educational Benefits Office	491-6731
Veterinary Medicine and Biomedical Sciences College	491-7051
Women's Programs and Studies	491-6384
Youth Agency Administration Interdisciplinary Studies Program	491-6365

UNIVERSITY CALENDAR

Fall Semester- 1993

August 18	Wednesday. Orientation
August 19-20	Thursday, Friday. Advising and registration for new students. Late registration fee assessed beginning Monday, August 23
August 23	Monday. Classes begin
August 26	Thursday. End of limited drop period
August 29	Sunday. Registration closes. End of initial schedule change period for adding some courses
September 7	Tuesday. End of extended schedule change period for adding all courses. Last day for dropping courses without record entry, changes in grading options, and tuition and fee adjustments
October 17	Sunday. Last day for dropping courses
November 20	Saturday. Fall recess begins; no classes next week
November 24-28	Wednesday through Sunday. Holiday - University offices closed
November 29	Monday. Classes resume
December 10	Friday. Classes end
December 13-17	Monday through Friday. Final examinations
December 17-18	Friday, Saturday. Commencement ceremonies
December 22-26	Wednesday through Sunday. Holiday - University offices closed

Spring Semester- 1994

December 31	Friday. Holiday - University offices closed
January 12	Wednesday. Orientation
January 13-14	Thursday, Friday. Advising and registration for new students. Late registration fee assessed beginning Tuesday, January 18
January 17	Monday. Holiday - University offices closed
January 18	Tuesday. Classes begin
January 23	Sunday. End of limited drop period. Registration closes
January 24	Monday. End of initial schedule change period for adding some courses
February 2	Wednesday. End of extended schedule change period for adding all courses. Last day for dropping courses without record entry, changes in grading options, and tuition and fee adjustments
March 12	Saturday. Spring recess begins
March 21	Monday. Classes resume. Last day for dropping courses
May 6	Friday. Classes end
May 9-13	Monday through Friday. Final examinations
May 13-14	Friday, Saturday. Commencement ceremonies

Summer Session - 1994

May 16	Monday. 4- and 12-week terms begin
June 10	Friday. 4-week term ends
June 13	Monday. 8-week term begins
July 4	Monday. Holiday - University offices closed
August 5	Friday. Last day of classes

Fall Semester- 1994

August 17	Wednesday. Orientation
August 18-19	Thursday, Friday. Advising and registration for new students. Late registration fee assessed beginning Monday, August 22
August 22	Monday. Classes begin
August 28	Sunday. Registration closes
November 19	Saturday. Fall recess begins; no classes next week
November 23-27	Wednesday through Sunday. Holiday - University offices closed
November 28	Monday. Classes resume
December 9	Friday. Classes end
December 12-16	Monday through Friday. Final examinations
December 16-17	Friday, Saturday. Commencement ceremonies

December 26-28	Monday through Wednesday. Holiday - University offices closed

Spring Semester - 1995

January 2	Monday. Holiday - University offices closed
January 11	Wednesday. Orientation
January 12-13	Thursday, Friday. Advising and registration for new students. Late registration fee assessed beginning Tuesday, January 17
January 16	Monday. Holiday - University offices closed
January 17	Tuesday. Classes begin
January 22	Sunday. Registration closes
March 11	Saturday. Spring recess begins
March 20	Monday. Classes resume
May 5	Friday. Classes end
May 8-12	Monday through Friday. Final examinations
May 12-13	Friday, Saturday. Commencement ceremonies

Summer Session - 1995

May 15	Monday. 4- and 12-week terms begin
June 9	Friday. 4-week term ends
June 12	Monday. 8-week term begins
July 4	Tuesday. Holiday - University offices closed
August 4	Friday. Last day of classes

THE UNIVERSITY

THE MISSION OF COLORADO STATE UNIVERSITY

In 1870 the Territorial Council and House of Representatives of the Territory of Colorado created the Agricultural College of Colorado. When the Territory became a State in 1876, the College was placed under the governance of the State Board of Agriculture. The College admitted its first students in 1879 and received designation that same year as Colorado's land-grant college under the Morrill Act of 1862. The Morrill Act provided federal endowment support for state institutions, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.

Subsequent federal legislation led to the establishment of an agricultural experiment station and extension service, while state legislation added responsibility for the Colorado State Forest Service. Following several name changes, the College became Colorado State University in 1957 and earned recognition by the North Central Association of Colleges and Schools as a mature university in 1974.

Colorado State University has a unique mission in the state of Colorado. The land-grant concept of a balanced program of teaching, research, extension, and public service provides the foundation for the University teaching and research programs, Agricultural Experiment Station,. Cooperative Extension, and Colorado State Forest Service. The University has long been a. leader in recognizing the rapidly changing global environment, and has a commitment to excellence in international education in all its instructional, research, and outreach programs. The University continues to make education and training accessible to deserving applicants from all classes and groups, and maintains a wide range of research, extension, and public service programs in response to the needs of the people of Colorado, the nation, and the world.

PURPOSE OF COLORADO STATE UNIVERSITY

Colorado State University shares with all universities the commitment to search for truth and understanding, to enhance and extend knowledge, to preserve and transmit the intellectual content of the culture, and to educate people for critical thought. In pursuance of these purposes, the University strives for excellence in all its endeavors. Education at Colorado State University encompasses the major areas of human knowledge - the sciences, the arts, the humanities, and the professions.

The University has a historic reputation of excellence in the full range of instructional programs from the baccalaureate to the postgraduate level. Graduate and professional programs are intrinsic to the purposes of the University and, as essential components of a comprehensive, research-oriented university, the undergraduate programs provide the foundation for the University and benefit by direct access to the new knowledge created through research. In the land-grant tradition, the University emphasizes instruction and research in professional areas important to the state and nation. The University recognizes the increasing interdependence of all peoples and cultures of the world, and the important implications such interdependence holds for succeeding generations. Finally, the University accepts the concept of learning as a lifelong activity, which occurs in a variety of settings, and structures its educational programs accordingly.

The educational philosophy at Colorado State University recognizes and respects people as individuals and as members of social groups. Because of this philosophical commitment, the University maintains programs to contribute to interpersonal, intercultural, and international understanding. By accommodating individual differences, the University seeks to maximize personal growth and development. Thus, the range and variety of educational offerings and experiences at once reflect the needs, interests, and aspirations of learners from disparate backgrounds; the curricular requirements of the general, graduate, and professional programs; the mission of the University; and 'the competencies of the resident faculty. Of equal importance, education at Colorado State University emphasizes consideration of values, for knowledge without values leaves the learner ill-equipped to make critical choices in life.

Responsibility for achieving the fundamental purposes of higher education rests with the community of scholars within the University. Accordingly. the University provides the services, environment, materials, and facilities to enable the faculty and students to discover, examine critically, preserve, and disseminate the knowledge and wisdom needed to help improve the quality of life for present and future generations.

To these ends, Colorado State University has articulated four primary goals: The discovery. dissemination, application, and preservation of knowledge within designated subject-matter areas.

Goals of Colorado State University

Goals provide a frame of reference for the entire University. Within this frame of reference. the University develops and implements the plans, programs, policies. and procedures calculated to assure the achievement of its goals. The four primary goals of Colorado State University are:

I. *Discovery of Knowledge* - The University will continue to encourage faculty members to engage in, and to prepare students for, scholarly endeavors, creative activities. and basic and applied research consistent with their individual interests, the institutional mission, and the needs of society.

II. *Dissemination of Knowledge* - The University will continue to provide learning experiences for all students and selected audiences, on and away from campus, to enable them to synthesize knowledge, think critically, communicate effectively, use knowledge and technology intelligently and responsibly, and act creatively within their own and other cultures.

III. *Application of Knowledge* -The University will continue to accept its responsibility to serve the needs of the people of Colorado, the nation, and the world by developing and applying new and tested knowledge and technology to identified problems, and by providing the leadership and professional assistance required for effective implementation of responsive programs.

IV. *Presentation of Knowledge -The* University will continue to recognize and act upon its responsibility to preserve the heritage of culture. knowledge, and natural and cultural resources for posterity.

Objectives of Colorado State University

As guides to action in the pursuit of the fundamental purposes and primary goals of the University, objectives facilitate the development and implementation of planned and responsive activities. Thus, clear and definite statements of objectives contain and reflect the intentions and aspirations of the University and outline the means and methods to achieve the four primary goals.

I. *Instructional Objectives* - The University will continue to encourage instructional development to maintain an atmosphere conducive to learning.

II. *Creativity Objectives* - The University will continue to encourage faculty, staff, and students to develop. evaluate, and apply innovative approaches in carrying out their activities.

III. *Change Objectives-The* University will continue to seek to anticipate and identify emerging societal needs, to analyze these needs critically, and to develop educational programs responsive to these needs.

IV. *Student Relations Objectives* - The University will continue to encourage the individual growth and development of students.

V. Human Resources Objectives - The University will continue to stress the wise and prudent nurture of available human resources through professional development and appropriate personal advancement.

VI. *Support Objectives* - The University will continue to provide the facilities and services necessary to fulfill the institutional mission.

VII. *Organization and Administration Objectives* - The University will continue to strive to create and maintain an environment of conditions, circumstances, relationships, and facilities that faculty members, professional employees, staff members, and students perceive as facilitative and supportive of the effort to assure the fulfillment of the institutional mission.

VIII. *Institutional Objectives - The University will* continue to strive to marshall its resources toward the fulfillment of its purposes and the attainment of its goals.

IX. *Evaluation Objective* - The University will continue to conduct systematic evaluations of progress toward the attainment of institutional, unit. and personal goals.

NONDISCRIMINATION POLICY

Colorado State University does not discriminate on the basis of race, age. color, religion, national origin, gender, sexual orientation, veteran status or disability, or handicap. The University complies with the Civil Rights Act of 1964, related Executive Orders 11246 and 11375, Title IX of the Education Amendments Act of 1972, Sections 503 and 504 of the Rehabilitation Act of 1973, Section 402 of the Vietnam Era Veteran's Readjustment Act of 1974, the Age Discrimination in Employment Act of 1967, as amended, Civil Rights Act of 1991, and all civil rights laws of the state of Colorado. Accordingly, equal opportunity for employment and admission shall be extended to all persons and the University shall promote equal opportunity and treatment through a positive and continuing affirmative action program. The Office of Equal Opportunity is located in Room 21. Spruce Hall. In order to assist Colorado State University in meeting its affirmative action responsibilities, ethnic minorities, women, and other protected class members are encouraged to apply and to so identify themselves.

Admission of students, employment, and availability and access to Colorado State programs and activities are made in accordance with these policies of nondiscrimination. Off-campus householders who desire to list student accommodations with the University must certify that they will comply with the University's policy on nondiscrimination in student housing.

Any student or University employee who encounters acts of discrimination because of age, race, religion, color, gender, sexual orientation, national origin, veteran status, or handicap either on or off campus is urged to report such incident to the Conciliation Office of Colorado State University, located in Room 21, Spruce Hall. Forms may be obtained at the Conciliation Office, and completed reports may be hand delivered or forwarded to the Conciliation Officer, Office of Equal Opportunity, Room 21, Spruce Hall. Any person who wishes to discuss a possible discriminatory act without filling out a complaint form is welcome to do so.

Any of the above discriminatory acts can also be the subject of complaints to the Department of Education, Office of Civil Rights as well as to the Office of Federal Contract Compliance Programs, Equal Employment Opportunity Commission, and the Colorado Civil Rights Commission; information on filing complaints with any of these agencies is available in the Conciliation Office.

PERSONAL ABUSE POLICY

Abusive treatment of individuals on a personal or stereotyped basis prevents the attainment of the University objective to create and maintain a work and study environment for faculty, staff, and students that is fair, humane, and responsible - an environment which supports, nurtures, and encourages people to excel on the basis of such relevant considerations as ability, performance, dedication, and diligence. As a special form of personal and stereotyped abuse, sexual harassment includes behavior ranging from unthinking and often unintentional denigration of a person, class, or group on the basis of unsubstantiated stereotyping to actual assault. The University deplores, condemns, and will act energetically to prevent all forms of such abuse.

To assure the fulfillment of this University objective, faculty, staff, and students assist in the prevention of all forms of personal abuse. Administrators and faculty have a heavier responsibility in this regard because of the roles they play in the creation and maintenance of a campus environment conducive to teaching, learning, and creativity.

Incidents of personal abuse, including sexual harassment, should be brought immediately to the attention of the person(s) responsible for the event or activity during which the incidents occur. Such individuals include student leaders, teaching assistants, professors, department heads, deans, and/or other administrators. Those who for personal reasons choose not to mention the incidents to the persons having such responsibility are urged to discuss the incidents with the Director of Personnel, Dean of the Graduate School, Vice President for Student Affairs, Office of Equal Opportunity Staff, Provost/Academic Vice President, or President. These reports will be handled in a confidential and responsible manner, with appropriate action taken.

COLORADO STATE UNIVERSITY SYSTEM

Colorado State University is the largest of the three institutional members of the Colorado State University System. Administered by the Chancellor, the System promotes collaborative academic programs and related activities between and among Colorado State University, Fort Lewis College, and the University of Southern Colorado. Governed by the State Board of Agriculture, System administrative offices are located on the Fort Collins campus and in Denver.

STATE BOARD OF AGRICULTURE

Colorado State is governed by the State Board of Agriculture, which is also the controlling body for the Agricultural Experiment Station, Cooperative Extension, Colorado State Forest Service, Colorado Water Resources Research Institute, the University of Southern Colorado at Pueblo. and Fort Lewis College at Durango. The Board consists of nine members appointed by the Governor and confirmed by the Senate for four-year terms. In addition, the president of the Associated Students and an elected representative of the faculty from Fort Lewis College. the University of Southern Colorado, and Colorado State University serve as nonvoting members.

ACCREDITATION

Colorado State is accredited by:
North Central Association of Colleges and Schools Mature Status
Accrediting Board for Engineering and Technology
Accrediting Council on Education in Journalism and Mass Communication
American Assembly of Collegiate Schools of Business
American Chemical Society
American Council for Construction Education
American Medical Association
American Occupational Therapy Association
American Psychological Association
American Society of Landscape Architects
American Speech-Language-Hearing Association
American Veterinary Medical Association
Association for Marriage and Family Therapy
Council on Social Work Education
Foundation of Interior Design, Education, and Research
National Accreditation Council for Undergraduate and Graduate Curricula in Environmental Health
National Association of Industrial Technology
National Association of Schools of Music
National Council for Accreditation of Teacher Education
Society for Range Management Society of American Foresters

Colorado State is approved by the Colorado State Department of Education for training teachers.

Women graduates are eligible for membership in the American Association of University Women.

WESTERN INTERSTATE COMMISSION FOR HIGHER EDUCATION

Colorado State participates in a regional program with western states for undergraduate education in agriculture, natural resources, occupational therapy, and several graduate programs including veterinary medicine. Under this plan, WICHE states secure places for qualified students seeking admission and pay a proportionate share of the educational costs.

Students must write their states' WICHE certifying officer for application forms. State eligibility requirements vary, and the number of students from each state depends upon appropriations by the state legislatures. For addresses of state certifying officers, write the Western Interstate Commission for Higher Education, University East Campus, 30th Street, Boulder, Colorado 80302.

Additional information may be found in this catalog under program sections.

FACILITIES

Office in Facilities Services Center, North
Ronald A. Baker, Director, Facilities Development
Thomas M. Grip, Director, Facilities Operations

The Main Campus

Situated within the city of Fort Collins, the 666-acre Main Campus is virtually a city within itself. Included among its nearly 100 buildings are administrative offices and facilities, classroom buildings, laboratories, residence halls, library, student activity and recreational facilities, bookstore, cafeterias, and theaters.

Among the recently completed facilities on the central area of the Main Campus are the Painter Center for Laboratory Animals, a sophisticated facility for housing laboratory animals, the Molecular and Radiological Biosciences Building, and the Student Recreation Center.

The south area of the Main Campus contains the Veterinary Teaching Hospital, a facility designed to consolidate teaching and research programs in the clinical sciences. The west area of the Main Campus takes in married student housing and the Alumni Center.

Other Campuses and Facilities

The Foothills Campus, a 1,703-acre area located two miles west of the Main Campus, includes the biological sciences laboratories, Engineering Research Center, radiology laboratories, Surgical-Metabolic Laboratory, Animal Reproduction Laboratories, atmospheric science laboratories, Center for Disease Control, and the Colorado State Forest Service Nursery.' A recent addition to the Foothills Campus is the Equine Center which supports the new equine science program. Many graduate and some undergraduate students are involved in research projects conducted at this campus.

Fifty-five miles west of the .Main Campus, in the Rocky Mountains, is Pingree Park campus. This 1.192-acre area bordering Rocky Mountain National Park is used primarily for summer educational and research programs in forestry. engineering. and biological sciences.

Located southeast of the Main Campus is the 247-acre South Agriculture Campus. which supports instructional and research programs in agronomy and animal sciences. and the 163-acre Nature Center. The North Agriculture Campus encompasses an additional 489 acres.

In addition to the four campuses. Colorado State operates 11 research centers statewide to conduct research and experiments in various scientific fields.

UNIVERSITY LIBRARIES

Office in Morgan Library. Room 103
Joan Chambers, Director
The University Libraries support the teaching and research activities of the University's students and faculty by providing a diverse collection and offering a wide array of user assistance programs.

These services include a library instruction program ranging from library orientation to detailed sessions on creating bibliographies in the subject disciplines; three reference and information assistance desks; and both self-service and mediated online database search services; quiet and group study areas; photocopy services; and equipment to assist physically disabled library users. There is also an interlibrary lending service which obtains needed material from other libraries statewide and nationally if such resources are not available locally.

The collections, totaling over three million items. are housed in four facilities. The William E. Morgan Library is the central building housing the principal portion of the collection. including books. maps. journals. state and federal government documents. microforms, newspapers. nonprint materials. manuscripts. and special collections. In addition to the Morgan Library. there are three branch libraries serving the Atmospheric Sciences. Engineering Research, and the Veterinary Teaching Hospital. Lesser used materials are housed in a library storage depository located on Lake Street; materials are paged daily.

Access to library collections is enhanced by CARL. a library automation system which provides an online catalog of library holdings. online circulation services. periodical/serials information. and access to the holdings of other libraries.

The University Libraries is a member of the Association of Research Libraries and the Research Libraries Group. These memberships enable the Libraries to participate in preservation. resource sharing, and collection development programs on a national scale.

COLORADO STATE ALUMNI ASSOCIATION

Office in Alumni Center. 645 S. Shields

The Colorado State Alumni Association has been active since 1884 when it was organized by the first graduating class.

The purpose of the Association is to promote the interests of the University and to establish and maintain a mutually beneficial relationship between the University and its alumni. The Association believes an informed. interested. and involved alumni body is one of the University's most valuable assets.

The Association provides many programs and services for alumni, faculty. and students including the Alumni Advocates Program. the Distinguished Awards Program. Student Alumni Connection. alumni travel. class reunions. alumni chapter activities. credit programs. financial programs. and special events.

The *Alumnus* magazine is published by Colorado State University in cooperation with the Association.

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Michelle McKim	Executive Director
Debra McCune	Director
Frank Pierz	Director
Lisa Jacobs	Assistant Director
Margo Allmaras	Senior Secretary
Connie Parks	Senior Secretary
Susan Cuckler	Secretary
Dodie Jorgensen	Secretary

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UNDERGRADUATE ADMISSIONS POLICY AND PROCEDURES

Admissions Office in Administration Annex Mary Ontiveros, Director of Admissions

All correspondence about undergraduate admissions should be addressed to the Office of Admissions, Colorado State University, Fort Collins, Colorado 80523. Students interested in graduate admissions should request a copy of the Graduate and Professional Bulletin.

Colorado State University's admissions evaluation process is designed to promote diversity within the student population and to assure equal opportunities to all applicants. The quality of the educational experience provided to all students at Colorado State University depends in part on the maintenance of diversity within the student population. The final admissions decision is based on a student's potential for attaining a degree at Colorado State University, and takes into account the student's past academic performance, test scores, leadership qualities, high school and community service, principal/counselor/ teacher recommendations, geographic residence, and ethnic/racial background. Because the University receives more applications than it can honor, and because of the commitment to diversity as an important educational objective, the admissions evaluation process and the admissions decisions reflect and rest upon this range of factors. The University does not set quotas for members of particular groupings or for people possessing particular characteristics. However, to assure and increase the diversity of the students admitted, the University establishes and seeks to implement recruitment goals that provide guidelines for affirmative action to locate and identify a pool of qualified applicants.

Students who knowingly falsify transcripts or test scores, or who fail to indicate all previously attended institutions will be denied admission to the University.

REQUIREMENTS AND PROCEDURES

Admission requirements set forth in the following sections are minimum requirements that may be subject to change after a General Catalog has been printed. The State Board of Agriculture, Colorado State's governing board, reserves the right to deviate from published admission requirements. In such cases, changes in admission policy will be publicized.

Consult individual college sections for additional admission information.

Selective Service Registration

In compliance with Colorado House Bill 1021, Selective Service registration is required of male United States citizens who wish to enroll at Colorado institutions of higher education. Individuals providing false information are subject to penalty of law and disenrollment.

Application Deadlines

The application deadline is July 1 for fall semester and December 15 for spring semester. All applications received in the Office of Admissions will be processed for the term requested. However, admission for any term may close whenever the University meets its enrollment limit. Applicants are encouraged to submit a complete application and all academic credentials as early as possible. Applications are processed up to 14 months before the requested date of entrance.

Social Security Number

All students are requested to submit their social security number. International students are encouraged to file for a social security number although they are not eligible for social security benefits. The social security number is used as a student identifier in maintaining academic and financial records. This number is included on the student's photo identification card which may be solicited in connection with various University-related activities and services, and is used for posting grades. Students' disclosure of their social security number is voluntary.

The student social security number is only released to agencies or individuals outside the University at the request of the student or in accordance with federal and state requirements in regard to financial aid awards, Internal Revenue Service for student employee salary reporting, and State Controller's debt collection procedure.

Immunization Policy

See University Health Service in the Student Programs and Services section in this catalog for immunization requirements.

For High School Graduates

Colorado high school seniors applying for admission should obtain their application from the high school counselor. Out-of-state students should write the Office of Admissions, Colorado State University, Fort Collins, CO 80523 for an application. A $30 processing fee must accompany the admission application. This fee is not refunded if admission is denied and is not applicable to tuition and fees if the student enrolls. Make payable to Colorado State University a check or money order on which is indicated the applicant's full, legal name.

Colorado State University selects for admission students who appear to be best qualified to benefit from and contribute to the educational environment of the University. All applications are carefully and individually reviewed. Those students accepted without condition usually meet the admission standards for first-time freshmen as defined by the Colorado Commission on Higher Education.

Minimum admission requirements are as follows:

1. Completion of high school requirements.

2. Submission of scores from the American College Testing Program (ACT) or the Scholastic Aptitude Test (SAT) of The College Board. Tests may be taken during the junior or senior year in high school. Arrangements for tests and transmittal of scores to Colorado State should be made with the high school counselor or with the nearest office of the American College Testing Program, P.O. Box 168, Iowa City, IA 52240, or The College Board, P.O. Box 592; Princeton, NJ 08540.

   Many students are admitted during their senior year. In such cases, admission is subject to completion of all entrance requirements and high school graduation.

3. Satisfactory completion of 18 high school units of which 15 are academic units during grades 9 12. Of these 15 academic units, 12 of them must include: a) four units of comprehensive instruction of high school English including reading, composition, grammar, literature, and speech; b) five units of social science and natural science with a minimum of two from each; and c) three units of mathematics, including one unit of algebra and one unit of geometry.

   It is highly recommended that two units of foreign language be taken and that at least one unit of natural science include laboratory work.

   It should be noted that additional requirements may be stated by individual colleges. For example, the College of Engineering requires two units of algebra, one unit of geometry, one-half unit of trigonometry, and one unit of chemistry.

In special cases, students otherwise well-qualified, but not meeting the requirements, are considered for admission on a case-by-case basis.

For Non-High School Graduates

An individual 18 years or older who has not graduated from high school may be considered for admission. The application for admission must be accompanied by a $30 nonrefundable processing fee and a transcript showing completed high school courses. An applicant must also submit scores from the General Educational Development (GED) Test, and scores from either the Scholastic Aptitude Test (SAT) of The College Board or the American College Testing Program (ACT) may be required. The admission decision is based on the student's academic potential for attaining a degree at Colorado State. An interview may be required.

For Transfer Students

Undergraduate students who wish to transfer to Colorado State should request an application from the Office of Admissions. The completed application should be returned with a $30 nonrefundable processing fee. Applicants must also submit official transcripts covering all work taken from each

university or college attended. No part of the previous collegiate record may be disregarded. *Failure to list all institutions previously attended is a serious offense that will cancel admission or enrollment.* Transfer students currently registered at another institution must submit a list of courses for which they are presently enrolled, and in which they will enroll prior to entering Colorado State.

Students thinking about transferring to Colorado State should apply as early as possible, but no later than July 1 for fall semester and December 15 for spring semester. Earlier admission improves chances for financial aid and housing, and facilitates academic advising in the student's chosen major.

Applicants who have completed nine or fewer semester credits at other institutions should apply for admission as freshmen and submit official transcripts of all collegiate work attempted; these students should refer to the section on admission requirements for the high school graduate.

Applicants are granted admission on the basis of their previous academic and conduct records, the appropriateness of their previous courses to their proposed program of study, and the availability of space in the program. Admission is subject to satisfactory completion of current courses and submission of a final, complete, official transcript. Transfer students should plan to complete composition and mathematics before applying for admission to Colorado State. Priority will be given to students who demonstrate the greatest academic potential for attaining a degree at Colorado State.

Students who have completed an Associate of Arts or Associate of Science degree with a 2.00 or better cumulative grade point average (A--4.0) from an accredited community or junior college will be guaranteed admission to the University provided enrollment limitations have not been met.

Because of demand, admission to some programs of study is more competitive than others; admission to these programs is limited to students presenting the strongest academic credentials.

Students applying to the College of Engineering must have completed at least one term of calculus and one term of calculus-based physics prior to enrolling. Preference will be given to those applicants with the strongest records in pre-engineering programs.

Course work taken at vocational-technical institutes or nonaccredited colleges generally is not counted toward the minimum number of credits required for admission of transfer students.

Good Standing Requirement

Transfer applicants for admission to Colorado State whose records indicate they are under disciplinary censure generally may not be admitted until they have cleared their disciplinary records. While each case is decided on the basis of information furnished by the applicant and institution concerned, the general rule is applicants may be considered for admission to Colorado State for the term nearest the date they are eligible to return to their former institutions.

Evaluation of Credits

Colorado State maintains transfer guides with all community colleges in Colorado. Each guide consists of policies and practices for the acceptance of college credit, a list of courses which transfer to Colorado State, and an outline of academic programs. Students contemplating transfer are encouraged to meet with transfer advisers at their current institution as early as possible.

The Transfer Evaluation Section in the Office of Admissions and Records is responsible for determining routine course equivalencies for all courses that meet the University Studies Program requirements. Students should be aware that credits may transfer to the University. but not count toward department graduation requirements. Evaluation of credits is made only from official transcripts after a student has been granted admission. Courses with a D grade are not accepted as transfer credit. Transfer grades and credits are not computed within the cumulative GPA earned at Colorado State.

Any questions concerning the transfer evaluation report should be referred to the Degree and Transfer Evaluation Section of the Office of Admissions and Records.

Credit From Two-Year and Noncollegiate Institutions
See Credit Policies in the Graduation Credit Requirements section in this catalog.

For Former Colorado State Students
Former Colorado State students who have not at-tended another institution since attending Colorado State must file an application for readmission. Students who have withdrawn prior to the end of a semester must also file the appropriate readmission application. A $30 nonrefundable processing fee must accompany the application for admission for students who were not regularly enrolled during the previous year. Students are readmitted if they are in good standing and space is available in the University.

Students who have attended other collegiate institution(s) after attending Colorado State must file an application for readmission with the $30 nonrefundable processing fee, transcript(s) of all courses attempted at the transfer institution(s), and a list of courses that will be completed prior to entering Colorado State. The admission decision is based on previous Colorado State work and the student's academic performance at transfer institutions.

For International Students
International applicants seeking admission to Colorado State University as entering freshmen must present scores from the Scholastic Aptitude Test (SAT) of The College Board and the Test of English as a Foreign Language (TOEFL). Official secondary school transcripts and/or school leaving examinations must also be submitted. If transcripts are not in English, a certified English translation must also accompany each document.

All applications from international students must be submitted at least three months prior to the beginning of the term for which admission is requested. The initial inquiry about admission should indicate the applicant's academic background, proposed program of study, and the source and amount of financial support for study at Colorado State. The Immigration and Naturalization Service requires that the University have on file proof of financial support before the I-20 documentation, needed to obtain a visa, can be issued. A $30 nonrefundable processing fee must accompany the admission application. To obtain an international undergraduate application, contact the Office of Admissions. International applicants seeking admission to the Graduate School should refer to the *Graduate and Professional Bulletin.*

International applicants wishing to transfer to Colorado State University must also submit an international application at least three months prior to the beginning of the term for which admission is being requested. Official transcripts of all university or college courses taken in the United States or abroad are required. Secondary school transcripts and/or school leaving examinations must be submitted. If transcripts are not in English, a certified English translation must also accompany each document.

All international applicants, except those whose native language is English, are required to submit scores from the Test of English as a Foreign Language (TOEFL). The minimum acceptable TOEFL score is 525. Applicants with less than a 525 may be referred to the Colorado State University intensive English Program. Students who knowingly falsify transcripts or test scores, or who fail to indicate all previously attended institutions will be denied admission to the University. Sponsoring agencies will be informed of this decision.

Undergraduate foreign students are not eligible for scholarship assistance from Colorado State University sources, and their employment possibilities are severely limited by law; consequently, foreign students need to explore scholarship and loan possibilities within their home countries. Financial planning should include a thorough investigation of currency exchange and monetary transfer regulations between the home country and the U.S. See Yearly Costs for International Students in the Tuition, Fees. Expenses, and Adjustments section in this catalog.

Only U.S. citizens and permanent residents of the United States (and certain U.S. territories) may contact the Office of Financial Aid for information on applying for assistance.

FINANCIAL ASSISTANCE

Office in Student Services Building, Room 108
G. Kay Jacks, Director
Colorado State offers a variety of financial assistance programs for deserving and needy students. Awards recognize scholastic achievement, encourage continual educational growth, and assist needy students.

Financial assistance is subject to the financial resources available to Colorado State. Detailed information on all financial aid programs is available on request from the Financial Aid Office. Financial aid policies and procedures may change without notice.

FINANCIAL AID PROGRAMS

Scholarships

Undergraduate Colorado resident or nonresident students may be considered for the Creative and Performing Arts Award, Colorado Scholars Award, the Distinguished Scholars Award, Deans' Scholars Award, Meritorious Scholars Award, and the Colorado State University Academic Grant.

Undergraduate Colorado resident students may be considered for the Diversity Award, First Generation Award, and Outstanding Diverse Student scholarship.

The University also administers scholarships offered by private agencies, foundations, service clubs, and individuals. For more detailed information on available scholarships, contact the Financial Aid Office.

Army and Air Force ROTC scholarships are available to qualified high school graduates interested in ROTC, and to students enrolled in ROTC programs. Interested students should contact the ROTC departments.

Grants

Colorado State administers a number of grant programs available to undergraduate students. Several are restricted to Colorado residents. These include: Colorado State Grants which are generally $700 to $1,000 each year. and federal Student Incentive Grants, which are usually $700 to $1,000 each year. Residents and nonresidents may qualify for a federal Supplemental Educational Opportunity Grant, which ranges between $100 to $2,000 per year.

Additionally, the University administers the federal Pell Grant Program for qualified undergraduates.

The federal government establishes the dollar limits on these grants each year.
The Colorado Graduate Grant Program is restricted to Colorado residents and is the only grant program available for graduate students. These grants are generally $700 to $1,000 per year.

All grants may be renewed providing the student continues to document need and maintains satisfactory academic progress.

Loans

Colorado State participates in the federal Perkins Loan Program, the federal Stafford Loan Program, the federal Parents Loan for Dependent Students (PLUS) Program, the federal Supplemental Loan for Students (SLS) Program, the Health Professional Loan (HPL) Program. the Health Education Assistance Loan (HEAL) Program, and its own short-term emergency loan program. Both undergraduates and graduates are eligible to apply for the federal Perkins, Stafford, and SLS programs. The federal PLUS Program is available for dependent students. HPL and HEAL loans are restricted to students enrolled in the D.V.M. degree program. Loan amounts vary depending on need and on maximum limits established by federal regulations.

College Work-Study

The federal College Work-Study Program, administered by the Employment Section of the Financial Aid Office, provides part-time employment opportunities for qualified students. Students

average 12 hours of work per week and earn between $1,400 and $1,800 total for an academic year. Both undergraduate and graduate students are eligible to apply for the work-study program. Awards are based on an evaluation of students' financial need.

A merit work-study program is also offered at the University. Students do not have to document financial need to receive merit work-study. Students must find a job, generally on campus, which relates to their academic major. Undergraduate, second bachelor' s, and teacher certification students may apply. Nonresident graduate and nonresident international students may also apply. Interested students should contact the Student Employment Office.

APPLICATION PROCEDURES FOR NEED-BASED FINANCIAL AID
Application information and application procedures for any of the above programs may be obtained by writing to the Financial Aid Office.

SATISFACTORY PROGRESS STANDARDS
Students applying for and/or receiving financial aid are expected to maintain satisfactory academic progress. Failure to perform at established levels may result in students becoming ineligible for financial aid. Students' total number of credits are also evaluated, and students may not exceed established credit limits. Copies of the complete policy are available by writing to the Financial Aid Office. The satisfactory progress policy is in the information Guide that is sent to all students who receive an award notice.

FRAUDULENT RECEIPT OF FUNDS
Students who receive student aid funds through a misrepresentation, falsification, or omission of information may have their names referred to the Colorado Attorney General's office for possible prosecution under the law. Any person who knowingly makes a false statement or misrepresentation when applying for financial aid shall be subject to a fine of not more than $10,000 or imprisonment of not more than 5 years, or both. under provisions of the United States Criminal Code.

The Financial Aid Office retains the right to withdraw or cancel a student's aid if it is believed the student obtained the funds by fraudulent means.

FINANCIAL AID TRANSCRIPTS
(RELEASE OF INFORMATION)
Federal and state regulations require that all postsecondary institutions secure a record of a student's financial aid at all previously attended institutions before they consider the individual for aid. The release of this information is necessary for students who transfer between schools. All recipients of federal, state, or private aid at Colorado State should be aware that financial aid award information will be released to state and federal agencies, and to all postsecondary institutions that request this material.

REPORTING CHANGES
All students must notify the Financial Aid Office immediately of any changes in their financial situation, marital status, residency, class standing, or any other factors which can reasonably be construed to have a bearing on their financial aid.

STUDENT EMPLOYMENT
The Employment Section of the Financial Aid Office is responsible for the institution's Student Employment Program. This office lists some of the University's on-campus student positions, and is a central receiving and referral agency for jobs within the community and surrounding areas.

Students wishing work on or off campus should contact the Student Employment Office, Room 133, Student Services Building. Job searches must be done in person.

All individuals who are currently enrolled at the University as resident instruction (RI) students and are carrying one or more RI credits may use the University's employment services. Student employees are compensated on an hourly basis and are paid every other week.

Colorado State is an Equal Opportunity Employer which provides on-campus work opportunities to several thousand students each year. The University adheres to the state's fiscal rules and the regulations set forth by the Department of Education and the Colorado Commission on Higher Education which govern the work-study and student employment programs.

VETERANS' BENEFITS

The Financial Aid Office assists the Veterans Administration through the Veterans Educational Benefits Office by providing certification for educational benefits under Title 38, U.S. Code: Chapter 30 (New G.I. Bill), Chapter 31 (Vocational Rehabilitation), Chapter 32 (Post-Viet Nam Era). and Chapter 35 (Dependents Educational Assistance); and Title 10, U.S. Code: Chapter 106 (Selected Reserve Members). Students eligible for any of these benefits must contact the Veterans Educational Benefits Office, Room 104, Student Services Building, *at* least six weeks prior *to the* expected date of enrollment. Office hours are Monday-Friday from 12:00 noon to 4:00 p.m. Applicants should apply to Colorado State in a degree-seeking major before applying for veterans' educational benefits. To receive full benefits, a student must maintain at least 12 undergraduate-level credits or 9 graduate-level credits or research equivalent. Students must notify the Veterans Educational Benefits Office of any change of address, major, or enrollment status. A description of the regulations governing receipt of veterans' educational benefits, *Standards of Progress,* is available through the Veterans Educational Benefits Office.

Students participating in the advance payment program for fall semester must complete the necessary paperwork with the Veterans Educational Benefits Office during registration. All advance payment requests must be made prior to July 1. Advance payment checks will be disbursed from the Veterans Educational Benefits Office on the first day of class. Students must provide a picture ID.

FINANCIAL SUPPORT FOR GRADUATE STUDENTS

Graduate students seeking financial support should consult the appropriate section of the *Graduate and Professional Bulletin.* Merit-based awards, such as fellowships and assistantships, are available on a competitive basis. Need-based support, such as loans or work-study positions, may be provided to students who qualify.

TUITION, FEES, EXPENSES, AND ADJUSTMENTS

Authority to set tuition rates is vested in the governing boards of Colorado's state institutions of higher education. The tuition rates which apply to any succeeding fiscal year will not be known until June of each year. *The State Board of Agriculture. therefore. reserves the right to change the following tuition and fee schedules and related policies, including the time, date, and method for payment, at any time.*

SCHEDULE OF TUITION AND FEES

In addition to the charges listed under each category. students pay any special course fees; see Special Fees in this section.

Tuition and fees for a student registering for a combination of regular on-campus courses. continuing education courses, or SURGE courses will be assessed individually according to the schedule established for each.

Students who are off campus for full-time internships. practica, and professional affiliations. and are not concurrently enrolled in other on-campus experiences or courses. will be assessed a reduced student fee. This fee of $59.10 is the ASCSU fee. the facilities construction fee. plus a fee determined by the principal and interest of the bonds on athletic facilities. the student center. the student health service. and the student recreation center.

Undergraduate Students

Colorado Resident	Total Per Tuition Per Semester	Fees Per Semester	Total Per Semester	Academic Year (Two Semesters)
1 credit	$ 85.00	$ 24.00	$ 109.00	
2 credits	$ 170.00	$ 24.00	$ 194,00	
3 credits	$ 255.00	S 24.00	$ 279.00	
4 credits	$ 340.00	$ 24.00	$ 364.00	
5 credits	$ 425.00	$ 24.00	$ 449.00	
6 credits	$ 510.00	$272.04	$ 782.04	
7 credits	$ 595.00	$272.04	$ 867.04	
8 credits	$ 680.00	$272.04	$ 952.04	
9 or more credits	$1011.00	$272.04	$1283.04	$2566.08
Out-of-State Resident 2				
1 credit	$ 319.00	$ 24.00	$ 343.00	
2 credits	$ 638.00	$ 24.00	$ 662.00	
3 credits	$ 957.00	$ 24.00	$ 981.00	
4 credits	$1276.00	$ 24.00	$1300.00	
5 credits	$1595.00	$ 24.00	$1619.00	
6 credits	$1914.00	$272.04	$2186.04	
7 credits	$2233.00	$272.04	$2505.04	
8 credits	$2552.00	$272.04	$2824.04	
9 or more credits	$3824.00	$272.04	$4096.04	$8192.08

Graduate Students (Except Professional Veterinary Medical Students)

Total Per Colorado Resident	Tuition Per Semester	Fees Per Semester	Total Per Semester	Academic Year (Two Semesters)
1 credit	$ 97.00	$ 24.00	$ 121.00	
2 credits	$ 194.00	$ 24.00	$ 218.00	
3 credits	$ 291.00	$ 24.00	$ 315.00	
4 credits	$ 388.00	$ 24.00	$ 412.00	
5 credits	$ 485.00	$ 24.00	$ 509.00	
6 credits	$ 582.00	$272.04	$ 854.04	
7 credits	$ 679.00	$272.04	$ 951.04	

8 credits	$ 776.00	$272.04	$1048.04	
9 or more credits	$1165.00	$272.04	$1437.04	$2874.08
Out-of-State Resident				
1 credit	$ 333.00	$ 24.00	$ 357.00	
2 credits	$ 666.00	$ 24.00	$ 690.00	
3 credits	$ 999.00	$ 24.00	$1023.00	
4 credits	$1332.00	$ 24.00	$1356.00	
5 credits	$1665.00	$ 24.00	$1689.00	
6 credits	$1998.00	$272.04	$2270.04	
7 credits	$2331.00	$272.04	$2603.04	
8 credits	$2664.00	$272.04	$2936.04	
9 or more credits	$3989.00	$272.04	$4261.04	$8522.08

The $24.00 fee is for the student center and the $272.04 fee is for the student center. student health service. student recreation center. student activities. athletics. the stadium. the auditorium-gymnasium complex. and Colorado Public Interest Research Group (COPIRG). The COPIRG fee of $4.00 is refundable upon request. Part-time students carrying five credits or less may elect 10 pay the full fee and receive the same level of services and activities as full-time students.

Out-Of-State residents enrolled in the WICHE-supported program in Occupational Therapy pay Colorado resident tuition. In addition. the sending state pays a support fee of $4.800 per academic year for participants in the Occupational Therapy program.

Veterinary Medical Students Enrolled in Professional Course Registering for 9 Through 24 Credits

Senior veterinary students are assessed tuition on a credit basis for each semester since their class schedules vary during the three-semester period. The tuition is $166.90/credit for residents and $605.00/ credit for nonresidents. Fees for senior veterinary students are assessed over the three semesters in equal payments of $190/semester.

	Per Semester	Per Academic Year (Two Semeslers)
Colorado Resident		
Tuition	$3505.00	$ 7010.00
Fees'	$ 272.04	$ 544.08
Total	$3777.04	5 7554.(18
Out-of-Slate Resident		
Tuition	$127015.00	$254100.00
Fees'	$ 272.04	$ 544.08
Total	512977.04	525954.08

The 5272.04 fee is for the student center. student health services. student recreation center, student activities. athletics, the stadium. the auditorium-gymnasium complex. and Colorado Public Interest Research Group (COPIRG). The COPIRG fee of $4.00 is refundable upon request.

Out-of-state residents are responsible for the entire cost of their veterinary medical education, i.e., the out-of-state tuition and fees (see footnote 11 includes a facility use fee of 51 .001 for 1993-94. Students enrolled in the WICHE-supported program are responsible for the total amounts assessed. However. the general arrangement is for the student to pay the Colorado resident tuition and lees (see footnote 11 and the home state to pay the remaining tuition assessment and facility use tee as a participant in the WICHE Student Exchange Program.

Graduate Assistants

Full-time graduate assistants receive at least the minimum monthly stipend ($753 for 1993-94 with an increase to $781 effective May 1, 2994) set by the University. Such assistants must register for at least nine credits in the fall and spring terms, and such credits as the appointing department

may require each summer term during which the appointment is in effect. Assistants may have tuition payments made in their behalf.

Students Registering for Continuing Education Courses
Tuition and fees assessed for courses offered by the Division of Continuing Education vary by program, level of instruction, and delivery mode. Consult current Continuing Education publications for specific rate information or call the Division of Continuing Education at (303) 491-5288.

Special Fees Nonrefundable Fees

Admission application fee	$ 30.00
Application lee for admission to professional program in occupational therapy	$ 40.00
Application fee for admission to professional program in veterinary medicine	$ 40.00
Composition Placement Examination fee	$ 10.00
Credit established by challenge examination per credit attempted	$ 20.00
Dissertation microfilming fee	$ 50.00
Late registration fee	$ 50.00
Mathematics Placement Examination fee per credit	$ 8.00
Technology fees, per term (college-wide)	
Agricultural Sciences	$ 50.00
Applied Human Sciences	$ 35.00
Business	$100.00
Engineering	$125.00
Natural Resources	$ 50.00
Natural Sciences	$100.00
Prebusiness	$ 25.00
Veterinary Medicine and Biomedical Sciences	$ 50.00
Transcript fee per copy	$ 2.00

Research fees

Graduate students may be responsible for all or part of the costs involved in the preparation of theses, dissertations, or other scholarly work required in the academic program. The expenses of an appropriate research or artistic project are highly variable, depending on the discipline, the specific nature of the work involved, and the availability of resources from funded projects, students' sponsoring agencies, or the academic departments.

In some cases, students may pay such costs directly. In others, departments may request that funds be deposited in a special account in advance.

For full-time undergraduates and graduates; undergraduates only in Natural Sciences and Veterinary Medicine and Biomedical Sciences. Students registered for one through eight credits will pay a prorated amount.

Special Course Fees
Certain courses require enrolled students to pay fees for special services and/or materials. Since the costs are determined annually, course fees may vary from the stated charge in the Courses of Instruction section in this catalog. '

For some courses, enrolled students are assessed a uniform fee during registration to cover the costs incurred by the University to offer the courses. These costs include the rental of external facilities, the expenses of field placements, the provision of special facilities of a personal nature that the University would not otherwise maintain, and/or the costs of off-campus travel of students and supervising faculty members.

For some courses. enrolled students are assessed by the department variable fees based upon actual use of expended materials supplied by the department and used by the student in the creation. construction. and/ or fabrication of an object of value such as a class project that becomes the student's property.

For some courses, enrolled students are assessed by the department variable fees based upon actual damage to or nonreturn of equipment used in the courses.

All special course fees will be assessed and collected through normal student accounts receivable procedures. *No fees should be paid directly to academic departments or individuals.*

RESIDENCE CLASSIFICATION FOR TUITION PURPOSES

Residency for tuition purposes is determined by Colorado statutes. The initial classification is made by the University at the time of admission based on information supplied in the application for admission. Any student who has been classified as a nonresident and believes that he or she can qualify as a resident may obtain a petition from the Office of Admissions and Records (Degree Section) and a copy of the statutes governing tuition classification.

A person moving to Colorado must be domiciled in the state for twelve months and meet other provisions contained in the tuition classification law prior to the first day of class of the semester for which a tuition change is sought, before becoming eligible for a change in residence classification. An international student must hold an immigrant visa to be eligible to establish a domicile for tuition purposes in Colorado.

Active duty military persons stationed on a permanent change of duty station in Colorado and dependents will be assessed resident tuition. Forms for requesting an adjustment must be on file by the first day of class of each term.

A petition will be processed only if the student has been admitted to the University or is currently enrolled. The petition is to be returned to the Office of Admissions and Records (Degree Section) no later than the first class day of the term for which the change is desired. The decision of *the* University's tuition classification officer may be appealed to the Residency Appeals Committee by submitting a written request through the Office of Admissions and Records (Degree Section) no later than fifteen days after the petitioner has been notified of his or her tuition classification.

A student must notify the Office of Admissions and Records (Degree Section) of a change in residency status from resident to nonresident. Any student who willfully gives wrong information to avoid paying nonresident tuition is subject to legal and disciplinary action.

ADDITIONAL EXPENSES

Health Insurance

The University administers an optional health insurance plan for students at a reasonable rate. This insurance is in addition to the University Health Service program funded by student fees. Insurance is not a prerequisite to the use of the University Health Service, but is designed to supplement it and to help protect against the high medical costs of an accident or illness requiring hospitalization. This insurance plan provides additional coverage for any family plan; it provides primary coverage when no other plan is involved. The plan is optional; however, students are encouraged to enroll unless they already have adequate health insurance. Information on Student Health Insurance is contained in the Student Health Insurance brochure which is available to all new students.

Personal and Living Expenses

The amount of money spent by a student in an academic year (two semesters--August to May) for all other expenses varies with current prices and the habits and needs of the Student; therefore, it is difficult to estimate the amount of money needed by individual students for such items as entertainment, cleaning, laundry, and clothing. New students should have sufficient financial resources to insure successful completion of at least one semester.

Expenses not directly related to educational costs are not included in the estimates. Off-campus room and board may result in some savings, but comparable in-town housing and diet will approximate University residence hall costs.

Estimated Yearly Expenses

The following estimate of student costs. exclusive of tuition and fees, is based on a minimum but adequate standard. Students' actual expenses may be lower or higher, since these are only estimates. Certain courses *carry* a special course fee in addition to the regular tuition and fees.

	Total Per Semester	Academic Year (Two Semesters)
Room and Board/average	$2084.00	$4168.00
Books and Classroom Supplies	$ 235.00	$ 470.00
Incidental Personal Expenses	$ 750.00	$1500.00
Health Insurance		$ 857.00
Total of Estimated Costs	$3069.00	$6995.00

International Students

Students from other countries should anticipate expenses considerably higher than those quoted above. The above estimates do not include costs of transportation, clothing (particularly winter clothing for those coming from warmer climates), living expenses during vacation periods and during the summer months, and items of personal use which cannot be brought in a suitcase and which must be purchased in the United States after arrival. An unmarried undergraduate student should anticipate living expenses of about $700 per month in addition to out-of-state tuition, plus $700 settling-in expense.

In general, expenses for graduate students run considerably higher than for undergraduate students because of research costs, thesis expenses, field trips, special equipment, and more expensive textbooks. Total expenses for a graduate student may vary up to as much as $21,000 per calendar year. Students enrolled in specialized training courses in nondegree schools should refer to the specific program documents for costs.

Students accompanied by dependents must allow additional funds for a spouse at $3,000 per year and $2,400 per year for each child. Medical insurance is required for all foreign students and their accompanying dependents creating an additional approximate expense of $582 per year for students, $2,165 per year for spouses. and $966 per year for children.

All agencies and other entities sponsoring international students which utilize third party billing privileges will be assessed a $125 base service fee per student per semester. Those students and sponsoring agencies and entities receiving additional services over and above those provided to all international students will be assessed an additional $125 service fee per student per semester. Both of these fees apply to all international sponsored students who receive services as described above and who use University resources regardless of whether the student is registered for credit-bearing classes.

For a copy of the Service Schedule and/or a detailed list of estimated expenses, write the Office of International Student Services, Attn: Coordinator, Sponsored Degree Programs, 315 Aylesworth Hall, NE, Colorado State University, Fort Collins, CO 80523.

PAYMENTS AND ADJUSTMENTS

Payment of Student Accounts

Any student who completes registration is responsible for the payment of tuition, fees, and housing charges, and should be prepared to pay the University charges as billed. Payment of all University charges is to be received in the University Cashier's office by the due date.

Statements are mailed to students at the current address on file with the Office of Admissions and Records. Students may arrange to have the statements sent to a separate billing address by filling out

a billing address form in the Accounts Receivable Office. Students are responsible for keeping the University informed of current addresses. and for arranging payments. The University will not register a student, confer a degree on a student, nor provide a final transcript to any student or former student who has any financial obligation to the University (other than a loan not yet due).

University charges are due as follows:

Charges	Due Date
1/3 tuition, fees, housing, and all miscellaneous charges	8/6/93 and 1/7/94
1/3* tuition, fees, housing. and all miscellaneous charges	9/2 1/93 and 2/28/94
Student account balance	10/15/93 and 3/30/94

* 2/3 if not assessed on first statement

Summer session tuition and fees are due for registered students as billed by the Accounts Receivable Office.

Late Payments
Penalties will be assessed for late payment of student accounts for the purpose of encouraging prompt payment. Such penalties shall be assessed at a fixed percentage of the past due balance. The current rate Is 1.5% of the past due amount.

Registration Holds
Unpaid balances may cause a hold to be placed on the student's registration and transcripts. A student may not access the telephone registration system, nor receive transcripts, if a hold has not been cleared. To clear a hold, the student must: (1) pay the past due amount, and (2) notify the Accounts Receivable Office of the payment. Release of the hold can be expedited by making payment in person at the Cashier' s Office, 108 Johnson Hall, and then presenting proof of payment at the Accounts Receivable Office, 100 Johnson Hall.

Returned Checks
Any person who presents to the University a check that is not accepted for payment by the bank because of insufficient funds, stopped payment, nonexistent account, or other reason for which the person is responsible is charged a penalty as provided by state law.

The University sends a notice to the person who presents a check that is not accepted for payment by the bank. In the case of students, the notice is mailed to the student's Fort Collins area address and permanent mailing address. (Every student is required to notify the Office of Admissions and Records promptly of any change in his or her Fort Collins area address or permanent address.) Within the time specified in the notice the person is expected to make payment by cash, cashier's check, or credit card currently accepted by the University. The payment must be equal to the total of the invalid check plus penalty and fee if applicable. Failure to do so will result in action deemed appropriate under the circumstances, If the presentation of the check permits a student to register for an academic term and full payment of the check plus penalty and fee is not made within the time specified in the notice, the student's class schedule will be cancelled.

HOUSING DEPOSIT
Residence Halls
The $150 housing deposit for residence hall students serves as both an application fee and a contractual agreement guarantee. Partial refund of this deposit is available if the student cancels his/her request prior to submitting the Residence Hall Contract. For specific information about the refund policy refer to the "Contract/Refund Information" outlined in the Residence Hall Living brochure which accompanies the residence hall reservation form.

University Apartments
A deposit of $140 is required for students applying for University Apartments. This deposit serves as an application fee and a contractual agreement guarantee. This deposit will be refunded, upon request, anytime prior to assignment. The refund procedure for current apartment residents is outlined in the Apartment Life Contract Agreement. For further information, refer to the Apartment Life brochure which accompanies the Apartment Life application
form.

Tuition and Fees Adjustments

Tuition and fees, as applicable, are charged for all courses added during a term. Tuition and fee adjustments for students dropping courses, if applicable, will be allowed only during the schedule change period as listed in the University Calendar at the front of the catalog. After this deadline, there is no adjustment in tuition and fees should a student drop a course.

Withdrawal from the University is accomplished by contacting the HELP/Success Center to terminate all courses. Adjustments of tuition and fees are made only for these authorized withdrawals. Once a student completes one or more courses in a term (fall semester, spring semester, or summer session) a withdrawal is not authorized; however, the student can terminate remaining courses by contacting the Office of Admissions and Records. Normally a withdrawal is not permitted during the last two weeks of the semester.

Cancellation of assessments is authorized for courses which have not started at the time of withdrawal.

Tuition and fees which will be assessed for authorized withdrawals is the percentage according to the following chart:

Withdrawal Assessment for Fall and Spring I

Withdraw in Week:	**1**	2	3	4	5	6	7	8
	10%	15%	20%	30%	35%	40%	45%	50%
Withdraw in Week:	9	10	11	12	13	14	15	16
	60%	65%	70%	80%	85%	90%	100%	100%

'Summer term has a different assessment schedule and the withdrawal policy is in the Summer Class Schedule.

The following guidelines apply:

1. In the case of death, adjustment of tuition and fees will be made any time during the semester.

2. Withdrawal as a result of serious illness, disabling accident, military draft, or activation of reserves or national guard units, initiated at the HELP/Success Center, will be subject to review by the Office of the Vice President for Student Affairs which may recommend to the Vice President for Administrative Services a variation from the normal adjustment policy.

3. Financial aid will be prorated on the same basis as the normal adjustment policy. Unused portions of financial aid will be cancelled upon withdrawal.

4. University room and board charges will be assessed through the vacate date from University housing.

5. No adjustment will be made for a student who is suspended. dismissed, or expelled for breach of discipline.

STUDENT RIGHTS AND RESPONSIBILITIES

As in any community situation, an individual can be most effective and influential working through an established organization. At Colorado State, the two primary organizations are the department in which the student is majoring, and the University-wide student governing body, Associated Students of Colorado State University (ASCSU).

Academic department heads are required to incorporate student input into decisions affecting academic instruction and advising. This input usually takes form through departmental advisory committees and student evaluation of faculty members. Individual students, however. may make appointments with their department heads to discuss specific problems, plans, or suggestions.

The student governing body, ASCSU, is authorized by the State Board of Agriculture to establish a system of self-government, organized and administered by elected student representatives. It has the responsibility to advise and recommend to the University administration and to allocate funds designated by the Board in support of student programs and activities of authorized student groups and clubs. Additional information on student involvement is available through the ASCSU office and the Office of Student Activities, both located in the Lory Student Center, and the Faculty Council Committee on Student Life.

ACADEMIC RIGHTS AND RESPONSIBILITIES OF STUDENTS

Students' Educational Records

Colorado State must inform students annually of their rights accorded by the Family Educational Rights and Privacy Act of 1974 (P.L. 93-380, §513). Students may inspect their educational records and receive copies of any page therein except financial aid records which reflect the financial status of the parents.

Records and documents pertaining to a student's academic standing and progress including the admissions application, high school and/or college transcript(s), test scores, grades, and academic standing are maintained in a student's academic record.

Official academic records are maintained by the Office of Admissions and Records and the Graduate School.

Educational records are also maintained by college I offices, academic departments, faculty advisers, and some administrative offices which include Career Services, the HELP/Success Center, and the Office of International Education. The Office of the Vice President for Student Affairs maintains records concerning official University discipline actions. Officials responsible for these educational records are identified as directors or department heads in the University catalog. Addresses are available in the University directory.

All enrolled and former students may have access to their educational records maintained within the University. Those individuals and agencies having access to a student's records include University faculty and staff performing their job responsibilities related to University academic and educational programs; parents claiming a student under 21 as a dependent on their federal income tax; scholarship and other financial aid organizations supporting the student; organizations conducting studies for, or on behalf of, educational agencies or institutions for the purpose of developing, validating, or administering predictire tests, student aid programs, or to improve instruction; organizations carrying out accrediting functions of programs offered by the University; appropriate person(s) in an emergency; and any party designated by judicial order or subpoena provided the University notifies the student of the subpoena.

Any other individual or organization must have a student's written consent to view or have access to the educational record.

A student may receive one copy of each item of information contained in the educational record at a cost of $.25 per page.

Colorado State has defined public information as a student's name, current mailing address, telephone listing, major field of study, class, dates of attendance, participation in officially recognized activities and sports, weight and height of members of athletic teams, and honors and degrees awarded. The directory is published annually listing the names of students attending the University, their current mailing address, telephone number. major fields of study, and class. This information is available to the public and will be released unless a written request to withhold the information is on file in the Office of Admissions and Records by the end of the second week of classes. Information will be withheld until changed by the student.

Colleges and/or departments maintaining educational records provide students an opportunity to review their educational records and the right to challenge the record if the student feels the information is misleading, inaccurate, or otherwise in violation of the student's privacy or other rights. A student may contest whether or not the assigned grade was recorded accurately in the educational record. Students who wish to contest the grade as assigned by the instructor should follow the procedures described below under Academic Appeals. Students may provide a written explanation concerning the contents of such records and the explanation will be inserted in the record. Any dispute over the contents of the record will be handled through informal meetings or discussions in the office where the record is maintained. If informal meetings are not satisfactory, a student has the right to a formal hearing. Requests for formal hearings will be made to the Provost/Academic Vice President who will serve as the hearing officer. Prior notice of the hearing will be given to all parties concerned.

Academic Honesty
Any means of unauthorized assistance in preparing materials which a student submits as original work is deemed to be cheating and constitutes grounds for disciplinary action. Instructors are expected to use reasonably practical means of preventing and detecting cheating. Any student judged to have engaged in cheating may receive a reduced grade for the work in question, a failing grade in the course, or such other lesser penalty as the instructor deems appropriate. Serious instances may be referred to the Director of Judicial Affairs in the Office of the Vice President for Student Affairs.

Classroom Behavior
The classroom instructor is responsible for all classroom conduct. behavior. and discipline. University policy permits only enrolled students, persons authorized by the instructor, and administrative personnel to be admitted to instructional areas during scheduled periods. University policy and Colorado state law also prohibit all forms of disruptive or obstructive behavior in academic areas during periods of scheduled use, or any actions which would disrupt scheduled academic activity. Use of classrooms and other areas of academic buildings during nonscheduled periods is permitted only in accordance with departmental, college, or University practices.

Any person or persons in unauthorized attendance or causing a disturbance during scheduled academic activity shall be identified by the instructor and asked to leave. Persons refusing such a request may be removed by the University police and are liable to legal prosecution and/or disciplinary action.

Academic Appeals
Students have the right to appeal any academic decision against them. Such appeals should first be made under the procedure of the academic department involved. The Committee on Student Life defines and monitors implementation of departmental procedures. If satisfactory resolution cannot be achieved, a final appeal may be made to the Provost/ Academic Vice President. If the decision is the result of academic deficiency, the matter is referred to the Scholastic Standards Committee.

STUDENT RIGHTS AND RESPONSIBILITIES
Colorado State University expects students to maintain standards of personal integrity that are in harmony with the educational goals of the institution; to observe national, state, and local laws, and University regulations; and to respect the rights, privileges, and property of other people. Principles of academic honesty, respect for diversity, and pursuit of life-styles free of alcohol and drug abuse are examples of these standards. Students are not only members of the academic community; they are, additionally, members of the larger society and thus retain the rights, protection, guarantees, and responsibilities which are held by all citizens.

Students' Rights

As members of the University community, students can reasonably expect the following:

1. Students have the right to freedom from discrimination or harassment on the basis of race, ethnicity, gender, sexual orientation, religion, creed, political beliefs, national origin, age, or handicap.

2. The University shall not interfere with the rights of students to join associations.

3. Students should have accurate infonnation relating to maintenance of acceptable academic standing. graduation requirements, and individual course objectives and requirements.

4. Student records will be maintained in keeping with the Family Educational Rights and Privacy Act of 1974 and the guidelines for implementation.

5. In all instances of general discipline, academic discipline, and academic evaluation, the student has the right to fair and impartial treatment.

6. Colorado State University considers freedom of inquiry and discussion essential to a student's educational development. Thus, the University recognizes the right of all students to engage in discussion, to exchange thought and opinion, and to speak, write, or print freely on any subject in accordance with the guarantees of Federal or State constitutions. This broad principle is the cornerstone of education in a democracy.

7. Students have the right to be free from illegal searches and seizures.

8. Students have the right to freely exercise their full rights as citizens. In this light, the University affirms the right of students to exercise their freedoms without fear of University interference for such activity.

Students' Responsibilities

Students also have an obligation to know and follow the regulations of the University. Violations will I form the basis for University intervention or disciplinary action. The following actions are prohibited:

1. Academic dishonesty such as cheating, plagiarism, or knowingly furnishing false information to the University. (Specific procedures for cases of academic dishonesty are reviewed under the Academic Rights and Responsibilities of Students in this section of the catalog, the *Graduate and Professional Bulletin,* or the Honor Code of the Professional Veterinary School as applicable.)

2. Forgery, alteration, misuse, or mutilation of University documents, records, identifications, educational materials, University property, or unauthorized use of the University computer system, computer access codes, and University long distance calling identity codes.

3. Obstruction or disruption of teaching, research, administration, disciplinary procedures, and other University activities. Rioting, aiding, abetting, encouraging, participating in, inciting a riot, or any act of misconduct as defined is specifically forbidden on University premises.

4. Abusive conduct which threatens or endangers the physical or psychological health, safety, or welfare of an individual or a group of individuals; harassment of any member of the University community including harassment on the basis of race, sexual orientation, age, gender, religion, physical disability.

5. Intentional unauthorized interference with the right of access to University facilities, or freedom of movement or speech of any person on campus.

6. Failure to comply with the verbal or written directions of University officials acting in the performance of their duties and in the scope of their employment, or resisting police officers while acting in the performance of their duties.

7. Theft of, damage to, use of, or possession of other persons' or University property in a manner inconsistent with its designated purpose; unauthorized entry. use, or occupation of University facilities, property, or vehicles.

8. Use or possession on University property of firearms or simulated weapons; ammunition or other dangerous weapons, substances, or materials; bombs. explosives, or incendiary devices prohibited by law. Weapons for sporting purposes shall be stored with the University Police.

9. Violations of any rules, contracts, or agreements governing residence in or use of University owned or controlled property including authorized special events.

10. Unauthorized soliciting or selling in violation of University solicitation policy.

11. Violation of any federal or state law or local ordinance including but not limited to those covering alcoholic beverages. narcotics and illegal drugs, gambling, arson, sex offenses, assaults, harassment, violation of civil rights, disorderly conduct, or lewd, indecent, or obscene conduct or expression.

12. Aiding, abetting, conspiring, or inciting others to commit any act of misconduct set forth in 1 through 11 above.

13. Conviction of a crime of a serious nature. (Upon the filing of charges in the criminal or civil courts involving an offense of a serious nature and an administrative determination that the continued presence of the student would constitute a threat or danger to the University community, such person may be temporarily suspended pending the disposition of charges.)

A complete, formal text of the Rights and Responsibilities of Students and disciplinary procedures is available in the Office of the Vice President for Student Affairs, 201 Administration Building.

POLICIES RELATING TO STUDENT LIFE AND ACTIVITIES

A summary of established University policies dealing with a wide range of student life and activity follows. The complete texts of these policies are available in the Office of the Vice President for Student Affairs, 201 Administration Building.

Freedom of Expression and Inquiry

The faculty of Colorado State University considers freedom of discussion, inquiry, and expression to be in keeping with the history and traditions of our country and to be a cornerstone of education in a democracy. Therefore, it is the policy of Colorado State University to encourage students to engage in discussion, to exchange ideas and opinions, and to speak, write, and publish freely, in accordance with the guarantees and limitations of our state and national constitutions.

Scholars have not only a right, but also a responsibility, to examine critically the insights, understanding. values, issues, and concerns which have evolved in the various areas of human activity. Consequently, it is the policy that University-registered student organizations may invite guest lecturers, exhibitors, performers, and works of art to be performed or exhibited with no restrictions of form or content other than those imposed by law. It is understood that inviting a speaker, performer, or exhibit does not imply concurrence of the University or of the sponsoring organization with the opinions, beliefs, or values expressed. It is expected that in exercising their rights, individuals and groups will be cognizant of their obligations to other individuals and groups, to the academic community. and to the larger community of the city. the state, and the nation.

Peaceful Assembly

The University acknowledges the right of students to assemble in groups for peaceful purposes. At such gatherings, the University expects the rights and privileges of all persons to be respected and that there will be no endangerment to health or safety. Such gatherings must in no way disrupt the normal conduct of University affairs or endanger University property.

Persons planning such assemblies on the University campus must coordinate their activities and plans in advance through the Office of the Vice President for Student Affairs. The sponsoring individual or group must assume responsibility for compliance with all state and municipal laws and University policies. Assistance from staff is available to help plan such events, and the assistance of University police may be requested to help control traffic or crowds.

Any act by student demonstrators or groups which interferes with the rights of others, disrupts the normal functioning of the University, damages property, or endangers health or safety is grounds for suspension or dismissal from the University. Demonstrations are prohibited in any special-use facility or classrooms during academic hours or in any instance which interferes with educational functions. Demonstrators refusing to vacate premises upon request are subject to immediate temporary suspension and arrest under applicable municipal and state laws.

Freedom from Personal Abuse
The University acknowledges the right of all people to freedom from personal abuse. Abusive treatment of individuals on a personal or stereotyped basis prevents the attainment of the University objective to create and maintain an environment which supports, nurtures. and encourages people to excel in teaching, learning, and creativity. Therefore, the University deplores, condemns, and will act energetically to prevent all forms of personal abuse, including sexual harassment. For statements of University policy concerning personal abuse, see The University section and Student Rights and Responsibilities in this section of the catalog.

Membership in Student Organizations
Colorado State officially recognizes a great variety of student organizations. Policies established by the State Board of Agriculture prohibit any recognized student organization from excluding students from membership on the basis of race, color, religion, national origin, gender, sexual orientation, age, veteran status, or handicap.

All recognized student organizations must assure the University that their membership policies and procedures are in compliance with this University policy. Local chapters or regional, national, or international organizations must assure the University that membership policies of the parent organization do not require the local chapter to exclude any student from membership on the basis of race, color, religion, national origin. gender, sexual orientation, age, veteran status, or handicap.

Recognition of Student Organizations and Student Affiliated Organizations
Individuals associated with the University bring to the campus a wide variety of previously acquired interests and develop many new interests as part of the academic community. It is the policy of Colorado State University to enable interested persons to form and join organizations to promote their common interests and to foster the effective functioning of recognized organizations.

Student organizations are those formed for specific educational, professional, social, recreational, or other purposes which derive the majority of their membership and leadership from the student body. *Student affiliated organizations* are those that exist because of and/or have historic affiliation with Colorado State University. These organizations may or may not have a majority of student members.

The University recognizes student organizations and student affiliated organizations in order to provide services, resources, and facilities for these organizations; to effectively and equitably allocate University resources; and to coordinate the activities of various organizations. Organizations which are not recognized are limited in their access to the services and resources of the University.

To qualify for recognition, a student organization or a student affiliated organization must have a clearly stated lawful purpose, which may be part of a constitution, must function with the counsel and guidance of a faculty adviser, must have an adequate system of accounting for organizational funds, and must comply with University policies and regulations pertaining to organizations. Recognition is subject to periodic review and will be continued only as long as these conditions are fulfilled.

The Student Organizations Office, with the advice of the Student Life Committee, shall develop and implement procedures for recognition of student organizations and student affiliated

organizations and shall be responsible for recognizing organizations which qualify. The Student Life Committee shall monitor the recognition process. In cases of denial or revocation of recognition, appeals may be made to the Student Life Committee. Further appeal may be made to the Vice President for Student Affairs and ultimately to the President of the University.

The University Policy on Peaceful Assembly affirms the rights and privileges of individuals and groups to gather on public property for the purposes of peaceful assembly. The policies on recognition of student organizations and student affiliated organizations in no way limit this basic right.

Fraternities and Sororities
Under the joint sponsorship of the University and various national social fraternities and sororities, local chapters of the organizations have been established on the campus. There are 14 national sororities and 22 national fraternities whose activities are coordinated by the Interfraternity and Panhellenic Councils. Although given a broad degree of autonomy, the local chapters are subject to the dual supervision of their national organizations and the University. To the extent that effective self-regulation, in accordance with University policies, is maintained, supervisory intervention will be avoided.

Since the University expects to contribute such help as it can, guidelines concerning the scholastic, cultural, social, and ethical aspects of the organization have been developed to further the interests of both the University and the local chapter. Copies of these guidelines are available in the Greek Life Office, Lory Student Center.

The Board of Student Communications
Student communications media are an important way to develop. maintain, and enhance an atmosphere of free and responsible discussion and of intellectual exploration on campus. These media bring student concerns to the attention of the University and help formulate student opinion on larger societal issues. Consequently, responsible conduct and expression consistent with the objectives of the University is expected.

The University Board of Student Communications serves as publisher of those student communications media for which it allocates funds and is generally accountable to the University community, the student body, and the general public for the contents of the several media under its jurisdiction. As publisher, the Board is responsible through the Office of the Vice President for Student Affairs to the State Board of Agriculture for activities involving financial management, media promotion and evaluation, as well as formulation of policy and procedure.

Religious Organizations
Colorado State recognizes the vital importance of spiritual influences on society, the campus community, and in the development of its students. Within the constraints placed on it as a public institution by virtue of the fundamental separation of church and state, the University cooperates in facilitating ministries conducted by and for the members of the University community - who by individual interest, family background, or church membership - are interested in a deeper involvement in the disciplines of their respective faiths. At the same time, the University considers inappropriate any invasion of the privacy of the individual in the campus community by any denominational or nondenominational body or organization.

Living Regulations
All newly admitted first-year students without previous college experience, who are single, under twenty-one years of age, and not living with their parents are required to live in University residence halls for the first two consecutive terms of their attendance. Inquiries regarding this regulation, including guidelines for requesting an exemption, should be directed to the Office of Housing and Food Services, Palmer Center.

Solicitations of or by Students
Sales - Recognized University organizations must be authorized by the Student Organizations Office of Campus. Activities, Lory Student Center, before soliciting students or groups for the purpose of selling merchandise or services or obtaining contributions on or off campus. Proceeds from sales must be used toward fulfilling the purposes of the soliciting organization.

Solicitation by individuals or non-University groups is prohibited, except through established University sales outlets.

Information - Official University agencies and recognized student organizations may advertise and/or publicize by posters, banners, mobile sound systems, and handbills for promotional purposes if authorized by the Associate Director of Campus Activities and/ or campus police.

Representatives of religious or political groups may request use of authorized campus solicitation facilities for dissemination of literature pertinent to the intent of the organization.

Raffles Sponsored by Student Organizations
All raffles conducted at Colorado State must be licensed by the Secretary of the State of Colorado and administered by the Colorado Games of Chance Administration. Only recognized University student organizations may request use of the ASCSU raffle license. Requests require the approval of the Associate Director of Campus Activities in the Lory Student Center.

OTHER UNIVERSITY
POLICES AND REGULATIONS
Complete copies of the preceding and following University policies and/or procedures are on file in the Office of the Vice President for Student Affairs. 201 Administration Building.

- Discipline Appeals and Procedures
- Classification and Definition of Disciplinary Action
- Use of University Vehicles by Students
- Change of Address Policy
- Dog Policy
- Traffic Appeals System
- Laws and City Ordinances Pertinent to Student Behavior
- Rules Regarding Freedom of Expression at Colorado State Athletic Events
- Sign and Poster Policy
- Student Employee Grievance Procedure

STUDENT PROGRAMS AND SERVICES

Office in Administration Building, Room 201
Keith M. Miser, Vice President for Student Affairs
Student development programs and services, coordinated by the Division of Student Affairs, strive to develop graduates who assume their responsibilities as citizens. Much of citizen development takes place outside the classroom through student programs, activities, organizations, and services. Academic work and student life are interrelated. Student affairs faculty work closely with academic faculty to build an environment maximizing student growth.

ADVOCACY PROGRAMS Black Student Services
Office in Aylesworth Hall, Room 205
Blanche Hughes. Director
Black Student Services assists African-American students by providing support and encouragement for their academic. professional, cultural, and personal development. Black Student Services provides and coordinates services for African-American students with the Admissions Office, Financial Aid Office, HELP/Success Center, Academic Advancement Program, the University Counseling Center, and the general faculty. Black Student Services is committed to the philosophy of multiculturalism -recognizing and appreciating the differences within the African-American culture and appreciating other cultures.

El Centro of Hispanic Student Services'
Office in Lory Student Center, Room 178
Lupe Salazar, Director
El Centro/Hispanic Student Services is a special support program for Hispanic students. Aimed at maximizing the students' success potential while enrolled at the University, support services are provided in the areas of academic, cultural, and personal development. This includes academic advising, individual counseling, and cultural activities that may facilitate adaptation to the University environment.

In addition, referral services are provided in the areas of financial aid and admissions.

Native American Student Services
Office in Student Services Building, Room 312
Carolyn K. Fiscus, Director
The Native American Student Services Program is designed to serve as a supportive unit for new and continuing Native American students at Colorado State. Program services are focused on encouraging student utilization of existing counseling, academic, and financial aid resources, as well as providing information regarding aid and support from tribal institutions and other private and public organizations. Additional programs sponsored by the office include cultural and social activities that recognize and celebrate Native American heritage.

Nontraditional Student Office
Office in Spruce Hall, Division of Continuing Education
Harold Lopez, Director
The Nontraditional Student Office was established to provide support services to students age 23 and older, and other students of traditional age with nontraditional life circumstances. There are more than 6,000 nontraditional-age students enrolled at Colorado State, and more than 25% of the undergraduate students are nontraditional.

The Office strives to assist nontraditional students become oriented to the University, adjust to the demands of academic life, and identify and use appropriate student support services. It is also a meeting place for students to gather with others of similar age and concerns to discuss issues and share information.

The Nontraditional Student Office provides information, counseling, and referral services to a network of University support people. The staff works to promote the self-development of nontraditional students by supporting them in the pursuit of their educational goals.

Resources for Disabled Students
Office in Student Services Building, Room 116
Rosemary Kreston, Director
The Office of Resources for Disabled Students coordinates the University's efforts to seek full access to educational, cultural, and other programs sponsored by the University for any qualified student with a disability. Students with mobility. visual, heating, or learning disabilities are eligible for support as well as students with chronic health conditions. Compensatory, informational, and advocacy services are available without charge and are provided dependent upon student need. Some of the services include: priority registration, note takers, readers. taped textbooks, interpreters, alternative testing, information on community resources, and advocacy to resolve individual situations.

Services for Asian American Students
Office in Aylesworth Hall NE, Room 116
Linda M. Ahuna, Director
A major objective of the Services for Asian American Students is to promote and support the academic success of Asian students while providing opportunities for them to have an enriching overall University experience. In addition to the cultural, educational, and social programs it initiates and sponsors, Services for Asian American Students also provides direct support to students in a variety of ways. These include counseling in areas of financial, academic, personal, and career concerns. In addition, because the Office works with many other campus offices, it serves as an access to other support services and resources. Students are encouraged to take advantage of those services that will contribute to the achievement of their personal and academic goals.

Women's Programs and Studies
Office in Student Services Building. Room 112
Karen J. Wedge, Director
The Office of Women's Programs and Studies provides service and programs with women as the focus. The Office serves all students - undergraduate and graduate, women and men. Its programs concentrate on expanding the awareness and interest levels of students while creating conditions that allow both women and men students to share fully and equally in the multitude of opportunities and resources provided by the University.

The support Services are designed to reflect and enhance the expectations, goals, and aspirations of women, their concerns, and the contemporary issues confronting them.

Women's Programs and Studies provides the following services and programs to Colorado State University students and the campus community: Counseling and Referral; Women's Studies Program Advising; Materials Resource Center; Cam-pus-wide Programs and Symposia; and Victim Assistance/Advocacy.

ATHLETICS'
Intercollegiate Athletics
Office in Moby Complex. Room 202
Corey B. Johnson. Director
The mission of varsity intercollegiate athletics at Colorado State University is to offer to interested male and female student athletes an opportunity to participate in intercollegiate athletic competition;to provide a focal point where students, faculty, alumni, and the community may identify with the University; and to project a favorable public image of Colorado State. Intercollegiate athletics is an integral part of the University's educational process, and the potential of intercollegiate athletics is pan of the total potential of the University. The University is committed to equal opportunity in athletic programs for men and women. In athletic programs, as in all of its endeavors, Colorado State is committed to excellence and integrity.

The University is a member of Division IA of the National Collegiate Athletic Association (NCAA) and competes in the Western Athletic Conference (WAC). Other WAC members include Brigham Young University, Fresno State University, San Diego State University, the United States Air Force Academy, the University of Hawaii, The University of New Mexico, the University of Texas at El Paso, the University of Utah, and the University of' Wyoming.

The Department of Intercollegiate Athletics is organized as an auxiliary enterprise supervised by the Director of Athletics. The Faculty Council Committee on Intercollegiate Athletics serves in an advisory capacity to both the President and the Director of Athletics. Regulations for the conduct of intercollegiate athletics conform to those established by the Western Athletic Conference and the National Collegiate Athletic Association. The University's athletic policies are in harmony with the principles adopted by the North Central Association of Colleges and Schools.

Colorado State engages in men's intercollegiate competition in basketball, cross country, football, golf, tennis, and track (indoor and outdoor).

Colorado State engages in women's intercollegiate competition in basketball, cross country, golf, swimming/diving, tennis, track (indoor and outdoor), and volleyball.

Students participating in intercollegiate athletics are expected to make satisfactory progress towards a degree by completing 24 semester credits with passing grades during the school year (fall, spring) in required or elective courses acceptable in their major degree program. Limited summer credit and transfer credit from an accredited institution may be used to fulfill this requirement. Students also must be enrolled in a minimum of 12 credits during their practice and competitive seasons and must comply with all other eligibility and academic requirements of the NCAA and the WAC.

The University reserves the right to change or eliminate any of the intercollegiate sports in which it competes as it may deem necessary or desirable.

Recreational Sports
Office in Student Recreation Center
Bill Ellis, Director
The Recreational Sports Department offers a variety of recreation services to students on campus. These are *intramural sports* and *open recreation* in the Student Recreation Center. *club sports,* and *lifestyle classes.*

The *intramural sports* program provides students an opportunity to compete against other Colorado State students in league sports, individual sports, and tournaments in women, men, and coed divisions during the fall, spring, and summer terms. League sports include:
* basketball
* flag football
* innertube water polo
* soccer
* softball
* volleyball.

Individual sports and tournaments are one- or two-day activities including:
* doubles volleyball
* duathlon/triathlon
* flag football
* golf
* indoor soccer
* innertube basketball.
* racquetball
* softball
* swim meet
* tennis
* 3-on-3 basketball

Most activities take place on the intramural fields and in Moby Complex, both adjacent to the Student Recreation Center. Entries for all intramural programs are taken on the dates and times listed in the Program Calendar, available at the Intramural Sports Office in the Student Recreation Center.

The Student Recreation Center is available for *open recreation* to full-fee paying students from early morning to late evening Monday through Friday and from late morning through evening on weekends. The Center houses:

* gymnasium with basketball/volleyball/badminton courts
* five racquetball courts
* two Short Court courts
* aerobics room
* swimming pool
* sports equipment check-out
* sun deck.
* weight room
* running track
* locker rooms
* lounge
* spa pool
* staff offices

A variety of drop-in aerobics classes are also offered throughout the day. A complete schedule of open hours in the Student Recreation Center as well as a listing of aerobics classes is available at the Student Recreation Center.

Club sports are student-run sport organizations. Interest and participation vary with trends and student leadership. The clubs operate on a modest budget and earn additional funding to run programs. The goal of the club sports program is to provide students with the opportunity to organize, coach, or participate in sports activities that fall beyond the scope of the intramural program. There is a variety of both competitive and recreational clubs allowing students to learn a sport, practice a sport, and oftentimes compete intercollegiately. Currently 30 club sports exist on campus from the highly competitive (competition is usually against other colleges, universities, and organized clubs):

* alpine ski racing
* baseball
* ice hockey
* lacrosse
* polo
* rodeo
* rugby
* soccer
* volleyball

To the more recreational in nature (participation and practice is usually with other Colorado State students; there is very little outside competition):

* badminton
* fencing
* frisbee
* gymnastics
* martial arts
* trap.

Contact the Recreational Sports Office in the Student Recreation Center for the names of student officers of each club sport.

Lifestyle classes are alternative noncredit classes providing opportunities for students to grow and learn outside of the classroom. Students have a chance to learn new skills while having fun. There are over 100 lifestyle classes offered each year including the following:

* belly dance
* country western dance
* CPR
* fencing
* guitar

(acoustic and bass)
* in-line skating
* massage
* photography
* pottery
* Tai Chi Chuan
* traditional dance
* yoga.

Specific course offerings are listed in the *Lifestyle and Outdoor Adventure* magazine available at the Student Recreation Center and the Lory Student Center. Also listed in the magazine are outdoor classes such as:

* birdwatching
* bouldering
* caving
* ice climbing
* kayaking
* llama trekking
* mountain bike skills and bike maintenance
* rock climbing
* telemarking
* wintermountaineering

Other recreational programs are provided through residence halls, fraternities and sororities, and the Lory Student Center.

CAREER DEVELOPMENT PROGRAM
Offices in Aylesworth Hall NE, Room 108 and HELP/Success Center, Durrell Center, Room 101
Charles O. Davidshofer, Director
The Career Development Program is designed to assist all students in exploring how personality and workstyle fit educational and career options. Students work with counselors to develop a strategy to establish and achieve career/life goals. The Career Development Program enables students to access career counseling; interest testing; Sigi-Plus, a computer-assisted guidance program; career resource materials; a videotape library; mini-workshops on skills, decision making, interests and values, and majors; two- and four-hour, life-planning workshops; the Colorado State University majors file; and the "Career Connection" program. Counselors work with students in a summary session to create a potential career description. Staff members are available to speak to classes regarding further information on the Career Development Program.

CAREER SERVICES CENTER
Office in Lory Student Center, Room 176
Charles O. Davidshofer, Director
The Career Services Center provides career planning and employment services for Colorado State students and alumni. The Center serves all majors and colleges.

Students are provided current job and labor market information to assist them in their career development. The Center also provides specific information on various occupations and employers as well as opportunities for major-related summer jobs, internships, and cooperative education positions. In addition, the Center also maintains limited statistical follow-up information on recent graduates.

Services which assist graduating seniors and graduate students in obtaining career employment include setting up credentials files, on-campus recruitment and interviewing opportunities, job vacancy information through JOBS (a computer-assisted telephone bulletin board system), and career and job resources (guide for preparing resumes, lists of potential employers, government announcements, etc.). Practice interviewing, which helps to increase the individual's skill level in job interviewing, is also provided. Students who are in the process of writing resumes may arrange to have them critiqued and may also choose to keep a copy on file in Career Services for potential employers to examine. Staff members are also available to speak to classes and organizations

regarding further information on Career Services, resume writing, interviewing, and other job search skills.

UNIVERSITY COUNSELING CENTER
Office in Clark Building, Room C 36
Charles O. Davidshofer, Director
Based on a mental health model stressing personal development and prevention as well as remediation of problems, the Counseling Center offers a variety of services and programs to students. These services include personal-social, academic, and vocational counseling for students experiencing difficulty in any of these areas, and developmental workshops for life planning and career development. Programs for reducing test-taking, math, public speaking, and general anxiety are also available.

The University Testing Service, a service of the Counseling Center, provides testing as an adjunct to counseling, assists faculty with automated test scoring, coordinates Colorado State challenge exams, and administers national tests. The Testing Service is located in C 81, Clark Building.

The Counseling Center's Learning Assistance Program provides services in general learning strategies, time management, test-taking skills, memory and concentration enhancement, and study strategies for reading flexibility. In addition, diagnostic and limited remediation services are available for learning disabled students.

Specialized services designed to assist students in choosing appropriate majors and careers are also available through the Career Development Program located in Room 108, Aylesworth Hall and Room 101, Durrell Center.

All counseling services are confidential. Hours of operation are 8:00 a.m.-5:00 p.m. Monday through Friday. Emergency consultation is available after hours by calling 491-7111. Call 491-605 3 or come to C 36 Clark Building to make an appointment or obtain further information.

FINANCIAL AID OFFICE
Office in Student Services Building, Room 108
G. Kay Jacks, Director
The Financial Aid Office administers a variety of state; federal, and private financial assistance programs for qualified students. Financial assistance programs include scholarships, grants, loans, employment, and veterans' benefits. Employment opportunities are also available in this office including College Work-Study, on-campus departmental positions, and community part-time employment.

See also, the Financial Assistance section in this catalog.

UNIVERSITY HEALTH SERVICE
Office in University Health Service Building
Susan J. WolfeIt, Medical Chief of Staff
Pamela J. Zimdahl, Administrator
The University Health Service is staffed and equipped to provide outpatient care to meet most student needs. Outpatient services are available 7:30 a.m.-6:00 p.m., Monday through Friday. Saturday hours are 10:00 a.m.-1:00 p.m.; the Health Center is always closed on Sundays. X-ray, laboratory, pharmacy, physiotherapy, optometry, dental services, health education, alcohol education, and nutrition services are available. Hours vary during summer session, breaks, and holidays.

All students carrying six or more credits are eligible to use the Center. Part-time students and spouses may elect to pay the health fee for care by enrolling at the Center. The student health fee allows physician visits without charge to the user.

All students are required to complete a health history form prior to treatment at the Center. This history initiates the student's medical file and facilitates preventive medicine and emergency care. Medical records are confidential. No information is released without the patient's written request.

Colorado State University, in compliance with Colorado State laws and Health Department regulations, requires persons born January 1, 1957, or later to show proof of immunity against measles (two doses), mumps (two doses), and rubella (two doses) *by* submitting an immunization certificate to the University Health Service *prior* to arrival at school.

Additional information concerning immunization should be directed to Colorado State University, University Health Service, Bunny Jewert, Immunization, Fort Collins, CO 80523.

The University Health Service reserves the right to change services, charges, or hours of operation without notice due to financial or other reasons.

A sickness and accident insurance policy is available for students and student dependents at low cost. This is in addition to the University Health Service program funded by student fees. Insurance coverage is in effect during the school year and vacation periods.

This policy is optional; however, students are encouraged to have some coverage. *It is not necessary to have the student insurance in order to be treated at the Center.* A Student Health Insurance brochure is available through the Service.

HELP/SUCCESS CENTER

Office in Aylesworth NE, Room 201 and Durrell Center, Room 101
Paul Shang, Director
The Help for Education and Life Planning Center (HELP)/Success Center at Colorado State University combines the academic priorities of the faculty with a strong student affairs tradition. The HELP/ Success Center serves as an advising center as well as an academic major and career exploration resource for students enrolled in the University Open Option, prebusiness, pre-technical journalism, ACCESS, and CHOICE programs. In addition, University orientation programs are also coordinated by the Center.

General Services

The staff provides academic support including withdrawal procedures, academic advising, selection of a major, as well as career development and values clarification services to an increasing number of students.

Orientation Programs

All freshmen, transfer, readmitted, nontraditional, and international students attending Colorado State for the first time are urged to attend an orientation program. These programs are offered to help new students adjust to university life. During orientation, students meet with academic advisers and student orientation leaders, complete any necessary placement examinations, prepare class schedules, and register for first semester classes. Orientation introduces new students to the campus and its various programs, services, and activities in a personal and informal way.

New freshmen and their parents are particularly invited to attend Preview Colorado State, a one-and-a-half day orientation program held during summer. Other orientation programs are held just prior to registration, and The Premier welcomes new students to the University. Students receive orientation information soon after they are admitted. Questions should be directed to the Office of Orientation, HELP/Success Center.

OFFICE OF HOUSING AND FOOD SERVICES

Office in Palmer Center, 1005 W. Laurel
Grant P. Sherwood, Director

Residence Halls

Housing in the University residence halls provides services, programs, and facilities which are designed to enhance the student's total educational experience. Each residence hall is under the leadership of trained staff members, who are available to assist students in the development of programs, the understanding of policies, and to aid in the adjustment to University life.

Residence hall living allows students to actively participate in their hall's student government organization and educational programming opportunities. These activities provide experiences in leadership development and cocurricular education which supplement classroom instruction and greatly enhance the quality of on-campus University life.

First-Year Students
Experience has demonstrated that adjustment to academic and social life is greater for first-year students living in residence halls. For this reason, *all newly admitted first-year students without previous college experience, who are single, under 21 years of age, and not living with their parents, are required to live their first two consecutive semesters in residence halls.* All residents are required to sign a contractual agreement, which includes meals, and is binding for the entire academic year.

Reservation
The residence hall reservation form, along with an informational brochure, is mailed to newly admitted students as part of the admissions packet. Inquiries from continuing students should be directed to the Office of Housing and Food Services.

Special Residential Programs
Colorado State University seeks to give students the opportunity to live in residence halls that provide special programs which support the "whole person." Many of the programs allow residents the chance to interact with faculty members on a more informal basis, as well as provide special facilities for the use of the floor members.

The following programs are offered to give students a choice of environments in which to live. All inquiries should be directed to the Office of Housing and Food Services Assignment Coordinator. More specific information regarding each program is available upon request.

Academic Study Environment Floors house students who enjoy a more quiet study environment in which to live. Students will determine their own extended quiet hours program. Success of the program depends largely on the residents' willingness to self-monitor their own behavior.

Alcohol Free Floor is for students who choose to abstain from the use of alcoholic beverages and wish to live with other students making a similar commitment.

Bicycling Floors are available for enthusiasts of racing, touring, and mountain bike riding. Information on trips and training are among the programs offered to residents of these floors.

Engineering Program provides the opportunity for engineering students to live and learn in an environment that supports their academic and personal growth. Since eighty-five percent of the average student's week is spent outside the classroom, the living environment plays a major role in the educational experience.

Environmental/Community Outreach (ECO) Floors offer students, from a variety of fields, the opportunity to integrate their knowledge and share a common interest. Residents of this floor will learn of the many opportunities to become involved with children, senior citizens, and the developmentally disabled; to plant trees; clean up a river bed; and coordinate recycling efforts.

Equine and Agricultural Science Floors support students who possess an interest in horses and other animals, agronomy, farm and ranch management, food science, horticulture, landscape design, or agricultural business and economics.

Honors Program is a highly independent program where both social and educational programming is determined by the needs and wants of all floor members. Honors residents provide the same quality leadership and activity as the other residents in the hall while providing themselves with the opportunity to meet other honors students and to enjoy an atmosphere conducive to their academic goals.

International Awareness Floor offers a residential experience for American and international students. There will be opportunities to meet friends who are interested in international travel, politics, cultures, foods, and cultural events.

Leadership Floor residents are encouraged to become involved in the student organizations of Colorado State. Students will have the option of taking a personal development/leadership course that will help them learn new skills. The program provides an opportunity for student leaders across campus to interact with each other.

Multimedia Floors are for students with an interest in journalism, photography, graphic design, speech communication, film making, video art, international relations, or communication law. Darkroom facilities are available.

Natural Resources Floors support majors in this college with academic and outdoor opportunities as well as contact with student clubs.

Natural Sciences Floors are closely connected with the College of Natural Sciences. Tutoring and computer facilities are available to residents.

Nontraditional-Age Student Floor is directed toward the needs of the student who is 23 years or older. The floor provides a supportive environment to students, and programs are designed with the specific needs of this age group in mind. Students are encouraged to utilize the supportive services, programming events, and social occasions provided by the Nontraditional Student Office and the NTS Club.

Open Option Floors offer a chance to explore the many academic majors from which to choose. The HELP/Success Center, which provides advising for Open Option students, is adjacent to the hall with the Open Option Floors.

Outdoor Adventure Floors have a high percentage of nonresidents and are for students who like to plan activities other than solely "academic" programs. There is an emphasis on outdoor recreation such as backpacking, rock climbing, etc.

Performing and Fine Arts Floor provides support and education in the fields of art, dance, music, and theatre. Students in these areas face different types of stress such as auditions, performances, shows, and deadlines. There is a multitude of programming options for this group of students.

Personal Computer Floor is open to students interested in computers and their applications. Computers are not provided, but students are encouraged to bring their own. Any students who will be taking computer classes can benefit from this living experience.

Prebusiness Floors are set aside for an environment conducive to the academic and social needs of students seeking admission to the College of Business.

Benefits of the program include: association with students who are taking common courses, seminars by faculty, opportunities to get involved in on-campus business societies and organizations, quiet study atmosphere, and academic advising.

Preveterinary Medical Floor has an academic atmosphere. Students should be willing to learn about the prevet program and career alternatives. A mixture of prevet and veterinary medical students live on this floor.

Professional Futures and Occupational Therapy Floors focus on students seeking admission to, or already enrolled in, Colorado State's professional program in occupational therapy. However, the floors are open to students in preprofessional studies throughout the University.

Wellness Floor students participate in a variety of programming and floor functions that center around spiritual, intellectual, emotional, relational, sexual, environmental, physical, and vocational dimensions.

Women's High Technology Floor provides an atmosphere supporting women in their academic pursuits. The program has been developed for women in highly technical programs, such as

mathematics, physics, and chemistry. Many of the women are active in the Society of Women Engineers and the Engineering Legislature.

UNIVERSITY APARTMENT HOUSING

Apartment Life

Office in Palmer Center

FAMILY HOUSING

Aggie Village North and South

Aggie Village offers 289 furnished and unfurnished apartments with single-level floor plans in two-story buildings. Centralized laundry facilities, playground areas, a fitness center, and community center are located in the Village. A number of modified apartments for physically disabled students are available upon request. All utilities, including telephone and cable television hook-up, are included in the monthly rent.

University Village East and West

University Village is located west of campus. University East consists of 150 two-bedroom furnished and unfurnished townhouse apartments. University West offers 150 two-bedroom and 50 three-bedroom townhouse units (third bedroom is not furnished). Central laundry facilities and playground areas are provided in each area. A community center, study area, and fitness center are located in the Village. All utilities, including telephone and cable television hook-up, are included in the monthly rent.

Single Graduate and Nontraditional-Age Student Apartments

Lory Apartments are located on the northwest side of the main campus. These buildings consist of one-and two-bedroom units. The two-bedroom units are ' designed to be shared with one other single graduate and/or single nontraditional-age student. The one-bedroom apartments are rented to one student. Some two-bedroom shared apartments in Aggie and University Villages are reserved for single nontraditional-age and graduate students. Laundry facilities are available in each of the Lory Apartment buildings and centrally located in Aggie and University Villages. All areas have community rooms and fitness centers. All utilities, including telephone and cable television hook-up, are included in the monthly rent.

New Apartment Housing

Colorado State University is constructing 200 additional apartments for families, single graduate, and nontraditional-age students. These new apartments become available for occupancy in 1994.

Housing Assignments

The University apartment housing application and an International brochure are mailed to newly admitted students along with their certificate of admission. Inquiries from continuing students should be directed to the Office of Housing and Food Services.

Priority for assignment is determined by date of application. Deposits are refundable in full, prior to assignment, upon request by the applicant. If the applicant is assigned to an apartment, the deposit is held as a damage deposit. Any credits and/or charges (including the damage deposit) will be submitted to the student's account within 30 days after the resident vacates the apartment.

OFF-CAMPUS HOUSING

ASCSU Off-Campus Student Services

Office in Lory Student Center, Commuter Lounge

For those who desire to live off campus, ASCSU Off-Campus Student Services coordinates a free rental housing listing service for houses, duplexes. mobile homes, apartments, condominiums, rooms-in-homes,' and rentals-to-share. The office also provides numerous services to help the student have a successful off-campus living experience. This includes information on tenant's rights and responsibilities, lease interpretation, and roommate conciliation. Students planning to rent off-campus housing are encouraged to visit ASCSU Off-Campus Student Services before completing any rental transactions and to personally inspect off-campus housing facilities before signing any rental agreements since the University takes no responsibility for these accommodations.

STUDENT LEGAL SERVICES

Office in Lory Student Center, Room 200 E.
Jeanne Durr. Director
Student Legal Services is a group legal service providing legal advice and counsel to full fee-paying students on a variety of legal matters. Some of the more common cases involve tenant issues, traffic citations, consumer complaints, and wills. The staff works to educate clients about their legal rights and responsibilities and assist in the resolution of legal problems. Clients, who typically handle their own cases, are encouraged to learn about the methods and procedures necessary to deal with legal problems, including negotiation, mediation, and small claims court. The staff is available for educational presentations on campus.

CHARLES A. LORY STUDENT CENTER

Main Office in Lory Student Center, Second Floor
Manny Cunard. Director
The Lory Student Center is one of the largest and most heavily used student centers in the United States. Serving as the hub of University activities, the Center provides a variety of services to students, faculty, staff, and the community. In 1986, it was chosen by The New York Times as one of the top ten student centers in the country.

The Lory Center exists to encourage and advance the development and education of Colorado State students. The aim of the Center's innovative services and up-to-date programming is to create a stimulating and supportive atmosphere for all. The Center not only provides quiet, comfortable study areas, dining areas, and entertaining activities, but strives to construct an exciting, dynamic environment for the entire University community.

Housed in the Center is the University Bookstore, Box Office, Information Desk, the University Club, Cullman Gallery, Copy-Rite (photocopying), a video game room, bowling alley, commuter lounge, pottery studio, photo lab, hair stylist, florist, travel agency, a bike repair shop, an outdoor equipment rental shop, a microcomputer lab, and bank automatic teller machines. Serving over 25,000 people daily, the Center also offers a variety of reservable space such as: private dining and meeting rooms, ballrooms, and a 670-seat theatre. On an average day at the Center, there are 60 meetings with about 1.200 people attending.

The Center offers extensive dining choices which range from a formal, lull-service restaurant to fast foods. Lory Center Catering is also available to provide banquets for 1,200 or coffee and doughnuts for two.

The Center is the residence for the *Rocky Mountain Collegian* (the daily University newspaper), the *Silver Spruce* yearbook, KCSU-FM, ASCSU student government offices, Off-Campus Student Services, Career Services, Student Legal Services, the Office of the Ombudsman, El Centro/Hispanic Student Services, and various other student-related organizations.

Lory Center Governing Board

The Lory Center Governing Board is charged with the responsibility for developing and enforcing policies and guidelines for the appropriate use of the Lory Student Center. This Board, which consists of students and faculty, also analyzes and makes Center space assignments.

Campus Activities Center

The purpose of the Campus Activities Center is to promote cultural, recreational, social, and educational opportunities for the University community. The mission is to provide aesthetic, intellectual, and experiential challenges in an atmosphere which promotes creative dialogue, debate, and a sense of personal accomplishment.

The Campus Activities Center facilitates several personal and leadership development classes and workshops. Some are for course credit, others are cocurricular in nature. In addition, the President's Leadership Program is coordinated by Campus Activities Center staff.

Campus Activities Center includes Cultural Programs, the Greek Life Office, the Information Desk, Outdoor Adventure Program, and Student Organizations.

Cinema CSU presents foreign and American, classic and contemporary films each weekend. Festivals and special feature films are included in this comprehensive film program.

Entertainment Council, an all-student board. is concerned with the popular arts. Past presentations have included concert performers John Bayley. the Beach Boys, Willie Nelson. and George Benson; improvisational theatre; mimes; magic; and the Creative Arts Symposium.

Fine Arts Series, a student-faculty committee, sponsors approximately 15 programs a year. Programs in the past have included The Acting Company, Pilobolus Dance Theatre, pianist Philip Glass, Sweet Honey in the Rock, San Francisco Mime Troupe, Edward Abbey, Gwendolyn Brooks, Maya Angelou, and several major art exhibitions.

The Greek Life Office provides assistance and sup*port* to the social fraternity and sorority chapters at Colorado State as well as advising to Greek Supplemental Programs, IFC, Panhellenic, and Order of Omega.

The *Information Desk* is a resource center for information which is shared via telephone, person-to-person contact, and printed materials.

The *Outdoor Adventure Program* offers a variety of participatory programs for students, faculty, and staff. Some of the classes include wilderness survival, rock climbing, cross-country skiing, kayaking. and cycling. An Outdoor Resource Library and Rental Shop are additional dimensions of this curricular-learning program.

Student Organizations assists recognized student and student-affiliated organizations in program planning, public relations, financial/budgetary matters, and leadership development for organizational of-ricers and members. More than 200 campus organizations reflect the wide range of student interests -academic, political, religious, and special interest. Advising ASCSU is an integral part of this operation.

Student Government
All full-time Colorado State students are members of Associated Students (ASCSU), the student governing body which promotes the interests and welfare of the student. Students are represented by student senators and the ASCSU cabinet.

Programs and services provided by ASCSU include community services volunteer program. renters' information, test file, and off-campus student services.

Closely affiliated with student government are student-faculty committees including the Committee on Student Life, Athletic Advisory Committee, Lory Center Governing Board, Student Health Committee, and Student Fee Review Board.

KCSU-FM
KCSU, located at the north end of the Lory Student Center. is a professional public radio station broadcasting 365 days a year, 24 hours a day, at 90.5 on the FM band. The programming is a diversified format of acoustic alternative music coupled with award-winning' news from American Public Radio, and distributor of Monitor Radio and the BBC World News Service. Additionally, KCSU offers a complete span of local and regional news. KCSU represents Colorado State throughout northeast Colorado, with primary emphasis on Fort Collins, Loveland, and Greeley.

KCSU's staff consists of both full-time and part-time employees, including work-study and intern students. Students are offered the opportunity to learn from participating in a professional broadcast station.

UNIVERSITY OMBUDSMAN OFFICE
Office in Lory Student Center, Room 182
Gilbert Gutierrez. Ombudsman
The University Ombudsman Office helps ensure that students, faculty, and staff receive fair and equitable treatment within the University system. The Ombudsman considers all sides of a question in an objective manner, then determines how best to help bring about a nonadversanal solution at the lowest possible level. When appropriate, the Ombudsman can facilitate

communication between parties who find themselves in a dispute. Other services offered include: information and referral; consultation on conflict resolution options and approaches; mediation; and training in conflict resolution. All contacts with the Ombudsman's office are confidential.

PARKING MANAGEMENT

Office in Aylesworth Hall. Room C 107

Wendell E. Westfall, Manager

Parking at Colorado State University is provided for faculty, staff, students, and visitors. Parking permits are required and can be purchased at the Office of Parking Management. Colorado State has over 11,000 parking spaces on campus allocated to promote the best interests of the entire University community. For specific information, contact the Office of Parking Management.

UNIVERSITY-WIDE INSTRUCTIONAL PROGRAMS

ENVIRONMENTAL STUDIES

Colorado State University is second to none in terms of relevant academic, research, and outreach programs which address the environmental needs of Colorado, the nation, and the world. A key component of Colorado State's 21st-century, land-grant mission is to provide "liberal and practical" education in the science and technology of environmental management. The broad spectrum of environmental studies at Colorado State is uniquely dispersed over 100 majors and concentrations housed in 31 of the 57 departments of the University. At Colorado State, it is hard to find a degree or department that does not directly connect with environmental issues.

Campus-wide participation in environmental science and management is a result of the fundamental linkages between basic science and management of critical environmental issues that are a part of the Colorado State culture. A unique strength of the campus is the integration of its many programs. Integration results from a long-standing institutional culture and commitment that is very supportive of interdisciplinary research, teaching, and service.

Regardless of the major or program of study selected by the student, the goal of each is to:

1. Understand that scientific knowledge, policy considerations, and ethical issues are necessarily joined;

2. Comprehend the interrelationships among the environment, natural resources, and human society;

3. Perceive the need to integrate diverse social, political, legal, institutional. and biophysical considerations' inherent in attaining environmental goals;

4. Educate students to be articulate, sensitive, and knowledgeable about the complex environmental issues facing society;

5. Provide a balanced understanding of the natural and social processes as they relate to the environment.

All programs of study relating to environmental studies at Colorado State are incorporated in existing majors in the following departments.

PROGRAMS IN ENVIRONMENTAL STUDIES

College/Department	Environmental Program Focus
College of Agricultural Sciences	
Agriculture and Natural Resource Economics (B.S., M.S., Ph.D.)	Water, land, and soil management; risk assessment; water quality; policy analysis; sustainable systems ; natural resources and environmental management
Agronomy (B .S., M.S., Ph.D.)	Water, land, and soil management; risk assessment; global warming; ecology and ecosystem management; pollution control; natural resources management; water quality; sustainable management
Entomology (M.S., Ph.D.)	Water, land, and soil management; ecology and ecosystem management; pollution control; natural resources management; water quality; biodiversity; risk assessment
Horticulture (B.S., M.S., Ph.D.)	Water, land, and soil management; ecology; plant, landscape, and ecosystem management; natural resources management; environmental design and planning
Plant Pathology and Weed Science (M.S., Ph.D.)	Land and soil management; ecology and ecosystem management; pollution control; natural resources management; pest management in ecosystems
College of Applied Human Sciences	
Industrial Sciences	Air and climate

(B.S., M.S.)	
College of Engineering	
Agricultural and Chemical Engineering (B .S., M.S., Ph.D.)	Water, land, and soil management; irrigation engineering; non-point source pollution control; groundwater hydrology; water quality management; bioremediation; natural resources management
Atmospheric Science (M.S., Ph.D.)	Air and climate; global warming; ecology and ecosystem management; pollution control
Civil Engineering (B.S., M.S., Ph.D.)	Water resources; land and soil management; air and climate; risk assessment and management; policy analysis; global warming; pollution control; natural resources management
Mechanical Engineering (B.S., M.S., Ph.D.)	Air and climate; risk assessment and management; pollution control; waste minimization
College of Liberal Arts	
Anthropology (B.A., M.A.)	Policy analysis; ecology and ecosystem management
English (B.A., M.A.)	Nature writing; interpretation
History (B.A., M.A.)	Western natural resources management; water management; land management; historical preservation
Philosophy (B.A., M.A.)	Land and soil; policy analysis; normative policy ethics; environmental ethics; sustainable development ethics
Political Science (B.A., M.A., Ph.D.)	Water management; air and climate; policy analysis; natural resources management; international and trans-boundary resource management; comparative environmental policy; pollution and hazardous waste control
Sociology (B.A., M.A., Ph.D.)	Water management; risk management; policy analysis, natural resources management; pesticide management; rural development
College of Natural Resources	
Earth Resources (B.S., M.S., Ph.D.)	Water, land, and soil manag ement; air and climate; risk assessment and management; global warming; ecology and ecosystem management; pollution control; environmental geology; sedimentology
Fishery and Wildfire Biology (B.S., M.S. Ph,D.)	Wafer. land, and soil management; risk assessment and management; policy analysis; ecology and ecosystem management: pollution control; natural resource management; biodiversity; conservation biology
Forest Sciences (B.S., M.F., M.S., Ph.D.)	Water, land. and soil management; risk assessment and managemen t; policy analysis; global warming; ecology and ecosystem management; pollution control; geographical information systems; natural resources management: biodiversity; conservation biology
Range Science (B.S., M.S. Ph.D.)	Climate; risk management; policy analysis; global warming; ecology and ecosystem management; natural resource management; biodiversity; riparian systems
Recreation Resources (B.S., M.S., Ph.D.)	Water, land, and soil management; air and climate; policy analysis; pollution control; natural resources management: risk assessment; historical preservation; human dimensions in natural resources; ecotourism: interpretation
Natural Resource Ecology Laboratory	Water. land, and soil management; air and climate: risk assessment and management; policy analysis; .global warming: ecology and ecosystem management; pollution control; natural resources management
College of Natural Sciences	
Biology	Water, land, and soil management; risk assessment; global warming;

(B.S., M.S., Ph.D.)	ecology and ecosystem management; pollution control
Chemistry (B.S., M.S., Ph.D.)	Water chemistry; water quality
Physics (B.S., M.S. Ph.D.)	Pollution control
Psychology (B.S., M.S., Ph.D.)	Policy analysis, ecology and ecosystem, management: natural resources management
College of Veterinary Medicine and Biomedical Sciences	
Clinical Sciences (M.S., Ph.D.)	Veterinary health management; zoological medicine
Environmental Health (B.S., M.S., Ph.D.)	Toxicology; epidemiology; industrial hygiene/occupational safety; public health; risk assessment
Microbiology (B.S., M.S., Ph.D.)	Human and veterinary health; ecosystem function
Pathology (M.S., Ph.D.)	Causes and mechanisms of disease processes
Physiology (M.S., Ph.D.)	Environmental biology
Radiological Health Sciences (M.S., Ph.D.)	Radiation protection/health physics; radio ecology; radiobiology

INTERNATIONAL PROGRAMS

Dean Jaros, Director

International Programs has many dimensions at Colorado State University. International Programs are organized under: International Education and Training; International Student Services; and International Research and Development.

International Education and Training

Office in Aylesworth Hall, Room 315

Freeman M. Smith, Associate Director

Colorado State believes that all students and faculty should gain knowledge to live and work in an increasingly internationalized environment, an increasingly interdependent world. This can be accomplished by students and faculty participating in relevant international experiences on campus or abroad, learning about other cultures and issues of world importance, and committing part of their academic program to international studies.

Opportunities for international education and training exist in every college in the University. The Office of International Education and Training is the coordinating center for bringing awareness to the students and faculty of these opportunities and for facilitating arrangements for students and faculty to participate in the international dimension. Each college has an International College Coordinator who coordinates international opportunities for the students and faculty in their college.

Undergraduate students are offered a spectrum of opportunities to explore world cultures through the international Interdisciplinary Studies Programs for Asia, Latin America, and Russia and Eastern Europe, exchange programs, summer programs, study abroad, the Peace Corps, international research experience, and weekly international seminars.

Undergraduate students in agriculture or engineering who have an interest in continuing for an advanced degree in business are afforded the opportunity to continue for a master's degree in business management. Certain graduate students in agriculture and natural resources may join the Peace Corps Master's Internationalists program. Master's degree studies and Peace Corps service proceed in tandem. Interested students should apply simultaneously for admission to the Graduate

School at Colorado State University and to the Peace Corps six months in advance of the semester of anticipated enrollment.

Interdisciplinary Studies Programs
Undergraduates may enrich their understanding of regional cultures through the area studies for Asian, Latin American, and Russian and East Central European Interdisciplinary Studies Programs. For further information, refer to University Interdisciplinary Studies Programs in this section.

Study Abroad
Colorado State University encourages its students to undertake a semester or full academic year of study outside the United States to broaden their perspectives and increase their understanding of other cultures. Direct exchange programs and agreements with foreign universities allow qualified students to attend universities virtually worldwide. Students who want to include study abroad or participate in exchange agreements should plan for them by discussions with the Study Abroad adviser in the Office of International Education and Training when they first come to the campus, Deadlines for most programs are in October for the spring semester and March for the fall semester.

In addition to formal study abroad, there are many other opportunities for undergraduate students to enjoy a significant international experience through volunteer programs, work-based experience, internships, and experiential learning.

Various grants are available for international graduate study, including Fulbright, Marshall, Rhodes, and Rotary International fellowships. Application deadlines for these fellowships are usually in the fall the year before the student goes abroad. Students should contact the Office of International Education and Training at least 18 months before planning to go abroad. The University also formally sponsors exchange programs. In some cases, thesis or dissertation research may be arranged in connection with faculty members' international projects.

International Training
Colorado State University offers a variety of short courses and nondegree training programs in a variety of disciplines. In general, the clientele for these programs is international scholars, scientists, or technicians who need focused training in specific areas. Short courses are offered on the Colorado State campus and in-country. Although short courses are not part of a formal degree program, many are available for credit.

More comprehensive nondegree training programs are offered through each of the eight colleges; the International Center for Agriculture and Resource Development; the International School for Natural Resources; and the International School for Water Resources and Associated Programs. These training programs may involve up to one year of residence. Also offering short-term training opportunities are the Colorado Institute for Irrigation Management and the International Institute for Civil Engineering. For more information regarding short courses and nondegree training programs, contact the Office of International Education and Training.

International Student Services
Office in Aylesworth Hall, Room 315
Jean S. Griswold, Director
International Student Services provides immigration documentation and subsequent immigration services to foreign students. It also provides other support services such as pre-arrival information, on-campus orientation, assistance in housing, advising on problems arising from living in the United States, and serves as liaison to sponsoring agencies.

Foreign students are provided with a special orientation program before the start of classes each semester. Accordingly, these students are required to report to campus at an earlier date. This orientation program deals with academic matters, immunization requirements, health insurance policy, immigration requirements, and cultural adjustments to the University and the Fort Collins community. Because of the importance of orientation for new arrivals, attendance is required of all new foreign students.

Special services are available for agency-sponsored students. The office assists students by providing an international component to the cocurricular activities of the University through such events as International Week, the International Companions program, and other multicultural experiences. It facilitates the sharing of the experience of foreign students as a resource in classes, both on and off campus, and supports many community outreach programs.

International Research and Development

Office in University Services Center, Room 410
Merle H. Niehaus, Director

The University contracts for research and development projects in foreign countries, primarily developing countries. Federal agencies such as USAID and nonfederal organizations such as multilateral banks are the major sources of funding. Faculty develop proposals and serve in foreign countries on both short- and long-term assignments. Past activities have featured water resources and agriculture. However, the focus of international research and development is changing towards environmental issues, business management, health, and privatization. The Director of International Research and Development solicits funding for projects and coordinates the many units that participate in their implementation.

UNIVERSITY
INTERDISCIPLINARY STUDIES PROGRAMS

An interdisciplinary studies program is a series of courses focused upon a particular problem or area of concern providing a variety of disciplinary perspectives.

Although completion of courses in an interdisciplinary studies program does not lead to a degree, credits earned in these courses can be used in meeting the requirements for a degree.

An interdisciplinary studies program includes a core of required courses, with some selectivity, and also a wide choice from supporting courses.

Interdisciplinary studies are designated in the catalog to assist the student in identifying logically related course work in a broad subject-matter area.

Completion of requirements for an interdisciplinary studies program is noted on the student's academic record (transcript) but not on the diploma. The minimum number of credits in an undergraduate interdisciplinary studies program is 20. No minimum number of credits is specified at the graduate level.

Asian Interdisciplinary Studies Program

Office in Aylesworth Hall, Room 315
Coordinated by a Faculty Advisory Board and the Office of International Education and Training

Asian studies is an interdisciplinary program designed as a component within a student's major and has four basic objectives: to broaden understanding of the cultures and civilizations of Asia; to explore various disciplines dealing with a common area of study; to provide a coherent program of Asian studies enabling students to become more effective international citizens; and to enable students to live and work more effectively in Asian cultures.

Program details are available from the Office of International Education and Training.

A minimum of 21 credits is required including 10 credits outside the student's major. Courses must be taken in at least *three* disciplines.

Core Courses (6 credits required)			**Credits**
PL	106	Wisdom of the East-Oriental Philosophy	3
		or	
PL	172	Religions of the East	3

Select one course from the following:

HY	273	Asia-The Formative Years	3
HY	274	Asia-Years of Transformation	3
L	105C	First-Year Chinese I	5

L	105J	First-Year Japanese I	5

Asian Studies Area Courses (9-15 credits required)			**Credits**
AR	112	History of Oriental Art	3
AR	311	Art of Africa	3
E	347/HY 347	Modern Mideast Through Literature	3
E	356	Asian Literature	3
HY	215	Revolution and Conflict in the Middle East	3
HY	302	Ancient Civilization-Near East	3
HY	340	Late Imperial China	3
HY	341	Revolutionary China	3
HY	342	Japan Since 1800	3
HY	346	Eastern Rome. Islam and the West. 500-1453	3
HY	404	Ancient Israel	3
HY	453	Pacific Wars. 1937-1975	3
IE	271	India	3
L	102J	Introduction to Japanese Language and Culture I	3
L	102K	Introduction to Korean Language and Culture I	3
L	103J	Introduction to Japanese Language and Culture II	3
L	103K	Introduction to Korean Language and Culture II	3
L	107C	First-Year Chinese II	5
L	107J	First-Year Japanese II	5
L	200J	Second-Year Japanese I	5
L	201J	Second-Year Japanese II	5
L	309	Contemporary Chinese Literature and the Arts	3
PL	309	Ideas in Oriental Art and Literature	3
PL	349	Philosophy of Tao and Zen	3
PL	360	Topics in Oriental Philosophy	3
PL	369	Mind and Body in Eastern Thought	3
PL	371	Contemporary Eastern Religious Thought	3
PL	379	Mysticism East and West	3
PO	445	Comparative Asian Politics	3

Supporting Field Courses (0-6 credits)
May be taken from courses approved by Advisory Board.

Biotechnology Interdisciplinary Studies Program
Office in Anatomy/Zoology Building, Room W I02
Coordinated by a Faculty Advisory Board and the Assistant Dean for Biomedical Sciences, College of Veterinary Medicine and Biomedical Sciences

The Biotechnology Interdisciplinary Studies Program is a cooperative effort of faculty from departments in several colleges of the University who share a common interest in the commercial application of biological systems and processes. The purpose of the program is to provide students with the interdisciplinary background necessary for understanding the roles of the various majors in the emerging field of biotechnology.

Program details are available from the office of the Assistant Dean for Biomedical Sciences, College of Veterinary Medicine and Biomedical Sciences.

Students must select a minimum of 21 credits from a combination of core and elective courses.

			Credits	
Biochemistry Core				**4-6**
BC	351	Principles of Biochemistry	4	
BC	352	Principles of Biochemistry Laboratory. I		
BC	401	Comprehensive Biochemistry I	3	
BC	403	Comprehensive Biochemistry II	3	
BC	404	Comprehensive Biochemistry Laboratory	2	
		Microbiology Core	8	

MB	300	General Microbiology	4
MB	436	Industrial Microbiology	4

Process Engineering Core			**4-6**
AC	304	Unit Operations and Transport Phenomena I	3
AC	305	Unit Operations and Transport Phenomena II	3
AC	306	Momentum and Heat Transfer Laboratory	2
BH	306	Bioprocess Engineering	4

Biotechnology			
BH	450	Topics in Biotechnology	2

Electives (chosen from courses not required for graduation in the major and approved by the Advisory Board)

Cell and Molecular Biology
Interdisciplinary Graduate Program
Graduate Faculty of Cell and Molecular Biology
Office of the Graduate School

The graduate program in cell and molecular biology is a cooperative effort among a number of faculty members from several different colleges and departments of the University with common interests in this general area of modern biology. The purpose is to offer an interdisciplinary program for M.S. and Ph.D. students enrolled in various academic departments.

The program itself does not lead to a degree in cell and molecular biology; the credits earned in the courses of the program are fully compatible with and contribute to the completion of the degree requirements in any of several departments. The program includes a core of lecture courses, modular courses in laboratory research methods and techniques, and a seminar course in which students. faculty, and visiting scientists participate.

Program details are available from the Office of the Graduate School.

			Credits
M.S. Program			
BC	401,403	Comprehensive Biochemistry I,II	6
CM	501	Advanced cell Biology	4
CM	701A-I	Topics in cell and Molecular Biology	2
CM	702A-G	Methods in Cell and Molecular Biology	2
CM	792	Cell and Molecular Biology Seminar	1

Ph.D. Program			
BC	401,403	Comprehensive Biochemistry I, II	6
CM	501	Advanced Cell Biology	4
CM	701 A-I	Topics in cell and Molecular Biology	4
CM	702A-G	Methods in cell and Molecular Biology	4
CM	792	Cell and Molecular Biology Seminar	2

Conservation Biology Interdisciplinary Studies Program
Office in Natural Resources Building, Room 101
Coordinated by a Faculty Advisory Board and the Office of the Dean, College of Natural Resources

The Conservation Biology Interdisciplinary Studies Program is designed to benefit primarily students interested in contemporary environmental issues that deal with the loss of biotic diversity. In addition, the Program will prepare students to best manage for biotic diversity in present-day landscapes.

Program details are available from the Office of the Dean, College of Natural Resources.

Core Curriculum			**Credits**
AG	330	Principles of Genetics	3
BY	220	Ecology	3
NR	120	Environmental Conservation	3
NR	200	Maintenance of Biotic Diversity	3
NR	495	Independent Study	1-2
S	320	Population-Natural Resources and Environment	3

Select at least three credits from the following:

B	355	Ecology of Landscapes	3
EH	446	Environmental Toxicology	3
EN	453	Population Ecology	3
F	311	Forest Ecology	3
FW	474	Wildlife Ecology	3
NR	360	Methods of Landscape Analysis	3
PL	345	Environmental Ethics	3
PO	361	Politics and Natural Resources	3
RS	331	Range Ecogeography	2
Z	478	Evolution	3

1. B 350/Z 350 may be substituted.

2. The number of credits taken must assure a minimum of 20 total credits in the program.

Criminal Justice Interdisciplinary Studies Program
Office in Clark Building, Room C 130 Coordinated by a Faculty Advisory Board and the Associate Dean, College of Liberal Arts

The interdisciplinary studies program in criminal justice is designed as a component within a student's major in which free electives are used to complete 20-21 credits. The program has five basic objectives: to broaden students' understanding of criminal justice issues and problems in contemporary American society; to expose students to a number of disciplines dealing with a common area of knowledge; to enhance the students' major field of study with an area concentration that broadens the scope of their education; to enhance students' career options; and to promote cross-disciplinary and interdisciplinary cooperation among participating faculty and students.

Program details are available from the Office of the Associate Dean, College of Liberal Arts.

A minimum of 18 semester credits of the total 20-21 credits required in the program must be in upper-division courses. Students must earn a minimum grade of "C" in each course comprising the Criminal Justice Interdisciplinary Studies Program.

Core Courses			**Credits**
PO	413	Civil Liberties in America	3
S	253	Introduction to Criminal Justice	3
S	352	Criminology	3
		or	
S	372	Sociology of Deviance	3
S	354	law Enforcement and Society	3
SW	371 B	Social Work with Juvenile Offenders	3
		or	
SW	371C	Social Work with Adult Offenders	3
		Internship	3
		or Independent Study	3

	Credits
Supporting Courses	**2-3**

AP	315	Psychological Anthropology	3
AP	413	North American Indians Today	3
AP	479	Forensic Anthropological Methods	3
FO	496A-1	Group Study	Var.
HC	411	Families and the Legal Environment	2
HD	311	Adolescence	3
PO	305	Judicial Politics	3
PY	320	Abnormal Psychology	3
PY	325	Psychology of Personality	3
PY	465	Adolescent Psychology	3
S	330	Social Stratification	3
S	332	Comparative Majority-Minority Relations	3
S	333	Gender Roles in Society	3
S	352	Criminology	3
S	372	Sociology of Deviance	3
SW	370B	Social Work Practice-Mental Health	3
SW	371A	Social Work with Children and Families	3
SW	371 B	Social Work with Juvenile Offenders	3
SW	371C	Social Work with Adult Offenders	3

1. Can be used to fulfill supporting course requirement if not used as a core course requirement.

Ecology Interdisciplinary Graduate Program
Graduate Faculty of the Program for Ecological Studies Office of the Graduate School

The Program for Ecological Studies offers outstanding opportunities for graduate study in basic and applied aspects of ecology. Any student enrolled in a master's or doctoral degree program within a department may participate in this University-wide, interdisciplinary ecological studies program. The program is a cooperative effort among over 70 faculty members from 14 departments and 5 colleges of the University who share a common interest in ecology.

Through the cooperation of the .many academic departments and government agencies, the program offers a wide array of facilities, field research sites, equipment, and support services. Because of its location, one of the University's greatest resources is its accessibility to a wide variety of field study sites. Nearby major habitats include: shortgrass and nuxed-grass prairies; sagebrush plains; montane and sub-alpine meadows, forests, and open mountain grass-lands; southwestern deserts; alpine peaks; river and lake systems; and numerous agroecosystems.

Program details are available from the Office of the Graduate School.

Core Courses (minimum of 8 credits)			**Credits**
EY	500A-B	Theories in Autecology	3-4
EY	501A-B	Theories in Synecology	3-4
EY	571	Advanced Topics in Ecology	1-3

Satellite ecology courses which may be used in the Program for Ecological Studies (minimum of *12* credits required):

			Credits
Organismal Ecology 2			
AP	470	Primate Behavior and Ecology	3
B	450	Plant Ecology	4
B	530	Ecological Plant Morphology	2
F	510	Ecophysiology of Trees	3
FW	400	Fish Ecology	3
FW	540	Stream Fish Ecology and Management	3
MB	624	Microbial Ecology	2
Z	475	Animal Ecology	4
Z	510	Zoo physiological Ecology	3
Z	576	Biophysical Ecology	3

Population Ecology 2

B	450	Plant Ecology	4
B	530	Ecological Plant Morphology	2
EN	453	Population Ecology	3
FW	474	Wildlife Ecology	3
FW	662	Wildfire Population Dynamics	3
Z	475	Animal Ecology	4
Z	478	Evolution	3
Z	535	Behavioral Ecology	3

Community and Ecosystem Ecology 2

AG	455	Soil Microbiology	3
AG	755	Advanced Soil Microbiology	3
B	450	Plant Ecology	4
B	550	Research Methods in Plant Ecology	3
B	551	Plant Geography	3
F	624	Fire Ecology	3
FW	400	Fish Ecology	3
MB	432	Aquatic Microbiology	4
NR	575	Systems Ecology	4
NR	660	Biogeochemical Cycling in Ecosystems	3
NR	676	Ecological Models	4
R	670	Radioecology	3
RS	578	Ecology of Disturbed Lands	3
RS	630	Ecology of Grasslands and Shrublands. 3	
RS	640	Vegetation-Environment Analysis	3
RS	651	Primary Production and Decomposition	4
RS'	652	Secondary Production in Rangeland Ecosystems	4
Z	440	Freshwater Biology	4
Z	441	Stream Biology	3
Z	475	Animal Ecology	4
Z	576	Biophysical Ecology	3

Seminar Courses in Ecology

EY	592	Interdisciplinary Seminar in Ecology	1-3
Z	692E	Seminar in Ecology	Var.

1. Other courses may be substituted with the approval of the Academic Coordinator, Program for Ecological Studies.

2. A reasonably balanced distribution of courses among organismal. population, and community/ecosystem ecology will be required by the Academic Coordinator. Courses listed in more than one category may only be used for a single category.

EXERCISE SCIENCE AND NUTRITION

Interdisciplinary Graduate Program

Graduate Faculty of Exercise and Sport Science and Food Science and Human Nutrition Departments Office of the Graduate School

This interdisciplinary graduate program is a cooperative effort offered by the Department of Exercise and Sport Science and the Department of Food Science and Human Nutrition. It provides a unique opportunity for students to pursue combined educational interests in fitness, diet/nutrition, health, and athletic performance. Students enrolling in this program will receive their M.S. degree in either exercise and sport science or food science and nutrition, and completion of requirements for the interdisciplinary studies program will be noted on their transcript. Faculty members from both departments co-chair graduate thesis committees, and students are encouraged to explore research topics which bridge the respective disciplines of exercise and sport science and food science and human nutrition.

Program details are available from the Office of the Graduate School.

Core Curriculum			Credits
EX	553	Advanced Measurement and Evaluation	3
	or		
ST	301	Introduction to Statistical Methods	3
EX	560/FN 560	Exercise and Nutrition	3
EX	600	Research Methods	3
EX	603	Advanced Topics in Exercise Physiology	3
EX	692	Seminar	2
		or	
FN	692	Seminar	1
EX	696C	Group Study in Exercise and Nutrition. I or	
FN	696D	Group Study in Exercise and Nutrition. I	
EX	699	Thesis	10
		or	
FN	699B	Thesis-Nutrition	10
FN	550. 551	Advanced Nutritional Science I, II	6
PS	500	Mammalian Physiology I	4
		or	
PS	501	Mammalian Physiology 11	4
		Electives:	6-7

1. ST 301 or higher with consent of student's graduate committee.

2. The elective credits will be used to meet the student's requirements for the M.S. degree in either food science and human nutrition or exercise and sport science.

Gerontology Interdisciplinary Studies Program
Office in Gifford Building, Room 104
Coordinated by a Faculty Advisory Board and the Office of the Dean, College of Applied Human Sciences

The Gerontology Interdisciplinary Studies Program is a cooperative effort among faculty from different departments and colleges of the University who share a common interest in gerontology, the study of human aging. The primary purpose of the program is to provide students with background knowledge and practicum/internship experience to work effectively with and for the elderly in a variety of settings, and to enter professions in which there is a need to combine insight and skills derived from their major with knowledge about the aging process.

Program details are available from the Office of the Dean, College of Applied Human Sciences.

			Credits	
Core Requirements				**12**
HD	301	Perspectives in Gerontology	3	
HD	322	Adult Development and Aging	3	
SW	371F	Social Work with Social Gerontology	3	
Z	430	Biology of Aging	3	
Elective Courses			**5-8**	
FN	459	Nutrition in the Life Cycle	3	
HC	410	Family Financial Resources and Public Policy	3	
HC	460	Housing and Design for Special Populations	3	
HD	323	Death.Dying, and Grief	3	
OT	355	Handicapped Individual in Society	2	
OT	465	Theory and Practice in Gerontology	2	
PI	366	Philosophy of Aging	3	

Minimum of one to *three credits* practicum or internship directly related to the aging.

Hispano-American Interdisciplinary Studies Program
Office in Lory Student Center, El Centro,
Room 178 Coordinated by a Faculty Advisory Board and the Director of Hispano-American Studies

The Hispano-American Interdisciplinary Studies Program is dedicated to meeting the educational and research needs of faculty and students who wish to learn more about the Hispanic experience within Colorado and the North American context. The program endeavors to promote research on issues and concerns related to the Hispanic experience and provides an instructional and resource base for practicing and future professionals who are working with Hispanic populations.

Hispano-American Studies is designed as a component within a student's major in which free electives are used to complete 21 credits from a list of approved courses. Courses fall into two categories: Hispanic area courses dealing more specifically with the American Southwest and the U.S./Mexico border, and course work that concentrates on Mexican and Caribbean history culture.

Program details are available from the Office of El Centro. Students should consult with the Program Director prior to beginning the program.

Required Course			**Credits**
HA	200	Introduction to Hispano-American Studies	3

Core Courses (minimum of 12-13 credits)			
AP	331	Peoples and Cultures of Mexico	3
ED	256	Education of the Hispanic	3
ED	428	Exceptionality, Diversity and Human Relations	3
ED	486C	Practicum-Exceptionality and Diversity	3
HA	492	Seminar	1
HY	472	American Southwest	3
PY	492	Seminar	3
SW	365	Exploring Hispanic Identity	3
	495	Independent Study (in department chosen by the student)	2-3

Support Courses (minimum 5-6 credits)			
GR	376	Geography of Middle America	3
HY	350	Mexico	3
HY	352	Caribbean Civilization	3
L	105S	First-Year Spanish I	5

Latin American Interdisciplinary Studies Program
Office in Aylesworth Hall, Room 315 Coordinated by a Faculty Advisory Board and the Office of International Education and Training

Latin American Studies Interdisciplinary Program, open to all students, seeks to broaden understanding of the languages, cultures, institutions, political and economic systems, and the processes of change in Latin America. By comparing developmental processes of Latin America with those of the United States, students may better understand the problem of change in their own society.

To qualify for a certificate in Latin American studies, students should complete, with a grade point average of 2.00 or better, a minimum of 15 credits in Latin American area courses, and at least 10 credits in either Spanish or Portuguese language. The latter requirement may be waived if the Department of Foreign Languages and Literatures certifies that the student has at least this equivalence in language proficiency. If language is waived. the student must complete 20 credits in Latin American area courses. Except for language, a student may not have more than seven credits in any one discipline.

Program details are available from the Office of International Education and Training.

Area Courses			Credits
AP	331	Peoples and Cultures of Mexico	3
AR	312	History of Pre-Columbian Art	3
GR	375	Geography of South America	3
GR	376	Geography of Middle America	3
HY	270	Colonial Latin America	3
HY	271	Latin America Since Independence	3
HY	350	Mexico	3
HY	352	Caribbean Civilization	3
L	336	Introduction to Spanish-American Civilization	3
L	351S	Survey of Spanish Literature 11	3
L	435S	Advanced Studies in Spanish Civilization	3
L	449	Spanish-American Literary Movements and Periods	3
L	452S	Genre Studies-Spanish	3
PL	462	Seminar	3
PO	331	Politics and Society Along Mexican Border	3
PO	446	Comparative Latin American Politics	3
S	366	Peoples and Institutions of Latin America	3

Nonprofit Agency Administration Interdisciplinary Studies Program
Office in Gibbons Building, Room 104
Coordinated by a Faculty/Community Advisory Committee and the Office of the Dean, College of Applied Human Sciences

The Nonprofit Agency Administration Interdiscipli-nary Studies Program is designed to enhance a student's academic readiness to enter a career position in the youth and human service fields through specific curricular emphases in various areas of human services, organizational management, and administration in social service agencies.

Students must declare their intent to earn a certificate in Nonprofit Agency Administration Interdiscipli-nary Studies Program by completing an application in the program office. Students who complete the program often find professional positions in many of the human service agencies such as Boy Scouts of America, Big Brothers/Big Sisters of America, Junior Achievement, 4-H. the YMCA, the YWCA, Red Cross, Girl Scouts of America, Campfire, Boy's Clubs, and Girl's Clubs.

Students must complete a minimum of 22 credits from the categories below with a cumulative grade point average of "C" or better. Program details are available from the Office of the Dean, College of Applied Human Sciences.

			Credits
I.	**Nonprofit Agency Administration Courses** (required)		
	HS 100	Nonprofit Agency Administration	3
	HS 401	Volunteer Management and Service- Learning	3
	HS 402	Nonprofit Agency Fund Raising and Management	3
II.	**Financial Management Area Courses**		
	(select one course from Category 11)		
	BA 210	Financial Accounting	3
	RR 375	Budgeting and Revenue Resources	3
	Management Area Courses		
	BN 300	Management Fundamentals	3
	BN 320	Organization Management	3
	EA 205	Farm and Ranch Management	3
	EA 228	Agricultural Business Management I	3
	EX 365	Program Administration	2
	HD 438	Administration of Human Development Centers	3
	NR 320	Natural Resources Policy and Administration	3

PO 351	Public Administration	3
RR 431	Park and Protected Area Management	3

III. Marketing/Public Relations Area Courses (select one course)

BK 300	Marketing	3
EA 310	Agricultural Marketing	3
JT 350	Public Relations	3
NR 400	Public Relations in Natural Resources	3

IV. Computer Usage Area Courses (select one course)

A 320A-E	Computer Applications in Agriculture	1
BD 140	Computers in Business	2
	and	
BD 141	Computers in Business Laboratory	1
CS 110	Personal Computing I	4
NR 260	Introduction to Natural Resource Analysis	3

V. Human Service Courses
(select two courses, one per section only)

Community Area Courses

HA 200	Introduction to Hispano-American Studies	3
RR 330	Social Aspects of Natural Resource Management	3
S 331	Community Dynamics and Development	3
S 341	Sociology of Rural Life'	3
S 342	Leisure and Society	3
S 343	Sport and Society	3
SW 322	Generalist Activities and Skills for Practice	3
SW 470	Generalist Social Work Practice Application	3

Group Work Area Courses

BN 410	Organizational Behavior	3
ED 355	Educational Psychology	3
and		
ED 386	Practicum	1
PY 315	Social Psychology	3
PY 340,341	Organizational Psychology. Laboratory	4
S 340	Bureaucracy and Modern Organizations	3
SP 205	Group Communication	3
SW 321	Generalist Social Work Perspective	3
SW 330	Human Diversity Practice Issues	3

Youth Development Area Courses

HD 101	Individual and Family Development	3
HD 217	Creative Experiences for Children	3
HD 311	Adolescence	3
PY 260	Child Psychology	3
PY 465	Adolescent Psychology	3
SW 371A	Social Work with Children and Families	3
SW 371B	Social Work with Juvenile Offenders	3

IV. Internship
(select one course; minimum three credits required)

BK 487	Internship	Var.
BN 487	Internship	Vat.
BP 487	Internship	Var.

EX	487	Internship	Var.
HD	487	Specialized Internship	Var.
HM	487A-C	Internship	Var.
NR	487C	Internship II-Recreation Resources	Var.
SW	488	Field Placement	Var.

Religious Interdisciplinary Studies Program
Office in Clark Building, Room C 130
Coordinated by a Faculty Advisory Board and the Associate Dean, College of Liberal Arts

The Religious Studies Interdisciplinary Program permits students to use electives to complete 21 credits from a list of approved courses.

The program encompasses the major religious traditions of humanity. It enables students to integrate a field of special interest from offerings in religious studies and related areas. Consequently, students may become acquainted with religion as viewed by different disciplines, e.g., philosophy, history, psychology, sociology, and anthropology. In addition the program encourages students to view religious phenomena in their cultural context through the media of music and the arts.

Program details are available from the Office of the Associate Dean, College of Liberal Arts.

1. Twenty-one credits, ordinarily seven courses, selected from approved courses in at least three disciplines.

2 A grade point average of 2.0 in courses selected for the program.

3 Three required courses. designed to survey the world religions. and to introduce students to
methods of studying and understanding religion:

			Credits
PL	171	Religions of the West	3
PL	172	Religions of the East	3

Select one course from the following:

AP	322	Religion in Nonliterate Societies	3
AP	324	Folk Religion	3
E	160	Mythical and Biblical Backgrounds	3
PY	492	Seminar	3
S	375	Sociology of Religion and Medicine	3

4. Four supporting courses, chosen in consultation with the Religious Studies adviser from the following:

AP	310	Peoples and Cultures of Africa	3
AP	322	Religion in Nonliterate Societies	3
AP	324	Folk Religion	3
AP	340	Medical Anthropology	3
AR	411	History of Medieval Art	3
E	337	Western Mythology	3
E	360	Chaucer	3
E	363	Milton	3
HY	215	Revolution and Conflict in the Middle East	3
HY	230	Medieval Europe	3
HY	253	History of Modern Christianity	3
HY	273	Asia-The Formative Years	3
HY	302	Ancient Civilization-Near East	3
HY	310	The Age of the Reformation	3
HY	360	Colonial and Provincial America to 1740	3
HY	404	Ancient Israel	3
HY	451	Early Christian Church to 500A.D	3

HY	452	Medieval Christianity, 500-1500	
PL	106	Wisdom of the East-Oriental Philosophy	3
PL	1702	Understanding Religion	3
PL	272	Meaning and Truth in Religious Belief. 3	
PL	309	Ideas in Oriental Art and Literature	3
PL	349	Philosophy of Tao and Zen	3
PL	355	Philosophy of Religion	3
PL	359	Philosophy of Humans	3
PL	360	Topics in Oriental Philosophy	3
PL	369	Mind and Body in Eastern Thought	3
PL	370	Contemporary Western Religious Thought	3
PL	371	Contemporary Eastern Religious Thought	3
PL	375	Science and Religion	3
PL	379	Mysticism East and West	3
PL	463	Seminar in Religious Studies	3
PL	497	Group Study	1-9
PY	492	Seminar	1-3

1. Accepted only when designated "Psychology of Religion."

2. Credit for PL 170 not allowed for majors in philosophy. philosophy and religion concentration.

Russian and East Central European Interdisciplinary Studies Program
Office in Aylesworth Hall, Room 315 Coordinated by a Faculty Advisory Board and the Office of International Education and Training

The Russian and East Central European Interdisciplinary Studies Program is designed to give students comprehensive coverage of the Soviet and East Central European areas. The basic purposes of the program are to broaden understanding of the peoples and cultures of the Soviet Union and East Central Europe. to promote the study of the Soviet Union and East Central Europe within an integrated interdisciplinary framework, and to enhance student awareness of increasing East-West interdependence.

Program details are available from the Office of International Education and Training.

Core Courses (9 credits)			**Credits**
E	353	Russian and Soviet Literature in Translation	3
HY	235	Slavic and East Central European Civilizations	3
PO	345	Comparative Socialist Systems	3

Elective Courses (12 credits)

No more than 9 credits can be taken from one department.

EC	370	Comparative Economic Systems	3
EC	376	Marxist Economic Thought	3
HP	397	General Honors Colloquium	2-3
HY	422	Habsburg Empire	3
HY	423	Eastern Europe Since 1918	3
HY	440	Imperial Russia	3
HY	441	Revolutionary Russia and the Soviet Union	3
HY	442	Contemporary Soviet Union in Perspective	3
L		Any 200-Level or above German course	3
L		Any 200-level or above Russian course	3
PO	241	Comparative Government and Politics	3
PO	421	Modern Political Theories	3
PO	437	American Security Policy	3

Colloquia. seminars. and independent study, as appropriate.

Women's Interdisciplinary Studies Program
Office in Student Services Building. Room 112 Coordinated by a Faculty Advisor., Board and the Director of the Office of Women's Programs and Studies

The Women's Studies Program is an interdisciplinary branch of inquiry within the University curriculum designed to examine traditional knowledge and institutions from a feminist perspective. The major functions of this effort are the expansion of empirical knowledge, the critique of existing theory, and the reconceptualization of core concepts paying particular attention to those theories and data which address the roles and relationships of the sexes.

The program's objectives are: to provide learning experiences enabling students to reassess traditional disciplines from a feminist perspective; to develop an appreciation of the historic and contemporary contributions of women of all cultures; to explore the ideological assumptions regarding women implicit in social institutions; to create opportunities for women to acquire knowledge and skills necessary for physical, social, and emotional weft-being; to encourage innovative teaching and research; and to promote equality of the sexes.

Students who wish to pursue a certificate in women's studies must declare their intent with the Office of Women's Programs and Studies.

Program details are available from the Office of Women's Programs and Studies.

Undergraduate Program

core courses minimum of 15 credits required)			**Credits**
E	330	Images of Women in Literature	3
E	332	Modem Women Writers	3
HY	468	Women in America	3
IE	470	Women and Development	3
PL	250	Philosophy of Sex and Gender	3
PO	412/HC 412	Civil Rights in America	3
PY	296	Group Study	3
		or	
PY	496	Group Study	3
PY	327	Psychological Perspectives on Female Experience	3
S	333	Gender Roles in Society	3
SW	371H	Women's Issues in Social Work	3
WS	200	Introduction to Women's Studies	3
WS	397	Group Study	3
WS	472A	Seminar in Women's Studies- Humanities'	3
		or	
WS	472B	Seminar in Women's Studies- Social Sciences	3
		or	
WS	472C	Seminar in Women's Studies- Natural Sciences	3
WS	495	Independent Study	1-3

Supporting courses (minimum of 6 credits required); may be taken from core courses or courses approved by Advisory Board.

1. Required

Graduate Program

Women's Studies offers a program leading to a certificate for those students who, for professional and/or personal reasons, wish to supplement their graduate programs of study. Interested students must apply to the program at the Office of Women's Programs and Studies.

Cure Curriculum			**Credits**
WS	692	Seminar in Women's Studies	3
WS	695	Independent Study	3-6
		or	
WS	699	Thesis	3-6

Supporting Courses

E	630C	Special Topics in Lit-Theory and Technique Studies	3
E	630D	Special Topics in Literature Gender Studies	3

HC	610	Families and the Legal Environment	3
HY	695	Independent Study	3
WS	687	Internship in Women's Studies	1-3

Select no more than one course from the upper-division Women's Studies undergraduate offerings.

1. Ordinarily interdisciplinary work in women's studies and the candidate's major discipline subject to Women's Studies Board oversight and separate from department thesis/dissertation.

UNIVERSITY PROGRAMS

The Core Curriculum in Biological Sciences

Office in University Services Center, Room 408
Thomas A. Goreil, Director

The biology core curriculum provides intensive preparation in biological sciences and supporting mathematical and physical sciences which may be completed in two years. The core curriculum provides a fundamental base which prepares students for further study in various biological disciplines. Most of the specific biologically oriented majors will, therefore, require participation in much of the core curriculum.

Course requirements for specific life science majors will be found in catalog descriptions of various departments in the Colleges of Agricultural Sciences, Applied Human Sciences, Engineering, Natural Resources, Natural Sciences. and Veterinary Medicine and Biomedical Sciences.

Freshman Year			**Credits**
BY	102	Attributes of Living Systems	4
BY	103A-B	Biology of Organisms	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
M	155, 255	Calculus for Biological Scientists I, II	8
		Humanities, social sciences	2-4
		Physical education/wellness	2

1. Students who have not had high school chemistry must take C 101 as a prerequisite to C 111.

2. M 155 requires M 124 and M 126 as prerequisites.

Sophomore Year			**Credits**
BY	220	Ecology	3
BY	310	Cell Biology	4
BY	311	Developmental Biology	4
C	341. 343	Organic Chemistry I. II	6
C	344	Organic Chemistry Laboratory	2
PH	121. 122	General Physics I. II	10
		or	
PH	141. 142	Physics for Scientists and Engineers I, II	10
		Humanities. social sciences	2-4

University Honors Program

Office in Newsom Hall
Michael B. Histand, Director

Program Philosophy and Purposes

The University Honors Program offers an enhanced academic experience to academically motivated undergraduates in all majors. A core of lower-division honors courses represents disciplines essential to a broadly based and liberal education. Students in the Honors Program will be part of a community of scholars complimenting a strong educational foundation with help from a cadre of honors advisers who help students to prepare academic plans tailored to their individual interests and abilities. Social inter-play is focused in the special residence honors floors in Newsom

Hall, and in cocurricular activities consisting of seminars, community service efforts, and cultural excursions. The Program fosters an association of serious students and faculty and encourages joint efforts leading to independent study and research.

Main Program Features

1. Honors Courses

Honors sections of freshman and sophomore courses are available for virtually all majors. These sections are typically smaller than regular sections, and are taught by outstanding professors. At the upper-division level the program features honors colloquia, honors independent study projects, and a senior seminar. In addition, honors option sections of regular courses are available for students who may take a regular section of a course and complete additional work for honors credit.

2. Honors Advising

At Preview Colorado State (summer freshman orientation) honors students receive honors academic advising. An honors adviser is assigned to each student to provide advice on course scheduling, academic concerns, and future professional opportunities.

3. Honors Housing

Floors in Newsom Residence Hall are reserved for honors students. Quiet hours, socialization, sharing honors courses with students on the floor. and proximity of the computer-equipped Honors Office are some of the advantages.

Graduation as a University Honors Scholar

Students who develop enriched curricula in accordance with the honors core courses, who have at least a 3.50 cumulative GPA, and who successfully complete a senior honors thesis, second major, or double minor, will graduate as University Honors Scholars.

Admission

Freshmen are admitted by invitation on the basis of ACT or SAT scores and their high school record. During the freshman year, students are admitted by invitation on the basis of their academic performance at the University and upon the recommendation of the honors advisers in the college of the student's major.

Honors Societies

Outstanding academic achievement is recognized by inviting students who have achieved superior scholastic records to join one or more of the 43 all-University or college honor societies on campus. For further information, contact the societies' respective academic departments.

SUMMER SESSION

Office in Spruce Hall
Marcia Bankirer, Director
Barbara Gutshall, Coordinator

The University provides a wide range of academic courses during summer session to meet the needs of a diverse group of students. New freshmen and transfer students mingle with continuing and special students to create a substantial population. Courses taught by regular and visiting faculty members offer to students a broad selection of educational opportunities on a schedule featuring four-, eight-, and twelve-week terms.

Graduate students and returning teachers pursue advanced study and conduct research during the summer. Numerous special institutes. conferences, and workshops assure responsiveness and variety. A unique program offers courses focused upon the life and culture of the American West. For detailed information, contact the Summer Session Office.

Issued annually in March, the *Summer Session Bulletin* contains information on courses, special programs, costs, living accommodations, and opportunities. The *Bulletin* includes application forms for both registration and housing. Copies are available on campus at the Office of Admissions and Records, or may be requested free-of-charge by calling 1-800-854-6456 or (303) 491-7985.

UNIVERSITY DIVISIONS

Division of Continuing Education
Office in Spruce Hall
Marcia Bankirer, Director/Associate Provost for Extended Studies
The Division of Continuing Education is the largest organization for continuing adult education in the state of Colorado. The Division offers a wide range of credit and noncredit educational opportunities available on campus. off campus, by correspondence study, and via telecommunications delivery systems. Programs include traditional, academic, degree-oriented courses as well as instructional packages to meet the specific needs of individuals, groups, and industries.

Credit Programs include sponsoring special sections of regular academic courses available during evening hours on the Fort Collins campus. In addition. "piggyback" participation in on-campus credit courses is available during hours most convenient to those individuals continuing their education on a pan-time basis. Where a need exists, the Division arranges contract credit courses conducted at off-campus locations.

Noncredit Programs include courses, workshops, and institutes for personal and professional development conducted both on and off campus. Some noncredit programs offer continuing education units (CEUs), a measurement which enables organizations and professions to recognize participation in continuing education programs. The Division is responsible for program evaluation and administration in awarding CEUs. Noncredit courses also include certificate programs in work-related areas.

Independent Study by Correspondence is also offered by the Division in both credit and noncredit areas. Through the use of a course syllabus, textbooks, and additional reference materials, students can complete courses without the limitations of time and place associated with classroom instruction. Learning assignments are submitted by mail and examinations are arranged under the supervision of an authorized proctor at a time and location convenient to the student.

Videotape Instruction is available in credit courses for graduate degrees through *SURGE (State University Resources in Graduate Education).* Courses are available in 20 disciplines including engineering, business, computer science, and statistics. Over 130 locations nationwide serve as SURGE sites enabling students to continue their graduate studies at their place of employment or at an open SURGE site.

Each semester the Division offers credit *Telecourses* broadcast at convenient hours for the part-time student. The Division also makes available *Videotape Short Courses* to business and industry for on-site instruction and training. Over 60 videotape short courses are available, on demand, in the areas of engineering, computers, management, and education. The Division's affiliation with other video instruction organizations allows for further programming opportunities and resources.

The Division's *Advising Services* assists students in their continued studies with education, academic, and career planning. Information is provided on financial aid and student services. Counselors provide support for students admitted on a provisional basis to the University through the *Guaranteed Admissions Program* and the *ACCESS Program,* enabling them to successfully enter the academic environment.

The Denver Center for Continuing Education represents an extension of University resources to the people and businesses of metropolitan Denver. The Center is located at Broadway and 16th. Classes are offered on site and facilities include a fully equipped microcomputer lab. The Denver Center also serves as an open SURGE site for graduate studies and provides academic and career counseling to Denver students.

The Division of Continuing Education staffs offices at Spruce Hall, Main Campus, Fort Collins, and the Denver Center. For more information on any of the Division programs. call (303) 491-5288, or toll free (800) 525-4950.

Division of Armed Forces Services
Philip N. Omi
Coordinator for ROTC Affairs

Reserve Officers' Training Corps History

An Act of Congress dated July 2, 1862, provided for military science and tactics instruction in federal land-grant colleges. Such instruction has been given at Colorado State University since its establishment. In 1919, the Department of Military Science and Tactics of the institution was included in the Reserve Officers' Training Corps under the provisions of the First National Defense Act, July 3, 1916. The ROTC Vitalization Act of 1964 provides for a two-year ROTC program in addition to the traditional four-year program and authorizes ROTC scholarships.

General Information

The Army and Air Force four-year programs complement the four college years and include one summer encampment. Students satisfactorily completing Army or Air Force departmental requirements will be commissioned as second lieutenants in the Army or Air Force.

Additionally, each service offers a two-year program whereby a student may earn a commission after completing two years of ROTC training during the junior and senior years. This program is designed for transfer students or students unable to take ROTC training during their freshman and sophomore years.

Each student entering the junior year (sophomore year if on scholarship) of ROTC enlists in the Army or Air Force Reserve and signs a contract. This contract includes a military commitment and obligates the student to complete the junior and senior year (and sophomore year if on scholarship) ROTC courses, and to accept a commission as a second lieutenant, if offered. Scholarship students and all junior and senior ROTC cadets receive $100 a month, tax free, during the academic year.

Some graduates may defer active duty until the attainment of graduate degrees. Opportunities also exist for graduate study while on active duty. Many active duty officers are selected each year for enrollment at civilian universities in graduate degree programs. Such study is accomplished with full pay and allowances of an officer.

Purpose

The purpose of the Army and Air Force ROTC courses is to develop leadership capabilities, to provide expertise in organized activities, and to qualify students for duty as officers with the Armed Forces of the United States. The courses are designed to develop self-reliance, confidence, initiative, honor, and a sense of duty as a citizen.

College Scholarship Program

Scholarships are available to qualifying students entering or enrolled in the University Air Force or Army ROTC programs. Scholarship consideration is predicated on student ability, performance, and potential. In order to accept the scholarship, if offered, the student must enroll in ROTC. These ROTC scholarships provide full payment for tuition, laboratory expenses. certain fees, textbook allowance, and an allowance of $100 per month, tax free, during the academic year.

Details of the scholarship program may be obtained from the ROTC department concerned. Refer to the following sections for names of persons who can supply additional information.

Department of Aerospace Studies

Office in Military Science Building, Room 204A
Colonel Edwin R. Teilborg, USAF, Professor of Aerospace Studies

Air Force ROTC

The preparation of future Air Force officers is provided through the Air Force 'ROTC program. Enrollment is open to any student attending the University on a full-time basis. The curriculum provides the individual with a firm understanding of the concepts of aerospace power and the Air Force mission, organization, and operation.

Enrollment in AFROTC is voluntary and accomplished during both the fall and spring registration periods. Scholarships are available in many academic disciplines on a competitive basis. Approximately one-third of the students hold scholarships and a fourth of the cadet corps are women. Almost all Air Force career fields are open to women officers.

General Program
Both the two- and four-year Air Force ROTC programs are offered. The program consists of the General Military Course (GMC) during the freshman and sophomore years and the Professional Of-ricer Course (POC) the remaining two years of college. Those students unable. or who elect not to participate in the GMC, may substitute a six-week summer field training period for this requirement. Entry to the POC is on a competitive basis.

Flight Screening Program
Qualified cadets, selected for pilot training, participate in the Flight Screening Program the summer between their junior and senior years. This program provides instruction in principles of flight and Federal Aviation Regulations (FARs), and flying training at Air Force expense in light aircraft at Hondo Air Base, Texas.

Active Duty Obligation
There is no active duty obligation for enrolling in either the freshman or sophomore AFROTC courses. Students who complete the Air Force ROTC program and receive a commission, incur a four-year, active duty obligation. Flying officers serve additional commitments from the time they receive their aeronautical rating.

Department of Military Science
Office in Military Science Building, Room 102
Lieutenant Colonel Robert D. Dillon,
Professor of Military Science

Army ROTC
The Army ROTC program is designed to provide the professional and leadership education necessary to qualify the ROTC cadet for a commission as a second lieutenant in the United States Army. The individual may serve on active duty for three or more years or in the Reserve Forces for eight years.

The ROTC cadet is afforded a selection of one of 21 career fields in the Army, aligned with his or her academic major and/or individual preference. A list of these specialties may be obtained from the Department of Military Science.

Flight Training
After commissioning, flight training is available, but competitive, to those officers who have taken and passed the flight physical and flight aptitude test. These tests are administered during the MS 111 or junior year of ROTC. Training may include fixed wing or rotary wing (helicopter) training.

General Program
The Military Science Program is subdivided into two levels: the basic course is aligned with the freshman and sophomore years and consists of the fundamentals of leadership and management, land navigation, and the organization of the United States Army. The advanced course, paralleling the junior and senior years, covers leadership assessment, military history, and ethics and professionalism. It also includes military skills that prepare the cadet for entry into active or reserve duty as a commissioned officer. Participation in leadership laboratory is open to all students who have successfully completed the necessary prerequisites. However, commissioning credit is granted to students who are fully qualified for contracting and who have taken the military oath of enlistment.

Scholarship recipients and advanced course students are required to complete a Professional Military Education component. The Professional Military Education component consists of two essential parts - a baccalaureate degree and at least one undergraduate course from each of rive designated fields of study. Cadets must take a course in written communication, military history, human behavior, computer literacy, and math reasoning. They are encouraged to take a course in national security affairs and management. However, cadets may substitute approved alternative courses for any of these requirements.

Two-Year Program

A two-year program is also available for students who have not taken the first two years of ROTC. This program requires the student to attend a summer camp at Fort Knox, Kentucky, between the sophomore and junior years. This six-week course consists of basic military training and allows the student to enter the Advance Course upon return to campus.

Another option to receiving an officer's commission is the Simultaneous Membership Program (SMP). This program allows a cadet who is a member of a reserve or National Guard unit to be in the Advanced Course of ROTC, be paid at the E-5 drill pay rate, work as an officer trainee in their unit, and compete for a reserve or active duty commission. Students can also receive the Reserve GI Bill and tuition assistance while in Army ROTC.

The military science curriculum is intended to enrich and supplement baccalaureate or postgraduate studies in all fields. The Army recognizes the need for officers with varied academic credentials and will award a commission to students who successfully complete ROTC.

Waiver of University Physical Education/Wellness Requirement
Successful completion of any two ROTC courses (including the physical fitness portion) from the sequence MS 110, MS 121, MS 210, MS 221, MS 310, and MS 320 will constitute a waiver of the University physical education/wellness requirement.

Financial Assistance Opportunities
In addition to two-, three- and four-year scholarships. Army ROTC has the Simultaneous Membership Program (SMP) which provides additional experience and financial assistance from two sources: a National Guard or Reserve unit and Army ROTC. SMP students may also qualify for GI Bill funds, loan repayment money, and possibly tuition assistance money.

UNIVERSITY INSTITUTE Nutrition Institute
Officers: Donald E. Johnson.
President: Joseph A. Maga. Secretary,
The Nutrition Institute is an interdepartmental organization of staff members engaged in teaching. research, and extension programs involving nutrition. The institute coordinates Colorado State nutrition offerings and cooperates in developing Ph.D. programs in the Departments of Agricultural and Chemical Engineering, Animal Sciences, Biochemistry, Clinical Sciences. Fishery and Wildlife Biology, Food Science and Human Nutrition, Pathology. Physiology. and Range Science. Assistantships, study-grants, and courses concerned with the various aspects of animal and human nutrition are offered in the different departments.

The Nutrition Institute sponsors interdepartmental seminars and symposia to provide balance and learning opportunities for graduate students, faculty, and practicing nutrition professionals in the state.

SCHOLASTIC STANDARDS

Help for Education and Life Planning
HELP/Success Center Office in 201 Aylesworth Hall, NE and Durrell Center, Room 101
Paul Shang, Director
Scholastic standards are mandated by the faculty through the University Scholastic Standards Committee. Procedures relative to scholastic standards are administered through the HELP/Success Center. Those students whose scholastic achievement is less than that required for graduation are placed on probation or dismissed from the University.

Policies on scholastic standards are within the purview of the faculty of Colorado State and may be changed at any time and for any reason. Policies regarding probation, dismissal, and appeal are determined by the faculty and the University in their absolute discretion subject to acceptance by the governing board of Colorado State.

ACADEMIC STANDARDS

In order to graduate, a minimum cumulative grade point average (CUM GPA) of 2.0 on a 4.0 scale must be earned at Colorado State University. The CUM GPA is based on grades of A, B, C, D, and F. A student is expected to maintain a CUM GPA of 2.0 or higher at all times. Grades earned in regular credit courses through the Division of Continuing Education or the Colorado State summer session will count toward the CUM GPA regardless of when those classes are taken. Failure to maintain a CUM GPA of 2.0 or higher will result in one of the following actions.

Academic Probation

Failure to maintain a CUM GPA earned at Colorado State University of 2.0 or higher will result in academic probation for a period of two regular semesters (fall and spring). Grades earned in regular credit comes through the Division of Continuing Education or the Colorado State summer session will count toward the CUM GPA regardless of when those classes are taken. At any time that the CUM GPA is raised to a 2.0 or higher, the student will return to regular academic standing.

Students who withdraw from Colorado State while on probation will remain on probation if they return to the University. Students on academic probation who return to Colorado State after attending another institution will continue their probation, since transfer credits are not computed within the CUM GPA earned at Colorado State.

Academic Dismissal Students on academic probation who do not raise their CUM GPA to 2.0 or higher after two regular semesters (fall and spring) will be dismissed from the University. Students who have been academically dismissed will not be readmitted to Colorado State until a CUM GPA of 2.0 or higher is achieved by virtue of course work completed during the Colorado I State summer session or through the Division of Continuing Education. At any time that the CUM GPA is raised to 2.0 or higher, the student may apply for readmission to the University in regular academic standing.

Students may apply for readmission to the University provided that they have enrolled at another accredited institution and accumulated more than nine semester credits with a CUM GPA of 2.0 or higher in all courses completed since dismissal.

Upon transferring back to Colorado State, students will have two semesters following re-enrollment to raise their CUM GPA earned at Colorado State to 2.0 or higher or face academic dismissal for a second time. Transfer credits are not computed within the CUM GPA earned at Colorado State.

Students who have raised their CUM GPA to a 2.0 or higher or who apply as students transferring from another institution may apply for readmission to the University subject to any enrollment limitation as set by the Colorado Commission on Higher Education or the governing board of the University.

PRIVILEGE OF APPEAL OF ACADEMIC DISMISSAL

Students have the privilege to appeal academic dismissal. A written appeal may be submitted to the HELP/Success Center for consideration by the Scholastic Standards Committee. All appeals must be submitted to the HELP/Success Center in accordance with the Center's written instructions. All appeals of academic dismissal will be acted upon by the Scholastic Standards Committee no later than seven business days prior to the first day of classes for the next regular academic semester (either fall or spring).

ACADEMIC FRESH START

Undergraduate students may apply for an academic fresh start, a policy which allows students to establish a new academic record. A student may be granted a fresh start only once.

An academic fresh start may be granted only after five years have elapsed since the student's last term of enrollment as a regular student, regardless of the number of credits taken. The time period during which courses were taken through Continuing Education or the Colorado State summer session after leaving the University will not count as part of the five-year interval.

Applications for a fresh start will be made through the HELP/Success Center and should be submitted one semester prior to the academic term in which a student wishes to enroll in the University. Receipt of a fresh start does not guarantee admission but may aid the student in normal admissions procedures.

A student granted a fresh start and enrolled will have a demarcation on the permanent academic record to delineate the previous record from the new academic record achieved under the fresh start policy. Credits for those courses in which a grade of at least "C" or "S" was awarded prior to the fresh start may be applied toward graduation requirements under the fresh start policy. Only grades earned after the fresh start demarcation will be computed in the new GPA.

REGISTRATION AND STUDENT RECORDS

Office of Admissions and Records Administration Annex, Room 100

REGISTRATION

Registration, including schedule changes (adds and drops), will be accomplished by students using touch tone telephones. In order to fully benefit from the system, it is essential that students follow the required procedures and conform to the established deadlines as presented in the applicable class schedule. Being prepared to register by telephone will minimize mistakes and time on the system, thereby reducing the demand during peak registration periods.

Registration Restrictions

Since portions of registration are completed by mail it is essential that students maintain a current mailing address with the Office of Admissions and Records. Deadlines for registrations and payments of tuition, fees, and other charges must be met to ensure registrations are confirmed. Therefore, students must respond to correspondence from the University in a timely manner. This may require authorization for others to act in the student's behalf when they will be unavailable to receive their mail for a period of time.

Late Registration

Late registration begins the first day of the term and extends until the close of the registration period listed under the University calendar for that term. A late registration fee of $50.00 is assessed.

Class Schedule

The class schedule, which is available to students prior to the beginning of registration, announces registration procedures and courses to be offered during a given term. Enrollment must conform to the courses listed in the class schedule or its official addendum.

Faculty Advisers

A faculty adviser provides students with pertinent information about a major and assists in planning a program of study. The faculty adviser is associated with a student's major department or field and is assigned by the department head or college dean.

Close cooperation and understanding between student and adviser is to a student's advantage. Therefore, students are responsible for seeking out their advisers for aid in solving academic problems, especially before each registration.

Credit Load

Completion of at least 128 semester credits is required for an undergraduate degree. To complete a degree in four years a student must average 16 credits per semester.

Credit Overload

Undergraduate students who wish to register for) more than 18 credits per semester must have an overload approved by their adviser and major department head. Graduate students should consult the *Graduate and Professional Bulletin.* Approval of an overload for graduate students must be obtained from the department head and graduate dean.

Full-Time/Half-Time Enrollment Status

See information listed under Student Records in this section.

Class Attendance Regulations

At the discretion of the instructor in charge, any full-time student. faculty member, or senior citizen may attend any class without formal registration provided adequate classroom space is available.

Students should attend all classes for which they are registered to obtain maximum educational benefits.

Absence or lateness does not excuse students from required course work.

Instructors and departments are responsible for establishing class attendance policies. These policies must accommodate student participation in University-sanctioned extracurricular/cocurricular activities. Students must inform their instructors prior to the anticipated absence and take the initiative to make up missed work in a timely fashion. Instructors must make reasonable efforts to enable students to make up work which must be accomplished under the instructor's supervision (e.g., examinations, laboratories). In the event of a conflict in regard to this policy, individuals may appeal using established University procedures.

Academic departments may drop from a course any students who fail to attend both of the first two regularly scheduled meetings of the class (one meeting for laboratory courses or for classes which meet once each week), unless the students have notified the department or the Office of Admissions and Records in advance.

Since this procedure is a department option, students remain responsible for dropping courses they do not intend to complete and within the required time period for drops.

Senior Citizen Visitation Privilege
At the discretion of the instructor in charge, senior citizens may attend any class as a visitor without formal registration provided classroom space is available. The following regulations are applicable to these visitations for senior citizens:

1. Participant must be 62 years of age or older.

2. Participation is subject to the approval of the instructor and available space in the class.

3. Approval for visitation cannot be obtained prior to the first day of class in order to serve tuition-paying students first.

4. Academic credits or grades will not be assigned or awarded upon completion of the visitation nor will a record of participation be maintained by the University.

5. Instructors are under no obligation to grade assignments or tests submitted by visitors.

6. Student services are not available to visitors such as: student health, counseling. athletic event tickets, ID cards, etc., without payment as appropriate.

7. Tuition and student and technology fees will not be assessed; however, course fees (i.e., transportation expenses, breakage fees, consumable supplies associated with labs, etc.) as published in the class schedule will be assessed visitors.

Repeating a Course
The original grade and grades earned in repeated courses are used in calculating grade point averages; however, repeated credits earned are only used once to fulfill graduation requirements.

Auditors
A student wanting to attend a class without earning credits may register as an auditor. Auditing a course requires prior approval of the instructor of the course. If an instructor determines that an auditor's attendance or participation in the course is unsatisfactory, the course will not be recorded on the student's academic record. Changes to or from audit status must be made during the registration or schedule change-period. Tuition and fees are assessed for audited credits. Audits do not count for full-time status for loan deferments. financial aid, etc.

Pass/Fail
Undergraduate students, except first-term freshmen and transfers, with a cumulative Colorado State grade point average of 2.00 or better and with the adviser's consent, may register for approved courses on a pass/fail basis. This work may not be in areas of study required in the student's major or minor or for teacher certification (i.e., it must consist of free electives not specified as to general area of study. A 20-credit social science requirement, for example, would not be considered free electives.) Students may elect pass/fail grading in one course per term in courses offered for student option pass/fail grading. Students may select this pass/fail grading

option for physical education activity courses used to meet the University physical education/wellness requirement.

Performance equivalent to a grade of D or better is recorded as S (pass). Performance equivalent to F is recorded as U (fail). Neither the S or U grades are used in calculating the Colorado State grade point average; however, courses graded S apply to graduation requirements. Changes to or from pass/fail grading by students must be made during the schedule change period.

A grade for a course taken as pass/fail may not be converted to a traditional grade for purposes of improving the GPA to meet graduation or scholastic requirements. In situations where students change their major or minor to include required courses taken previously for pass/fail grades, the major department will determine if such courses may be considered as fulfilling degree requirements. When it is determined that an ineligible student is or has been registered for a pass/fail course, a traditional grade will be assigned. Repeating a course on a pass/ fail basis for which a previous traditional grade was assigned will not alter the effect of the previous grade on the GPA. A correct pass/fail registration including adviser approval is the express responsibility of each student.

Graduate students taking pass/fail courses are subject to limitations imposed by their graduate committees and departments.

Schedule Change and Drop Periods
Periods for changing schedules (adds, drops, changes of sections, grading options, or credits) are listed in the University Calendar at the front of this catalog and in the applicable class schedule. Courses dropped during this period are not reflected on the student's academic record, and tuition and fees may be adjusted as a result. Within the schedule change period these changes may be made as follows: limited - first 4 days of the semester; initial period - first 5 days of the semester; extended period - first 12 days of the semester. Consult the appropriate class schedule for the deadlines for each course.

The drop period begins after the schedule change period and closes at the end of the eighth week of the term. During this period courses may be dropped and a W (withdrawal) will be recorded on the academic record. No drops may be made after this period. See also, Class Attendance Regulations in this section of the catalog. Tuition and fees will not be adjusted for drops during this period. See also Tuition and Fees Adjustments in the Tuition, Fees, Expenses, and Adjustments section in this catalog.

Courses taught in terms of less than 16 weeks are subject to proportionately shorter drop periods.

Students withdrawing from the University may not use the drop procedure but must contact the HELP/ Success Center. See also Withdrawal from Colorado State in this section.

Discontinuing a Class
If a student discontinues attending a class and has not officially dropped through the Office of Admissions and Records, the grade of F (failure) is recorded.

STUDENT RECORDS
Administration Annex, Room 100

Undergraduate Classification
Student level (class)is determined by the number of credits earned at Colorado State and credits accepted in transfer. Transfer credits may or may not be acceptable in meeting degree requirements.

Student Level	*Semester Credits*
Freshman	0-29
Sophomore	30-59
Junior	60-89
Senior	90 and over

Change of Address

Each student is required to submit a change of address form to the Data Control Section of the Office of Admissions and Records 1 or any change of current address.

Full-Time/Half-Time Enrollment Status
Enrollment status (lull-time, half-time) is determined by the number of credits which the student has completed or is pursuing for the term in which the certification is requested. Courses from which the

student has withdrawn or is auditing are not included. (The following schedule for enrollment status differs from the full-time/part-time schedule for tuition and fees. See Tuition, Fees, Expenses, and Adjustments section in this catalog.) Credit requirements are as follows:

Fall/Spring Semesters:

Undergraduates	
Full-time	12 or more credits
Half-time	6-11 credits
Graduates	
Full-time	9 or more credits
Half-time	5-8 credits

Summer Session:

Undergraduates	
Full-time	6 or more credits
Half-time	3-5 credits
Graduates	
Full-time	5 or more credits
Half-time	3-4 credits

Contact the Records Section of the Office of Admissions and Records for certification of enrollment status, level (class), grade average, and term(s) of attendance.

Change of Undergraduate Major
Any undergraduate student regularly enrolled in the University may transfer from one major to another, exclusive of those majors involving a formal selection process, or those having established course requirements or internal limits on changes.

Students wishing to transfer from one noncontrolled major to another can obtain information about the transfer process and a change of major form from the Records Section, Office of Admissions and Records. All changes of major are processed through this Office.

Information about open option categories and controlled majors that have formal selection processes limiting admission to those majors can be obtained from the HELP/Success Center.

Withdrawal from Colorado State
Students who are planning to leave the University for any reason during a term *must* contact the HELP/ Success Center (Room 201, Aylesworth NE/Room 101, Durreli Center) prior to their departure. Unless this procedure is followed, students are not eligible for an adjustment (if appropriate) of tuition and fees even if withdrawal is within the authorized period. Students leaving the University without officially withdrawing receive failing grades in all courses.

Normally a withdrawal is not permitted during the last two weeks of the semester. See also, Tuition and Fees Adjustments in the Tuition. Fees, Expenses, and Adjustments section in this catalog.

Retroactive Withdrawal
A student may request that all grades in an academic period (one or more semesters of continuous enrollment) be retroactively removed and be replaced by entries of W on his/her transcript. A retroactive withdrawal may be granted only when a student has experienced circumstances or an' incident of such trauma and major proportions that reasonably he/she could not have been expected to have possessed normal capabilities necessary to complete the academic period

satisfactorily. The student must submit a written request for the retroactive Withdrawal to the HELP/Success Center.

Taking Courses at Another Institution
Enrolled students who expect to take undergraduate courses at another institution for transfer to Colorado State University must obtain a Request for Permission to Take Off-Campus Course Work from the Degree and Transfer Evaluation Section of the Office of Admissions and Records. The appropriate academic department must determine if courses will fulfill Colorado State degree requirements before the students enroll for the transfer work.

Students are responsible for insuring an official transcript will be sent to the Degree and Transfer Evaluation Section of the Office of Admissions and Records after the completion of the off-campus course work. No credit will be evaluated until an official transcript has been received. Courses with a D grade are not accepted as transfer credit toward a degree at any time, in any major.

The student must file an Application for Readmission with the Office of Admissions prior to leaving campus if the course work is taken any term other than summer session.

See also, International Programs, Study Abroad in the University-Wide Instructional Programs section in this catalog.

Community College Cooperative Registration Agreements
Under a cooperative program with Aims Community College (Greeley) and Front Range Community College (Fort Collins), Colorado State students may register for one course (maximum of five credits) per term without additional tuition assessment.

Eligibility - Students must be enrolled at Colorado * State in resident instruction courses, i.e., not Continuing Education or Placement, for the corresponding term for which they are registered at:

Aims Community
Fall quarter
Winter or spring quarter
Summer quarter

Colorado State
Fall semester
Spring semester
Summer session

Front Range
Semesters match those at Colorado State.

Credit Load - For the above corresponding fall or spring term, Colorado State students must be registered for 12 credits to attend Aims or 9 credits to attend Front Range. Summer session requires 12 credits.

Course Restriction - Registration for a maximum of one undergraduate, resident instruction course (maximum of five credits) is authorized. Registration will be subject to the availability of the course and the student meeting the prerequisites.

Tuition - Tuition and student fees for the course taken under this agreement will not be charged to the eligible student. Applicable course fees will be paid by the student. If the student is determined to be ineligible for this cooperative registration privilege, applicable tuition and student fees will be assessed, and the student will be responsible for payment of these charges.

Registration - Applicable forms are available in the Records Office.

Colorado Exchange Program
Colorado State, in cooperation with the Colorado School of Mines, the University of Northern Colorado, and the University of Colorado, provides tuition-free instruction for graduate students

through a reciprocal agreement. The following conditions must be met to qualify for the program:

1. The graduate student is registered and paying full tuition and fees at the home institution.

2. The course requested is pan of a regular load -*not an overload.*

3. The student is working on an advanced degree and the course requested will be used to meet degree requirements.

4. The course is not offered on the student's own campus when that student can enroll.

5. The request is presented prior to registration for the semester or quarter the course is to be taken.

6. The request is presented any term except graduation quarter or semester.

7. A separate request form is completed for each course taken.

8. Space is available.

Additional information and registration forms are available in the Records Section of the Office of Admissions and Records or the Office of the Graduate Dean.

National Student Exchange

Colorado State is a member of the National Student Exchange and thereby eligible to exchange qualified undergraduate students with over one hundred colleges and universities in the United States and its territories. Exchanged students are assessed the resident tuition rate by the host institution for up to one year. By participating in the exchange, students can broaden their educational experience through encountering different academic, geographical, and cultural settings. Interested students should contact the Registrar's Office in the Office of Admissions and Records for additional information.

Final Examinations

Final examinations, when appropriate, are given during the final week of each semester. During this week, classes are rescheduled to meet for two-hour periods,

The following procedures apply to all courses during the final week of the semester:

1. Final examination week is part of the regular semester. Student attendance shall be consistent with University policy.

2. Courses for less than four credits shall meet for one period. Courses for four or more credits may meet for two periods.

3. Classes shall meet only at the times indicated on the final examination schedule.

4. Any approved exception of regulations 1,2, and 3 above, e.g.., special types of examinations which need more time or special locations to conduct, shall be announced by the second week of class and communicated in writing to the Registrar.

5. If a student has three or more final examinations (not classes) scheduled for the same day or if conflicts of examination times occur, the student may negotiate a time change with the instructors involved. If the parties involved cannot find a mutually agreeable time, the Registrar's office indicates which courses must be changed.

6. Any student who has a conflict with the examination schedule must inform the instructor as soon as possible before the examination. If an agreement cannot be reached between the instructor and student as to the appropriateness of a make-up examination, the student should appeal to the department head.

Grading

Term grades are reported by letter only. The scale of grades and grade points follows:

Grade points

Grade		per credit
A	(Excellent)	4
B	(Good)	3
C	(Average)	2
D	(Poor, but passing)	1
I	(Incomplete)	*
F	(Failure)	0
W	(Withdrawal)	*
S	(Satisfactory)	**
U	(Unsatisfactory)	*
AU	(Audit)	*
NG	(No Grade Reported)	*

*Credits not used to compute grade point average (GPA) and not counted toward graduation.

* * Credits not used to compute GPA but counted toward graduation.

Credits for courses graded F and WF are used to compute GPA, but they do not count toward graduation. (WF grades were not issued after Summer Session 1979.)

Incompletes

The grade of I (incomplete) is a temporary grade awarded to indicate that for reasons that were beyond the student's control or that could not reasonably have been anticipated, the student could not complete the requirements of the course. When an I is assigned, the instructor shall specify in writing the requirements the student shall fulfill to complete the course. After one year or at the end of the semester in which the student graduates (whichever comes first), an incomplete will be automatically changed to an F (failure) unless the course has been previously completed and a grade change submitted by the instructor, Students should not register again for a course in order to clear incompletes.

UNDERGRADUATE DEGREE REQUIREMENTS

Office of Associate Provost for Undergraduate Studies Administration Building, Room 108

The graduation requirements-department, college, and University - are displayed in this catalog as guides to advising and program planning and are subject to change. A student is held for any changes in requirements in years not completed except if such changes would extend the time normally required to complete the degree.

All students pursuing a second bachelor's degree will be required to meet University Studies Program requirements.

Each student is responsible for knowing and meeting degree and graduation requirements.

UNIVERSITY STUDIES PROGRAM
Students must fulfill the requirements as outlined in this section. These include a minimum of 37 credits in 5 categories: Communication and Reasoning; Natural Sciences; Arts and Humanities; Behavioral and Social Sciences; and Physical Education/ Wellness as shown in the following chart.

The Colorado State University Studies Program seeks to assure that students obtain an education characterized by breadth as well as depth in preparation for meaningful and productive lives. Within the context of structured requirements, the student also has the opportunity to exercise considerable choice to plan a program of studies to fulfill that objective.

The credits in category II must be taken in two or more prefixes outside the department of the student's major; credits in categories II/and IV must be taken in two or more departments outside the department of the student's major. In addition to the minimum credits outlined in the following categories, *4 additional credits* must be selected from courses listed in categories II-IV A and/or B for a *total of at least 37 credits.*

In categories I-IV, any department and/or college may more narrowly define the list of options students might use to fulfill a particular requirement, or may specifically require certain courses from the lists to fulfill a particular requirement.

Courses listed in categories I-IV have no prerequisite which would, in themselves, satisfy the requirement. No course can be used to satisfy more than one requirement within the University Studies Program. Courses with college-wide prefixes (A, BG, LB, NR) cannot be used to meet University Studies requirements in categories II-IV by majors within the college; however, University-wide prefixes (BH,' BY, HA. HP, IE, WS) may be used by all majors in all categories. Reserve-numbered courses (those ending in -80 to -99) are excluded from the University Studies Program.

In addition, all undergraduate students are required to take one cross-cultural awareness course. Students may use the course to satisfy this requirement within the 37 credits framework of the USP requirements outlined above. This requirement will become effective for entering new and transfer students beginning Fall Semester 1993; students readmitted Fall Semester 1993 or later must meet the cross-cultural awareness requirement. Courses that meet this cross-cultural requirement, and are already listed in one of the USP categories, are identified with an *. Additional cross-cultural courses are listed following USP category V.

University Studies Program Minimum Requirements

Category	Course(s)	Credits
Category I - Communication and Reasoning		
A) College Composition	CO 150	3 credits
B) Mathematics	Any mathematics	3 credits minimum course
C) Logic and Critical Thinking	See list below	3 credits minimum
D) Communication	See list below	3 credits minimum

Category II - Natural Sciences
At least one course mum have a formal laboratory (which may be taken in subcategory B); the seven credits in A must be taken in a minimum of two prefixes outside the department *of* the student's major.

A)	Natural Sciences Biological Sciences Physical Sciences	See list below	7 credits minimum
B)	Applied Natural Sciences and Technology	See list below	

Category III - Arts and Humanities
The six credits in A must be taken in a minimum of two department outside the department 01 the student's major.

A)	Arts and Humanities	See list below	6 credits minimum
B)	Studio and Applied Arts		

Category IV - Behavioral and Social Sciences
The six credits in A must be taken in a minimum of two departments outside the department of the student's major. EA and EC courses will not be allowed to satisfy the two-department requirement.

A)	Behavioral and Social Sciences	See list below	6 credits minimum
B)	Applied Behavioral and Social Sciences		

Category V - Physical Education/ Wellness	See list below	2 credits minimum
Additional Credits from II-IV A and/or B		4 credits minimum

Category I - Communication and Reasoning
Students' abilities in writing, computing, rhetoric, and critical thinking are important to academic success as well as to expanded opportunities after college. Courses in this category have as their central focus the refinement or development of specified skills related to communication, rhetoric, literacy, computation, and data analysis.

Courses in this category narrowly focus on the development of specified skills related to basic literacy, numeracy, computation. and communication; and stress the manipulation of linguistic or numeric symbols.

Minimum of 12 credits				**Credits**
A)	CO	150	College Composition	3
B)	M		Any mathematics course(s)	*3 minimum*
C)	Logic and critical thinking			*3 minimum*
	AC	101	Agricultural and Chemical Engineering I	2
	AC	102	Agricultural and Chemical Engineering II	3
	BD	140	Computers in Business	2
	BD	141	Computers in Business Laboratory	1
	BQ	270	Basic Business Statistics	3
	CE	101	Civil Engineering Principles I	3
	CE	102	Civil Engineering Principles II	3
	CS	101/EE 101	Engineering Computing	3
	CS	110	Personal Computing I	4
	CS	150	Introduction to FORTRAN Programming	3
	CS	151	Introduction to Pascal Programming	4

EE	101/CS 101	Engineering Computing	3
EE	102	Digital Circuit Logic	4
El I	307/ST 307	Introduction to Biostatistics	3
ME	101	Engineering Computing	3
NR	260	Introduction to Natural Resource Analysis	3
PL	110	Logic and Critical Thinking	3
PL	112	Reasoning and Problem Solving	3
PL	210	Introduction to Formal Logic	3
PL	415	Logic and Scientific Method	3
S	310	Quantitative Sociological Analysis	3
ST	201	General Statistics	3
ST	204	Statistics for Business Students	2
ST	301	Introduction to Statistical Methods	3
ST	307/EH 307	Introduction to Biostatistics	3
ST	309	Engineering Statistics	3
ST	311	Statistics for Behavioral Sciences I	3

D) Communication — *3 minimum*

CO	301 A-C	Intermediate Composition	3
E	320A-D	Introduction to the Study of Language	3
E	403	Nature Writing	3
JT	200	Professional Writing	3
JT	210	Newswriting	4
JT	300	Technical Communication	3
JT	301	Business Communication	3
L		Any first, second. third. fourth year language (no literature) course	3-5
SP	200	Public Speaking and Discussion	3
SP	207	Rhetoric and Argumentation	3

Category II - Natural Sciences

The natural world consists of physical and biological phenomena and has stimulated the development of distinctive methods of inquiry and a coherent structure of scientific knowledge. Educated people should understand these phenomena, the distinctive methods of inquiry, the general structure and content of scientific knowledge, and the responsible application of scientific knowledge to enhance the quality of life.

Minimum of 7 credits in A taken in two or more prefixes outside the department of the student's major,' at least one course in this category must have a formal laboratory (which may be taken in subcategory B).

A) Natural Sciences

Courses in this subcategory broadly treat the fundamentals of physical science or biological science.

Biological Sciences			**Credits**
AG	330	Principles of Genetics	3
B	104	Basic Concepts of Plant Life	3
B	105(L)	Basic Concepts of Plant Life Laboratory	1
B	120(L)	Principles of Plant Biology	4
BC	103	Ceils, Genes. and Molecules	3
BY	102(L)	Attributes of Living Systems	4
BY	103A-B(L)	Biology of Organisms	4
Z	101	Humans and Other Animals	3
Z	110(L)	Principles of Animal Biology	4

Physical Sciences

C	103 (C 104L)	Chemistry and Society	4
C	107 (C 108L)	Fundamental Chemistry	5
C	109 (C 110L)	General Chemistry for Engineers	5

C	I 11 (C I 12L)	General Chemistry I	5
C	I 13 (C 114L)	General Chemistry II	4
C	245 (C 246L)	Organic and Biological Chemistry	5
ER	130	Geologic Environment and Society	3
ER	140(L)	Physical Geology	4
PH	110	Descriptive Physics	3
PH	121(L)	General Physics I	5
PH	122(L)	General Physics II	5
PH	141(L)	Physics for Scientists and Engineers I	5
PH	142(L)	Physics for Scientists and Engineers II	5

B. Applied Natural Sciences and Technology

Applied courses are those which illustrate the application of knowledge and methods to identifiable areas of inquiry and problems.

Agriculture - A 116*, 300*
Astronomy- AA 100(L), 150(L), 301(L)
Agricultural and Chemical Engineering -AC 201
Agricultural Engineering - AE 364(L)
Agronomy - AG 100(L), 240(L)
Apparel and Merchandising - AM 120(L), 321
Animal Science- AN 100(L), 220, 221(L), 240(L), 322, 360/FT 360, 422
Anthropology - AP 150, 151(L). 330, 372(L)
Atmospheric Science - AT 300, 350, 440
Anatomy - AY 230/PS 230(L), 300/PS 300, 400(L)
Botany- B 223(L), 302(L), 325(L), 331(L), 332(L), 333(L), 338(L), 355,440
Biochemistry - BC 301
Biotechnology - BH 306(L)
Biological Science - BY 220, 310(L)
Chemistry. - C 331,341,47 1,475
Civil Engineering - CE 256, 260. 262(L)
Electrical Engineering - EE 201 (L), 451
Environmental Health - EH 220, 332(L)
Entomology - EN 102, 103(L), 302, 303A-C (L), 306(L), 424/Z 424, 445(L), 452
Earth Resources - ER 154(L), 272, 274, 304, 417(L), 450
Forest Sciences - F 100, 210(L), 311, 331 (L), 334(L)
Food Science and Nutrition - FN 125, 150, 200, 201(L)
Food Technology- FT 110, 360/AN 360. 365, 400, 447
Fishery and Wildlife Biology- FW 100, 300(L), 312
Geography - GR 210
Horticulture - H 100(L), 221(L), 310. 322(L)
Consumer Sciences and Housing - HC 340(L)
Honors - HP 445
Industrial Sciences- IS 142(L), 143(L), 152(L), 160(L), 261(L), 353(L)
Microbiology- MB 149, 300(L), 462/Z 462 (L)
Mechanical Engineering - ME 237, 331 (L), 431
Natural Resources - NR 120. 200, 220(L), 323(L)
Plant Disease - PD 361(L), 424
Physics - PH 245(L), 341,351,353(L), 361, 431,451
Physiology - PS 120, 124, 230/AY 230(L), 300/ AY 300
Psychology - PY 250A(L) & B, 352/353(L), 454A-B/455A-B(L), 456/457(L)
Radiological Health Sciences - R 400(L), 461
Clinical Sciences - VS 300
Weed Science - W 308(L)
Zoology - Z 212(L), 214(L), 300, 315, 329(L), 330(L), 335(L), 346, 424/EN 424, 430, 440(L), 455, 462/MB 462(L), 475(L), 477(L)

Category III - Arts and Humanities

The cultural world consists of the literary, philosophical, religious, musical, and artistic heritage. Educated people should understand the values of the past, the means of expressing these values, and the appreciation of beauty that give meaning to the present.

Minimum of 6 credits in A taken in two or more departments outside the department of the student's major

A. Arts and Humanities
Courses in this subcategory locus directly on literary, artistic. or philosophical expression; and study the history and theory of aesthetic and cultural experience.

Anthropology - AP 322*, 324*, 335
Art-AR 100', 110. 111,112*. 113*,310,312*, 315,410, 411,412, 414, 415,416
Dance - D 110, 427,428
English - E 140, 145. 160, 179, 232, 233, 234*, 235*, 236, 237, 238, 240, 242, 247. 270, 275, 330*, 332*, 333, 335*, 337,341,342,343, 345, 353*. 356', 360, 363,371,372, 430. 431,432, 434, 435, 436, 437, 438*, 439, 444, 445, 452. 455,465,475.476. 477,478
Honors - HP 110, I I 1, 310
Foreign Languages and Literatures - Any first, second, third. fourth year *language* course, L 250*, 309, 310, 335*, 336*. 350, 351,435*, 449, 450, 452, 453, 454
Music - MU 111,117, 118, 130, 230*, 332*, 334, 335,430, 431
Philosophy - PL 100, 105, 106*, 120, 170, 171, 172*, 205, 206, 250, 272, 300, 301,305A-F, 309*. 315,318, 325,327,345,348, 349*, 350, 351,352, 355, 359, 360, 366, 369*, 370, 371, 375, 379, 409, 425,435,438, 447, 479
Speech Communication - S P 201,25 5, 311,401. 411,417
Theatre - TH 141,341,342
Women's Studies - WS 472A

B. Studio and Applied Arts
Studio and applied courses are those which illustrate the application of knowledge and methods to aesthetic expression.

Apparel and Merchandising - AM 242
Art- AR 101,106A-E, 135, 160, 170, 230, 240, 245, 250, 255,260, 265, 270
Dance - D 120A-C, 121 A-C
English - E 210
Horticulture - H 130, 219, 331
Consumer Sciences and Housing - HC 250
Interior Design - ID 275
Industrial Sciences - IS 154, 205,206
Music - MU 150, 157,200, 204, 272A-V, 301. 302, 304, 305,309. 400, 401,402, 404
Speech Communication - SP 341,355
Theatre - TH 151, 161. 264, 265

Category IV - Behavioral and Social Sciences
All people exist in dynamic relationships with the common institutions and social and behavioral patterns of their culture. Educated people should understand individuals and societies in their sociocultural, psychological. economic, historical, and political dimensions.

Minimum of 6 credits in A taken in two or more departments outside the department of the student's major; EA and EC courses will not be allowed to satisfy the two-department requirement.

A. Behavioral and Social Sciences
Courses in this subcategory study fundamental behavior and social science principles in their sociocultural, psychological. economic, historical, and political dimensions.

Anthropology- AP 100', 250, 310', 311 *, 320*, 329, 331,340, 350, 351,. 373,374, 412*, 413', 421,440, 455,470
Agricultural and Resource Economics - EA 102,240/EC 240
Economics - EC 100, 102, 240/EA 240, 315

Geography- GR 100', 320*
Hispano-American - HA 200*
Human Development and Family Studies - HD 101,211,311,322, 330
History - All courses below HY 480 except 200
International Education - IE 270A-B*, 470*
Technical Journalism - JT 311
Military Science - MS 401/HY 401
Political Science - All courses below PO 480 except those on the applied list and 320
Psychology- PY 100. 260, 315,320, 325,465*
Sociology - All courses below S 480 except those on the applied list and 310, 311
Women's Studies - WS 200, 472B

B. Applied Behavioral and Social Sciences
Applied courses are those which illustrate the application of knowledge and methods to identifiable problems and opportunities in contemporary life.

Agricultural and Chemical Engineering AC 462
Agricultural Engineering - AE 460
Apparel and Merchandising - AM 250*, 363, 366, 450, 460*
Botany - B 250
Business Finance - BF 300, 311,360
General Business - BG 235,260, 305, 430.
Marketing - BK 300
Management - BN 300
Industrial Relations - BP 310. 471
Communication Disorders - CD 100. 445
Agricultural and Resource Economics - EA 205. 228. 300/EC 300. 305. 308. 310. 340/EC 340. 342, 344/EC 344. 346/EC 346. 348/EC 348. 375.405. 412. 460*. 462*. 478
Economics - EC 300/EA 300. 340/EA 340. 344/ EA 344. 346/EA 346. 348/EA 348. 460*
Education - ED 355
Exercise and Sport Science - EX 479
Forest Sciences - F 322. 333
Geography - GR 373. 375.376*. 422
Consumer Sciences and Housing - HC 100. 320. 330. 360. 401. 410. 411. 412/P0 412
Human Development and Family Studies -HD 301. 321. 323. 334
International Education - IE 271 *
Technical Journalism - JT 100. 250. 350. 411. 412. 414. 415
Mechanical Engineering - ME 310
Natural Resources - NR 320. 400
Occupational Therapy- OT 355*
Political Science - PO 351.361, 412/HC 412
Psychology - PY 228. 316. 327. 340. 440. 460
Recreation Resources - RR 200. 330
Range Science - RS 470
Sociology - S 320. 342. 343. 356. 374. 421. 460*. 463
Speech Communication - SP 241. 409
Social Work - SW 110'. 410
Women's Studies - WS 472C

Category V - Physical Education/ Wellness
Minimum of 2 credits
The faculty of Colorado State University recognizes that systematic and vigorous exercise is important for achieving high-level wellness and that knowledge of the benefits of exercise provides a rational basis for choosing an active life style. Consequently, all undergraduate students are required to complete successfully the course EX 123 or two semesters or two credits of physical education activity courses. These courses are: EX 100A-P, EX 101A-J, EX 102A-G, EX 103A-B, EX 104, EX 106. Students may repeat the same activity course in separate semesters. A repeated activity course may be used to complete the physical education/wellness requirement. One semester of AN 143A-B. AN 243A-B. AN 343A-C. or AN 145 may be substituted for one activity course. Completion of any two of the following ROTC courses (including the physical fitness

portion) will constitute a waiver of the physical education requirement: MS 110. MS 121. MS 210. MS 221. MS 310. and MS 320.

Veterans with at least six months of military service and/or students over 25 years of age at time of first entrance to Colorado State may be exempted from the physical education requirement for graduation. Modified and corrective programs are available for those with physical or health limitations. Exemptions for reasons of health are granted only upon recommendation of the University's Health Service and approval of the Exercise and Sport Science Department.

If a student is unable to swim. it is recommended that the student enroll in a swimming course.

Cross-Cultural Awareness Requirement
Cross-cultural awareness is intended to emphasize awareness of the diversity of culturally related factors which affect us individually and collectively. and awareness of how this diversity contributes to the structuring of values. processes. and institutions which both divide humans and bind them together.

The following courses meet the cross-cultural awareness requirement in addition to the courses designated with an * in the University Studies Program above:

Agronomy - AG 475
Anthropology - AP 315. 333
Art - AR 311. 318
Marketing - BK 470
English - E 347
Economics - EC 370
Education - ED 429
Geography - GR 378
Horticulture - H 230
History-HY 100. 101. 150. 151. 170. 171. 210. 215.230. 235.250. 251. 260. 264. 270.271.273. 274. 279. 340. 341.342.347.350. 352.420.442. 445.450. 463. 468. 472
Foreign Languages and Literatures - L 200. 201 *Landscape Architecture* - LA 120
Political Science- PO 131. 241. 331 *Sociology* - S 100. 332. 362
Speech Communication - SP 305
Social Work - SW 330. 365.37 IG

English Composition Requirement
The University English composition requirement must be fulfilled by *all* undergraduate students prior to completion of 60 credits in one of three ways:

1. Satisfactory completion of CO 150, College Composition.

2. Fulfillment of the CO 150 requirement by achieving a score of 4 or 5 on The Advanced Placement English Composition and Literature Test; or a score of 3, 4, or 5 on The Advanced Placement English Language and Composition Test; or placing in CO 150T (automatic credit for CO 150) on the Department of English Composition Placement Examination.

3. Transfer of equivalent credits from another college. Students who transfer with less than three semester credits in composition will be required to take the Composition Placement Examination *before* enrolling in CO 150.

Credit for CO 150 will not be given for high scores on the College-Level Examination Program (CLEP).

Placement Procedures
All students, including freshmen and transfer students who have not satisfied the University composition requirement in one of the three ways explained above, must take the Composition Placement Examination. The fee for this examination is $10. The examination is offered at Preview Colorado State and at the beginning of each semester (contact the Department of English for time

and place). Students should take this examination as soon as possible after admission, and may take the test only once. On the basis of this examination students are placed as follows:

1. If placement scores indicate a lack of basic writing skills, students can prepare for CO 150 through a tutorial program in the Writing Center or they may take an approved basic writing course through the Division of Continuing Education or at a community college. The Writing Center tutorial program is only available during the regular academic year, not during the summer session. The Writing Center tutorial does not require registration and does not carry University credit, but students must sign up for a tutor during the first three class days of the semester. For tutorial assignment, students should contact the English Department.

2. If placement scores indicate adequate preparation in basic writing skills, the student is placed in CO 150, College Composition.

3. If placement scores and previous record indicate superior writing skills, the student is placed in CO 150T, College Composition-By Exam. Students receiving credit through CO 150T will be automatically enrolled in CO 150T and will receive three semester credits of CO 150. Students whose departments require grades as well as credits in CO 150 should take an acceptable writing course at a more advanced level.

4. Undergraduate international students must take the Composition Placement Examination and will be placed in special sections of CO 150.

Enrollment Procedures
Students who enter as freshmen should complete the University composition requirement by the end of their sophomore year. Students (except first semester transfer and readmitted students) who have earned 60 or more Colorado State and transfer semester credits and who have not met this requirement may enroll only in the course necessary to fulfill this requirement. Transfer and readmitted students will be allowed the initial term of full-time enrollment before this restriction is imposed.

After taking the Composition Placement Examination, students should check scores in the English I Department to determine which course they should take. Students placed in CO 150T will be automatically enrolled in the course by the English Department.

Transfer students who need to complete the University composition requirement should take the Composition Placement Examination as soon as possible after entering Colorado State.

Mathematics Requirement
To satisfy the requirements of category I-B of the University Studies Program, students must earn three credits in mathematics. These credits may be earned by transferring credits from another school, taking courses at Colorado State, or qualifying for credit on the Colorado State University Mathematics Placement Examination.

All entering freshmen are required to take the Mathematics Placement Examination. This examination covers basic skills from high school algebra and geometry and the content of M 120, M 121, M 124, M 125, and M 126.

Students must score satisfactorily on the Mathematics Placement Examination (or the alternate Entry Level Mathematics Examination) before they may take M 120, M 130, or M 133. Preparatory courses designed to prepare students for these examinations are offered by the Division of Continuing Education and by community colleges.

Students are eligible for credit in those courses in which their Mathematics Placement Examination scores indicate competence. A fee of $8 per credit is assessed for credits earned from the Mathematics Placement Examination. If students decline to accept the earned credits, the courses will still count toward meeting prerequisites. but students will not be assessed the lee. Credits in M 120, M 121, M 124, M 125, and M 126, earned either by examination or completion, are not counted toward a degree in some majors.

Students (except first semester transfer and readmit-ted students) who have earned 60 or more Colorado State and transfer semester credits and who have not completed the requirements of category I-B of the University Studies Program may enroll only in the course(s) necessary to fulfill this requirement. Transfer and readmitted students will be allowed the initial term of full-time enrollment before this restriction is imposed.

GRADUATION REQUIREMENTS

Administration Annex, Room 100
The following are general graduation requirements and regulations which apply to all candidates for undergraduate degrees.

Students are required to complete *all* curricular requirements in place in the current catalog at the time of graduation. (See Changes in Undergraduate Curriculum Requirements in this section.)

Major Requirements
The student wishing to graduate must complete the requirements for a major and the University Studies Program (see the Undergraduate Degree Requirements section). A major is a sequence of courses in a subject-matter area or discipline which, when accompanied by appropriate supporting courses, leads to a degree. A minimum of 27 semester credits constitutes a major. Completion of a major is shown on both a student's diploma and academic record. Students may also elect to complete concurrently the requirements for a second major.

Second Major Requirements
Students may elect to complete concurrently the requirements for two majors. Combinations are available in unrelated as well as related majors.

At least one full term before the graduation term. students selecting second majors must contact the Records Section, Office of Admissions and Records to make official declarations and gain departmental approval for the joint curricular plans. Common requirements for either major may count in meeting curriculum requirements for both majors. Students must file intent-to-graduate cards and applications for graduation in the Degree and Transfer Evaluation Section of the Office of Admissions and Records for both majors. The single degree awarded is that degree appropriate for the first major. A single diploma is issued which displays both majors, and both are recorded on the student's academic record.

Students must complete degree requirements for the first major before they can graduate. Students completing degree requirements for the second major only cannot graduate until the first major's degree requirements have been met. Students declaring a second major cannot apply for a second bachelor's degree.

Concentration Requirements
Some majors have concentrations (or specialization areas). A concentration is a sequence of at least 12 semester credits of designated courses within a major designed to accommodate specific interests of students. Completion of a concentration is shown on a student's academic record. Concentrations which have the same name as the major will not appear on the student's academic record.

Option
Some majors have options which are a sequence of courses within a major or concentration of either guided electives or electives selected from areas of interest as approved by the student's adviser.

Minor Requirements
Students may elect to pursue a minor program of study in addition to the requirements for a major. Minor programs of study are optional and are offered only at the undergraduate level. A minor program of study consists of a minimum of 21 semester credits of required course work outside the academic discipline which constitutes the student's program of study (major). Students may take minors in their department which are outside their major. A minimum of *12* of the 21 credits must be course work at the upper-division level (300-400) and a minimum of 12 credits must be from course work within the department offering the minor.

At least one full term before the graduation term, students declaring minors must contact the Records Section, Office of Admissions and Records to make official declarations and obtain required departmental approvals. Once approval has been obtained, students deciding not to

complete minors must drop them officially through the Records Section, Office of Admissions and Records.

Students must complete intent-to-graduate cards and file applications for graduation in the Degree and Transfer Evaluation Section of the Office of Admissions and Records for the minor programs of study. Completion of a minor is shown on the student's academic record, but not on the diploma.

Second Bachelor's Degree
Acceptance to work toward a second bachelor's degree is contingent upon completion of a first bachelor's degree and fulfillment of regular admission requirements as well as receipt of favorable recommendations by the appropriate college and/or department. Transfer evaluation reports are not prepared for students who have a bachelor's degree.

Requirements for a second bachelor's degree include the following:
1. A minimum of 32 semester credits in residence in addition to the minimum number of credits required for the first degree.

2. All curriculum requirements for the major including University Studies Program requirements (see Undergraduate Degree Requirements section).

Students seeking second bachelor's degrees cannot declare second majors.

Students seeking second bachelor's degrees are not eligible to receive honors at graduation.

Changes in Undergraduate Curriculum Requirements
Students who enter the University for the first time or who are readmitted Summer Session 1986 or thereafter, must complete the University Studies Program (USP) requirements. Students admitted and/or enrolled in resident instruction programs prior to Summer Session 1986 are exempt from the USP requirements with the exception of the CO 150, mathematics, and physical education requirements.

Students are held for curricular requirements (including USP requirements) as set forth in the current catalog at the time of graduation, except 1) if so doing will extend the time normally required to complete the degree; or 2) if so doing will force students classified as juniors or seniors to take additional lower-division courses, exclusive of USP requirements. A request for waivers of or substitutions for curriculum requirements must be approved by the adviser and department head. Ultimate responsibility for ensuring that curriculum requirements are observed and that substitutions of equivalent courses or waivers are for good and sufficient academic reasons rests with the college dean and the Provost/ Academic Vice President.

Course Restrictions
Undergraduates may enroll for a maximum of nine credits of course work which may be applied toward a graduate degree at Colorado State provided that such course work: 1) is not used to meet bachelor's degree requirements; and 2) has been approved by the chairperson of the department in which a graduate degree will be sought. Forms for obtaining approval are available in Room 100, Administration Annex.

Undergraduate students may not enroll in courses numbered 600-699 to satisfy undergraduate degree requirements. Undergraduate students *may not enroll* in courses numbered 700-799.

Exclusion of Courses from the Bachelor's Degree
Undergraduates who enroll in 500-level courses which are not applied toward the bachelor's degree may request that an exclusion statement be placed on their academic records. This makes such courses potentially applicable to a Colorado State graduate degree. Students cannot exclude any courses below the 500 level under this policy. (See Course Restrictions above.) Courses at the 600 level are automatically excluded from use for an undergraduate degree.

A written request must be filed with the Degree and Transfer Evaluation Section of the Office of Admissions and Records, Room 100, Administration Annex, no later than the end of the schedule change period of the term in which the excluded course is taken.

Exclusion of these courses from the bachelor's degree does not assure acceptance of this credit toward a graduate degree program.

Graduation Credit Requirements

To meet requirements for the bachelor's degree, a student must fulfill the following requirements:

University

A bachelor's degree requires a minimum of 128 semester credits; however, individual programs in colleges and departments may exceed the minimum.

Only credits completed with grades of A, B, C, D, and S may count toward the graduation total. Some majors require a minimum grade of C in required courses. For further information, contact the department offering the major.

A minimum of 32 semester credits must be completed in residence at Colorado State as a major in that college which offers the degree as verified by the student's department. "In residence" courses include any Colorado State course offered and completed regardless of delivery system.

Senior Year

Of the last 32 semester credits earned immediately preceding graduation, no more than 16 may be completed at other colleges or universities. (See also, Graduation Procedures and Information, Off-Cam-pus Completion of Degree Requirements in this section.)

Graduation Average Requirement

The minimum scholastic average acceptable for graduation is 2.00 computed only for courses attempted at Colorado State.

Total credits earned and counted toward graduation may differ from total credits used in computing a scholastic average, since the scholastic average is computed by dividing the total grade points earned at Colorado State by the total credits attempted including credits for grades of A, B, C, D. F, and WF. Only courses with grades of K S, U, WP and W are excluded from computation of averages. (WF and WP grades were not issued after Summer Session 1979.) Credits graded S may count toward graduation. (See also, Grading in the Registration and Student Records section.)

Upper-Division Course Requirement

A minimum of 45 semester credits in upper-division courses (300-400 level) is required of all students completing a bachelor's degree program. Although 500-level courses can not be required in undergraduate programs of study, elective credits taken at the 500 level may be used to fulfill the upper-division requirement.

STUDENT OUTCOMES ASSESSMENT

Colorado State University holds itself accountable to offer the environment and the opportunity for students to improve their knowledge, capacities, and skills during their years at the University. Accordingly, the University collects information and assesses student outcomes, i.e. student development and intellectual growth. Results are used to strengthen instruction and educational opportunities at Colorado State. To be eligible to graduate, students at Colorado State must participate in student outcomes assessment as directed by the University.

By participating in outcomes assessments. students contribute to the University, to the education of future students, and to the University's ability to improve the education that it offers students. Thus, the students of the University have an opportunity to work with the University in achieving its educational purposes.

NONTRADITIONAL CREDIT POLICIES

All policies and procedures concerning granting of undergraduate credit are described in detail in the booklet, *University Credit.* available from the Degree and Transfer Evaluation Section of the Office of Admissions and Records. The evaluation of credit is done only alter a student has been accepted for admission to Colorado State.

College-Level Courses Completed by High School Students
Colorado State credit may be allowed for college-level courses completed at a college or university while a student is still in high school if the following conditions are met:

1. The college or university must be fully accredited by one of the six regional associations of schools and colleges. Credit will be granted only for academic courses.

2. An official transcript must be provided by the college or university showing the courses completed.

The College Board Advanced Placement Program
The Advanced Placement Tests administered by The College Board are used by the University to award credit and advanced placement in any of several fields in which a student may have participated in high school. Credit awarded is treated as transfer credit without a grade but is counted toward graduation and may be used in fulfilling specific curriculum requirements.

Credit is automatically granted for scores of three, four, or five on the Advanced Placement Tests in American history, art history, biology, chemistry. computer science, economics, English, European history. French, German. Latin. mathematics (calculus AB, BC), music, physics, psychology. and Spanish. Scores of one and two are not granted credit.

See the booklet, *University Credit,* for a complete table indicating those courses for which credit is awarded.

College-Level Examination Program (CLEP)
The College-Level Examination Program (CLEP) was designed by The College Board to enable both traditional and nontraditional students to receive college-level credit by examination. There are two types of examinations offered- the General Examinations and the Subject Examinations. Information may be obtained and arrangements made for taking the tests by contacting the University Testing Service, C 81 Clark Building, or by writing to The College Board, Box 1822, Princeton, NJ 08541 for a list of test centers. Credit awarded for these examinations cannot be used in meeting the Colorado State residency requirement for the baccalaureate degree.

General Examinations
The General Examinations measure college-level achievement in five basic areas of the liberal arts: English composition, humanities, mathematics, natural sciences, and social science-history. The test material usually covered in the first two years of college is often referred to as the general or liberal education requirement. Therefore, if a student takes a college-level course in a particular area, credit will not be allowed for the CLEP General Examination covering that area. Students scoring 500 or higher will be awarded a minimum of three semester credits for each examination or a maximum of 30 semester credits for all five examinations. Credit granted will be based on the following test scores:

General Examinations
500-574 = 3 semester credits
575-649 = 4 semester credits
650-724 = 5 semester credits
725-800 = 6 semester credits

Credit granted on the basis of the General Examinations will be treated as general elective transfer credit without a grade but will count toward graduation. Credit granted cannot be used to meet the University composition or mathematics requirements.

A maximum of 64 semester credits will be allowed for a combination of courses completed at two-year institutions and credits granted on the basis of the CLEP Examinations and other examinations.

Subject Examinations
The Subject Examinations measure achievement in specific college courses and are used to grant exemption from and credit for these courses. Students scoring equal to or greater than the mean scaled score on a specific Subject Examination in the year they take the test, will be granted credit

in .the amount allowed for the Colorado State equivalent course. Students who are enrolled in or who have successfully completed a course at a higher level may not receive credit for a lower-level prerequisite. Essays are not required for any test except General Psychology and Western Civilization I, II. See the booklet, *University Credit,* for a list of the Subject Examinations for which Colorado State credit will be granted.

International Baccalaureate
Students who graduate from high school with an international baccalaureate or have completed international baccalaureate examinations may receive University credit for scores of four and higher. The *University Credit* booklet lists the courses for which credit will be granted.

Challenging Colorado State Courses for Credit
Whenever feasible, the opportunity to challenge the content of a course on the basis of an examination is permitted. This option is at the discretion of the individual department and may exclude courses where a laboratory or practicum is an integral part of the course being challenged.

A fee of $20.00 per credit attempted is assessed and is not refundable. Upon successful completion of an exam, a grade of S (satisfactory) is recorded on the student's academic record. No record of unsuccessful attempts is recorded.

A course may not be challenged under the following conditions:
1. To satisfy the residence requirement for graduation.

2. When the person seeking credit is not currently registered at Colorado State at the time the examination is administered.

3. When a student has previously failed a placement or challenge exam for the course.

Students wishing to establish credit by challenge may obtain the application form from the University Testing Service.

Military Service
Students who have completed six months or more of active duty are given two semester credits in physical education and are exempted from the University requirement in physical education/wellness. Active duty must be verified with a supporting military document (such as a DD214), before credits are granted by the Degree and Transfer Evaluation Section of the Office of Admissions and Records. Students receiving VA Educational Benefits, who have a certified copy of their DD214 in their Colorado State VA file, may request that the Financial Aid Office (Veterans Affairs) submit verification of military service to the Degree and Transfer Evaluation Section.

Service Schools and Courses of the Armed Services
Credit may be allowed for those service schools with ' baccalaureate credit recommendation in the latest *Guide to the Evaluation of Educational Experiences in the Armed Services* prepared by the American Council on Education. Individual departments determine whether those courses clear major curriculum requirements or may be used as elective credit. Evaluations of service school training are made only for currently enrolled students.

Credit for Study Abroad
Students are encouraged to participate in accredited study abroad programs. Full credit is granted for courses taken in programs approved in advance by the University.

Students wanting undergraduate credit for study abroad must check with the Assistant Registrar for Degree and Transfer Evaluation prior to enrollment to ascertain if credit can be granted. To apply for credit, a student must process a "Request for Permission to Register for Off-Campus Course Work" and a Colorado State "Admissions Reservation" available in the Office of Admissions and Records, Room 100, Administration Annex, and the Study Abroad Office, Room 308, Aylesworth Hall.

Time Limitation on Credit Earned Toward a Bachelor's Degree

Courses completed within the preceding ten years may apply toward a bachelor's degree. After ten years, course work is reviewed by the department head and college dean to determine its appropriateness to the major requirements.

Credit from Two-Year Colleges

1. A maximum of 64 semester credits may be accepted in transfer from two-year colleges accredited by one of the six regional associations of schools and colleges.

2. A maximum of 64 semester credits is allowed for a combination of courses completed at two-year colleges and credits granted on the basis of CLEP and other examinations.

3. Credit earned at a two-year college may not be used to clear 300- and 400-level Colorado State courses.

These requirements do not alter the University graduation credit requirement and the senior year credit requirement.

Transfer Credit from Noncollegiate Institutions

Colorado State will award transfer credit for academic work done under the sponsorship of noncollegiate institutions, if 1) the courses proposed **for** transfer have been approved by the American Council on Education, 2) are listed in *The National Guide to Educational Credit for Training Programs,* and 3) are approved by the department and college in which the subject matter is taught at Colorado State, and the University. Those wishing to request such transfers should contact the Degree and Transfer Evaluation Section of the Office of Admissions and Records.

Correspondence and Extension

The number of credits completed by correspondence and/or by extension at other institutions shall not exceed 32 semester credits.

GRADUATION PROCEDURES AND INFORMATION

Checking *University graduation requirements* is the responsibility of the Degree and Transfer Evaluation Section of the Office of Admissions and Records. Curriculum requirements are checked by the department head of the first major and the second major and/or minor if applicable. Requests for waivers of or substitutions for curriculum requirements must be approved by the adviser and department head (see Changes in Undergraduate Curriculum Requirements in this section).

Intent to Graduate

No later than the third week of the term prior to the graduating term, students must file an intent-to-graduate card indicating their first major, and second major and/or minor if applicable, with the Degree and Transfer Evaluation Section of the Office of Admissions and Records. Students will subsequently receive senior status sheets concerning fulfillment of the University graduation requirements.

Application for Graduation

Candidates for degrees must complete and sign an application for graduation for majors, second majors, and minors in the first week of their graduation term in the department office(s) of their majors/ minors. Students not completing degree requirements that term must file another application for graduation during the first week of the new graduation term. After graduation applications have been filed, students who wish to remove their names from the graduation list must have written permission from their department heads.

Graduation List

The official graduation list is prepared each term by the Degree and Transfer Evaluation Section of the Office of Admissions and Records from the applications for graduation. Students may not graduate unless their names appear on the list as approved by the Faculty Council during the graduation term.

Off-Campus Completion of Degree Requirements

Seniors who are registered for final course work at another institution, either in residency or by correspondence or extension, must have their applications for graduation on file in the Degree and Transfer Evaluation Section of the Office of Admissions and Records by the end of the third week of the graduation term. Official transcripts showing completion of work from another institution must be on file in this office by the last day of the graduation term.

Good Standing Status

A student must be in good standing to receive a Colorado State degree. Accordingly, any student who is subject to suspension or probation for scholastic or disciplinary reasons will not graduate until the conditions of suspension or probation have been satisfied.

Financial Indebtedness

See Payment of Student Accounts under Tuition, Fees, Expenses, and Adjustments section in this catalog.

Commencement

Commencement is held each year at the end of each fall and spring semester. Students completing degree requirements during any term receive their diplomas by mail within a few weeks following the close of the graduation term. Candidates must appear in appropriate academic attire at commencement exercises.

ACADEMIC HONORS AT GRADUATION WITH DISTINCTION

Colorado State recognizes outstanding scholarship by granting the baccalaureate degree "Cum Laude," "Magna Cure Laude," and "Summa Cum Laude" to those students in each college who have achieved unusually high academic excellence in their undergraduate programs. Distinction designations are determined according to the following criteria:

1. "Summa Cum Laude" - Top one percent of graduates in each college
   "Magna Cum Laude"- Next three percent of graduates in each college
   "Cum Laude"-Next six percent of graduates in each college

2. The grade point average minimums used to determine each category are established each spring semester based on the cumulative grade point averages through the preceding fall semester of the spring graduating class for each college. These grade point averages are also used to determine the distinction recipients for the following summer and fall terms.

3. To qualify for this recognition, a minimum of 45 semester credits completed at Colorado State is required prior to the graduation term.

4. Courses completed prior to the graduation term are considered when determining distinction status; courses completed during the graduation term and transfer credit are not considered when determining distinction status.

5. Students seeking a second bachelor's degree are not eligible for distinction designation at graduation.

See also, the Honors Program in the University Wide Instructional Programs section in this catalog.

STUDENT RETENTION

Colorado State seeks to provide an educational environment in which students are encouraged to complete their degree programs. Recent studies have shown that a majority of the students who enter the University eventually earn baccalaureate degrees.

Colorado State has a low drop-out or stop-out rate, especially within the freshman class. Approximately 91% of the total student population and 93% of the freshmen attending during fall term, return for the spring term.

DEGREE PROGRAMS

UNDERGRADUATE DEGREES

The following is a list of majors offered by Colorado State. Many of the majors include concentrations and many departments also have minor programs of study. For information on requirements for undergraduate degrees, see Undergraduate Degree Requirements and college and department sections in this catalog.

Bachelor of Arts (B.A.)

Agricultural/Natural Resources Journalism
Anthropology
Art
Arts and Humanities
Economics
English
French
German
History
Music
Performing Arts
Philosophy
Political Science
Social Sciences
Social Work
Sociology
Spanish
Speech Communication
Technical Journalism

Bachelor of Fine Arts (B.F.A.)

Art

Bachelor of Music (B.M.)

Music

Bachelor of Science (B.S.)

Agricultural Business
Agricultural Economics
Agricultural Education
Agricultural Engineering
Agronomy
Animal Science
Apparel and Merchandising
Bio-Agricultural Science
Biochemistry
Biological Science
Botany
Business Administration
Chemical Engineering
Chemistry
Civil Engineering
Communication Disorders
Computer Science
Construction Management
Consumer Sciences
Electrical Engineering
Engineering Science
Environmental Health

Equine Science
Exercise and Sport Science
Farm and Ranch Management
Fishery Biology
Food Science and Technology
Forestry
Geology
Home Economics
Horticulture
Human Development and Family Studies
Human Nutrition and Dietetics
Industrial Sciences and Technology
Industrial Technology
Interior Design
Landscape Architecture Landscape Horticulture
Mathematics
Mechanical Engineering
Microbiology
Natural Resources Management
Occupational Therapy
Physical Science
Physics
Psychology
Range and Forest Management
Range Ecology
Recreation Resources Management
Restaurant and Resort Management
Statistics
Watershed Science
Wildfire Biology
Zoology

GRADUATE DEGREES
The following is a list of graduate degree programs offered by Colorado State. For information on requirements for graduate degrees, request a copy of the *Graduate and Professional Bulletin* from the Graduate School, Colorado State University, Fort Collins, CO 80523.

ACADEMIC DEGREES
Doctor of Philosophy (Ph.D.)
Agricultural and Resource Economics
Agricultural Engineering
Agronomy
Anatomy
Animal Sciences
Atmospheric Science
Biochemistry
Botany
Chemical Engineering
Chemistry
Civil Engineering
Clinical Sciences
Computer Science
Earth Resources
Economics
Electrical Engineering
Entomology
Environmental Health
Fishery and Wildfire Biology
Food Science and Nutrition
Forest Sciences

Horticulture
Mathematics
Mechanical Engineering
Microbiology
Pathology
Physics
Physiology
Plant Pathology and Weed Science
Political Science
Psychology
Radiological Health Sciences
**Range Science*
Recreation Resources
Sociology
Statistics
Vocational Education
Zoology

Master of Arts (M.A.)
Anthropology
Design, Merchandising, and Consumer Sciences
Economics
English
Foreign Languages and Literatures
History
Philosophy
Political Science
Sociology
Speech Communication

Master of Science (M.S.)
Agricultural and Resource Economics
Agricultural Engineering
Agronomy
Anatomy
Animal Sciences
Atmospheric Science
Biochemistry
Botany
Business Administration
Chemical Engineering
Chemistry
Civil Engineering
Clinical Sciences
Communication Disorders
Computer Science
Design, Merchandising, and Consumer Sciences
Earth Resources
Electrical Engineering
Entomology
Environmental Health
Exercise and Sport Science
Fishery and Wildfire Biology
Food Science and Nutrition
Forest Sciences
Geology
Horticulture
Human Development and Family Studies
Industrial Sciences
Mathematics

Mechanical Engineering
Microbiology
Occupational Therapy
Pathology
Physics
Physiology
Plant Pathology and Weed Science
Psychology
Radiological Health Sciences
Range Science
Recreation Resources
Statistics
Student Affairs in Higher Education
Technical Communication
Zoology

Professional Degrees
Doctor of Veterinary Medicine (D. V.M.)
Master of Agriculture (M.Agr.)
Agricultural Sciences

Master of Business Administration (M.B.A.)
Business Administration

Master of Education (M.Ed.)
Vocational Education

Master of Fine Arts (M.F.A.) ***An***
Creative Writing

Master of Forestry (M.F.)
Forest Sciences

Master of Home Economics (M.H.Ec.)
Home Economics

Master of Music (M.M.)
Music

Master of Social Work (M.S.W.)
Social Work

Requirements for the D.V.M. degree are listed in the *Graduate and Professional Bulletin.*

COLLEGE OF AGRICULTURAL SCIENCES

Office in Shepardson Building, Room 121
Professor Kirvin L. Knox, Dean
Professor P. Elaine Roberts, Interim Associate Dean

UNDERGRADUATE MAJORS
Agricultural Business
Agricultural Economics
Agricultural Education
Agronomy
Animal Science
Bio-Agricultural Science
Equine Science
Farm and Ranch Management
Food Science and Technology
Horticulture
Landscape Architecture
Landscape Horticulture

UNDERGRADUATE MINORS
Agricultural and Resource Economics
Entomology
Horticulture
Landscape Horticulture
Plant Pathology
Soil Resources and Conservation

Agriculture was the first science.. the progenitor of sciences .. and it remains the science that makes human life possible. It also is a science concerned with improving the quality of life and maintaining a productive, quality environment. Agricultural programs integrate biological, physical, and social sciences with agricultural sciences, and reinforce these with courses in the arts and humanities, to prepare students for a variety of careers. Students may look forward to careers in basic and applied research; production and utilization of food and related products; resource use and conservation; industry and business; education and public service; technical and professional services; professional, scientific, and technical communication; and institutional and governmental positions.

The college, recognizing the computer's ever-in-creasing importance in agriculture, provides instruction in computer-oriented agriculture through a variety of offerings.

COLLEGE PROGRAMS Undergraduate Majors
Undergraduate programs lead to a bachelor of science degree which requires a minimum of 128 credits with a minimum of 45 credits in upper-division courses. No more than 16 credits from independent study and/or internship courses may be used in fulfillment of the 128 credits. Information on inter-departmental and departmental majors, the various concentrations available, and career opportunities are described on the following pages. Students should consider simultaneously completing the requirements for a second major. See Second Major Requirements in the Graduation Requirements section of this catalog for a complete description of the program.

Open Option Students
Freshman students planning on an agriculturally related career but uncertain about a specific major should indicate that they wish to be classified as Agricultural Sciences Open Option on their application form. Open Option students will be given special attention and provided with an opportunity to explore many areas during their first semester. They will be assigned special advisers with particular expertise in assisting students in career exploration. Once a major is decided upon, the student can conveniently transfer out of the Open Option program into their new major.

Extension Emphasis

Although some careers with Cooperative Extension require specialized preparation in a particular agricultural specialty, some extension agent or farm adviser positions require a broad base in production agriculture. The majority of the Cooperative Extension positions require an advanced degree. Students wishing to prepare for an extension career or a career requiting extension-type capabilities should follow one of several majors in the College of Agricultural Sciences emphasizing the individual's career goals. Questions on academic programs that address Cooperative Extension should be directed to the Dean's Office, College of Agricultural Sciences.

International Agriculture Emphasis

Because the United States is the world's leading food producing and exporting nation, many countries look to us for agricultural expertise. The increasing importance of international trade, world population growth, shifts in living standards, and transfer of agricultural technology add to the dimensions of a career in international agriculture. Students interested in preparing for careers abroad in governmental agencies, including the Peace Corps, or with private firms may do so under most majors in the college. Students should ask their advisers about courses needed for such preparation. Also, general information about preparation for international careers may be obtained by contacting the Associate Dean, College of Agricultural Sciences, 121 Shepardson Building.

Career Internships

Students in certain majors may select a career internship. usually during the junior year, with permission of their department heads and approval of a cooperator. The number of allowable credits is determined by the student's department. Some internships are available each term with a larger number available during the summer term. Internships normally require a minimum of 10 weeks, and a stipend may be provided. Application must be made to the department at least 30 days before the term of the internship.

Western Undergraduate Exchange

Colorado State is a participant in the Western Undergraduate Exchange (WUE) program through the Western Interstate Commission for Higher Education. Nonresident students from designated western states may enroll in certain majors in the college and pay one and one-half times the resident tuition rate. For specific information on the designated states and majors, interested students should contact the Office of Admissions.

Study Abroad

Because of the global interdependencies in agriculture, the College of Agricultural Sciences offers a junior-year-abroad program with Wye College (University of London). The program is limited to qualified students in one of the undergraduate majors in the Department of Agricultural and Resource Economics. While at Wye College, students take the third-year program of study in agricultural economics along with the regular Wye College students. The Wye College program approaches the study of agricultural economics from a comprehensive international perspective, encompasses many of the general approaches of classical British education, and places emphasis on developing communication skills of the students.

Other study-abroad programs, of a more general nature, are available to agricultural students. Students interested in study abroad should contact the Office of International Education and Training, 315 Aylesworth Hall.

Transfer of Credits from Other Institutions

The college makes every effort to accept properly prepared transfer students from other institutions without credit loss. Agricultural courses from land-grant colleges and universities may be transferred at full credit. Credit from out-of-state institutions, other than land-grant, is normally accepted as it would be by the land-grant institution in that state.

Students planning to continue in two-year colleges beyond the freshman year should work closely with their college advisers for curriculum guidance. Attention should be given to the requirements of the student's proposed major. For additional information, contact the Dean of Agricultural Sciences.

For a bachelor's degree, a minimum of 15 credits must be earned from Colorado State's College of Agricultural Sciences. More restrictive requirements may be established by departments.

Graduate Programs
Graduate programs leading to the master of agriculture, master of science, and doctor of philosophy degrees are described in the *Graduate and Professional Bulletin.* Details regarding these particular degree programs may be obtained from departmental offices.

INTERDEPARTMENTAL MAJORs

Major in Agricultural Education

Office in Education Building, Room 209
The major prepares students for teaching youth and adults in the agricultural industry. Graduates are employed as teachers in high schools, community or junior colleges, area vocational schools, and technical institutes. Agricultural education provides background for employment in agriculture in foreign countries. Graduates not interested in teaching find employment in agricultural business and industry. With the expansion of agricultural education, the present demand for graduates far exceeds the number available.

Candidates completing the program in agricultural education are well prepared to serve school settings; The instructional content of this major requires students to demonstrate a competent knowledge of educational theory and a broad-based understanding in agricultural content. Through their participation in this program, students also refine their communication skills and personal qualities necessary to serve as educational leaders and managers.

Teaching agricultural education offers a challenging career for those who can meet the requirement of two years of occupational experience in the agricultural industry after attaining age 16.

Agricultural Education Concentration
This concentration prepares teachers for positions as high school and community college agricultural teachers. Graduates instruct high school students and adults in the efficient production and processing of food and fiber within the multibillion-dollar agricultural industry. Within the 131 required credits, the following minimum requirements must be met: 50 credits in technical agriculture, 13 credits in biological and physical sciences. and 44 credits in professional course work.

Freshman Year			**Credits**
AG	100	General Crops	4
AN	100	Animal Sciences	4
B	120	Principles of Plant Biology	4
		and	
Z	110	Principles of Animal Biology'	4
		or	
BY	102	Attributes of Living Systems	4
		and	
BY	103A-B	Biology of Organisms	4
CO	150	College Composition	3
M	120	College Algebra I	1
M	121	College Algebra II	1
	and		
M	124	Logarithmic and Exponential Function	1
	or		
M	133	Consumer Mathematics	2
PY	100	General Psychology	3
		Physical education/wellness	2
		Technical agriculture	4

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
AN	220	Feeds and Feeding	2
AN	221	Feed Formulation	1

C	107, 108	Fundamental Chemistry, Laboratory	5
CS	110	Personal Computing I	4
EA	102	Agricultural/Natural Resource Economics	3
EC	100	Principles of Macroeconomics	3
SP	200	Public Speaking and Discussion	3
		Arts and humanities	6

Junior Year			**Credits**
A	340A-B	Basic Agricultural Skills I, II	4
A	342	Agricultural Mechanics-Farm Construction	3
A	344	Agricultural Mechanics-Farm Machinery	3
ED	355	Educational Psychology	3
ED	401A	Teaching Classroom Reading/Literacy Skills	2
VE	300	Principles of Vocational Education	2
VE	401	Instructional Aids in Vocational Education	2
VE	420	Agricultural Experience and Adult Education	3
VE	486A	Practicum-Agricultural Education	1
		Technical agriculture	11

Senior Year			**Credits**
ED	428	Exceptionality, Diversity, and Human Relations	3
ED	486C	Practicum-Exceptionality and Diversity	1
VE	387	Internship	1
VE	402	Student Organizations in Vocational Education	2
VE	408	Methods and Evaluation of Instruction	4
VE	425	Methods/Materials in Agricultural Education	3
VE	485A	Student Teaching in Agricultural Education	12
VE	492	Seminar (2 semesters)	3
VE	496	Group Study (1 semester)	2
		Technical agriculture	4

1. Select from art. music, dance, foreign language, theatre, philosophy, and English courses in literature or humanities in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

Agricultural Extension Education
Concentration

This concentration, which requires 130 credits, emphasizes preparation for careers in the Cooperative Extension System including 4-H youth, agricultural production and economic efficiency, and adult volunteer and leadership development. The program of study in this concentration is broad based, balancing course work in technical agriculture, professional education, general education, adult education, journalism, and human development. The concentration provides students with excellent preparation for graduate studies.

Freshman Year		**Credits**	
AG	100	General Crops	4
AN	100	Animal Sciences	4
B	120	Principles of Plant Biology	4
		and	
Z	110	Principles of Animal Biology	4
		or	
BY	102	Attributes of Living Systems	4
		and	
BY	103A-B	Biology of Organisms	4
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
M	120	College Algebra I	1
M	121	College Algebra II	1
		and	
M	124	Logarithmic and Exponential Function	1
		or	

M	13 3	Consumer Mathematics	2
PY	100	General Psychology	3
		Physical education/wellness	2
		Agriculture electives	3.

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
AN	220	Feeds and Feeding	2
AN	221	Feed Formulation	1
C	107, 108	Fundamental Chemistry. Laboratory	. 5
CS	110	Personal Computing I	4
EC	100	Principles of Macroeconomics	3
SP	200	Public Speaking and Discussion	3
		Agriculture electives	3
		Arts and humanities 2	3
		Non-agriculture electives	3

Junior Year			**Credits**
A	340A-B	Basic Agricultural Skills I, II	4
A	346	Principles of Cooperative Extension	3
ED	355	Educational Psychology	3
H	100	Basic Horticulture	4
VE	300	Principles of Vocational Education	2
VE	401	Instructional Aids in Vocational Education	2
VE	420	Agricultural Experience and Adult Education	3
VE	486A	Practicum-Agricultural Education	1
		Agriculture electives	5
		Arts and humanities	3
		Non-agriculture electives	3

Senior Year			**Credits**
A	487	Internship	12
ED	428	Exceptionality, Diversity, and Human Relations	3
ED	486C	Practicum-Exceptionality and Diversity	1
VE	387	Internship	1
VE	402	Student Organizations in Vocational Education	2
VE	425	Methods/Materials in Vocational Education	3
VE	492	Seminar (2 semesters)	3
VE	496	Group Study	2
		Agriculture electives	3
		Non-agriculture electives	3

1. Select from advising list.

2. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

Major in Bio-Agricultural Science

Office in Shepardson Building, Room 121

This major combines general biology courses with agricultural science courses to form cohesive career-oriented programs of study. Special programs provided by departments of the college are included as concentrations under this major. Students may select a specific career-directed concentration or choose to follow a more general biotechnology program in preparation for a special career or postbaccalaureate studies.

Students graduating in bio-agricultural science should have a knowledge of plant classification, genetics, evolution. chemistry. economics, statistics. and computer applications as they relate to plant pathology, plant protection, and entomology depending upon their choice of concentration. They should have a

basic understanding of the processes and structure of plants relating to growth and production, and a basic knowledge of the biology of insects including their classification, physiology, ecology, and behavior. They should possess an understanding of the nature of a plant disease, the impact of that disease, and how that disease is controlled; an understanding of the principles of integrated pest management; and an understanding of the role of insects in ecosystems including an understanding of the relationship between insects, plants, livestock, and humans.

Agricultural Biotechnology Concentration
This program is designed for students interested in agricultural biotechnology. The core curriculum in biological sciences may be combined with either a specialization in a specific agricultural science or with courses providing a broader agricultural perspective. The concentration provides an ideal foundation for continued graduate studies in agricultural biotechnology or finds application in many scientific phases of agriculture.

M 120 and M 121 are considered review courses; credits in these courses may not be used toward a degree in the agricultural biotechnology concentration in the major in bio-agricultural science.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
		and	
Z	110	Principles of Animal Biology	4
		or	
BY	102	Attributes of Living Systems	4
		and	
BY	103A-B	Biology of Organisms	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
M	155	Calculus for Biological Scientists I	4
		Physical education/wellness	2

Sophomore, Junior, and Senior Years			**Credits**
AG	330	Principles of Genetics	3
BC	351	Principles of Biochemistry	4
BY	220	Ecology	3
BY	310	Cell Biology	4
BY	311	Developmental Biology	4
C	341. 343	Organic Chemistry I, II	6
C	344	Organic Chemistry Laboratory	2
CS	110	Personal Computing I	4
MB	300	General Microbiology	4
PH	121,122	General Physics I, II	10
		or	
PH	141,142	Physics for Scientists and Engineers I, II	10
ST	301	Introduction to Statistical Methods	3
		Agricultural-biological sciences	16
		Arts and humanities	6
		Behavioral and social sciences	6
		Communication	3
		Computer course	3
		Electives 5	18

1 Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2 Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

3 Select from list of courses in category I-D in the University Studies Program.

4 Select from list of computer courses in category I-C in the University Studies Program.

5 Students interested in completing requirements in the Biotechnology Interdisciplinary Studies Program may obtain a list of specific course requirements from the Office of the Assistant Dean for Biomedical Sciences, College of Veterinary Medicine and Biomedical Sciences.

Entomology Concentration
Students in this concentration acquire a broad knowledge of insect forms including control of injurious ones through biological, chemical, and cultural practices. Students are prepared for technical, research, and regulatory positions with state and federal governments, high school and college teaching, insecticide manufacturers and processors, or their own businesses such as beekeepers, pest control operators, or entomological consultants. Students may choose to continue into graduate school.

Students are advised by entomology faculty and have access to laboratories well-equipped with mounts, slides, and models, and an insect collection of more than 800,000 specimens.

M 120 and M 121 are considered review courses; credits in these courses may not be used toward a degree in the entomology concentration in the major in bio-agricultural science.

Freshman Year			**Credits**
BY	102	Attribute.% of Living Systems	4
BY	103A-B	Biology of Organisms	4
C	111,113	General Chemistry I, II	7
C	112	General Chemistry Laboratory I	1
CO	150	College Composition	3
M	124	Logarithmic and Exponential Function'	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
		Communication	3
		Physical education/wellness	2

Sophomore Year		**Credits**	
C	245, 246	Organic and Biological Chemistry, Laboratory	5
M	155	Calculus for Biological Scientists I	4
PH		Physics	3
Z	212	Animal Biology-Invertebrates	4

Junior Year			**Credits**
BC	351,352	Principles of Biochemistry Laboratory	5
		or	
BC	401. 403	Comprehensive Biochemistry I, II	6
EN	302	Applied and General Entomology	2
EN	303A-C	Entomology Laboratory	3
ST	301	Introduction to Statistical Methods	3

Senior Year			**Credits**
EN	423	Evolution and Classification of Insects	4
EN	451	Insect Pest Management	4
EN		Entomology	4-7
		Arts and humanities-'	6
		Behavioral and social sciences	6

1. Select from list of SP courses in category I-D in the University Studies Program.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

3. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

Plant Pathology Concentration

This concentration provides the student with an in-depth program in plant science and plant production, and a broad knowledge of plant pathology, including control of disease by genetic. cultural, biological, and chemical means. Students are advised by plant pathology faculty and can obtain credit for special laboratory, greenhouse, and field studies. Students are able to specialize their plant science course work to include areas of interest such as nursery, field, vegetable, turf, and tree crops. Students are prepared for graduate studies; technical, research, and consultant positions with local, state, and federal governments and private companies; and high school and college teaching.

Freshman Year			**Credits**
BY	102	Attributes of Living Systems	4
BY	103A-B	Biology of Organisms	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
		Physical education/wellness	2

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
B	223	Plant Identification	3
C	245, 246	Organic and Biological Chemistry Laboratory	5
		or	
C	341. 343	Organic Chemistry I, II	6
		and	
C	344	Organic Chemistry Laboratory	2
EA	102	Agricultural/Natural Resource Economics	3
MB	300	General Microbiology	4
PH	110	Descriptive Physics	3
		Communication	3
		Computer language	3

Junior and Senior Years			**Credits**	
AG	330	Principles of Genetics	3	
B	331	Plant Anatomy	4	
B	333	Introductory Mycology	4	
B	440. 441	Plant Physiology, Laboratory	5	
BC	351	Principles of Biochemistry	4	
EN	302	Applied and General Entomology	2	
EN	303A-C	Entomology Laboratory	2	
PD	361	Elements of Plant Pathology	3	
PD	464	Plant Disease Control	2	
PD	495	Independent Study	3	
ST	301	Introduction to Statistical Methods:	3	
		Arts and humanities	6	
		Arts and humanities. and behavioral and social sciences	4	3
		Behavioral and social sciences	6	
		Technical/scientific writing	3	

1. Select from list of SP courses in category I-D in the University Studies Program.

2. M 155 or three credits of computer science may be substituted.

3. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

4. Select from departmental list of approved courses.

5. Select from list of courses in category IV-A in the University Studies Program. excluding EA and EC courses.

Plant Protection Concentration

The plant protection concentration prepares students for a rewarding career at the bachelor's level. Courses dealing with weeds and insects are combined with disease studies to form a cohesive program of study. Students are advised by entomology, and plant pathology and weed science faculty. Government agencies, industry, and agribusiness are prospective employers. Internships are available.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
		and	
Z	110	Principles of Animal Biology	4
		or	
BY	102	Attributes of Living Systems	4
		and	
BY	103A-B	Biology of Organisms	4
C	111. 113	General Chemistry I, II	7
C	112. 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
		Communication	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AG	100	General Crops	4
		or	
H	100	Basic Horticulture	4
AG	240	Introductory Soil Science	4
B	223	Plant Identification	3
C	245, 246	Organic and Biological Chemistry/Laboratory	5
		or	
C	341. 343	Organic Chemistry I, II	6
		and	
C	344	Organic Chemistry Laboratory	2
EA	102	Agricultural/Natural Resource Economics	3

Junior Year			**Credits**
EN	302	Applied and General Entomology	2
EN	303B	Horticultural Entomology Laboratory	1 or
EN	303C	Agricultural Entomology Laboratory	1
PD	361	Elements of Plant Pathology	3
ST	301	Introduction to Statistical Methods	3
W	308	Biology and Control of Weeds	4
		Computer language	3
		Genetics	3
		Technical/scientific writing:	3

Senior Year			**Credits**
B	440, 441	Plant Physiology, Laboratory	5
		Arts and humanities	3
		behavioral and social sciences 4	15

Select Entomology or Plant Pathology Option:

Entomology Option

BY	220	Ecology	3

Select two courses from the following:

EN	423	Evolution and Classification of Insects	4
EN	451	Insect Pest Management	4
EN	452	Agricultural Pesticides	3

Plant Pathology Option

PD	464	Plant Disease Control	2

Select two courses from the following:

AG	414	Agricultural Experimental Design	3
AT	350	Introduction to Weather and Climate	2
		or	
ER	424	Bioclimatology	3
B	331	Plant Anatomy	4
B	333	Introductory Mycology	4
MB	300	General Microbiology	4
PD	495	Independent Study	3

1. Select from list of SP courses in category I-D in the University Studies Program.

2. Select from departmental list of approved courses.

3. Select from list of courses in category 11I-A in the University Studies Program. At least six credits must be taken in at least two departments.

4. Select at least three credits from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

Minor Programs

Minors are offered in entomology and plant pathology. Students are provided with maximum breadth and depth while utilizing a limited number of requirements. The minors also serve to broaden the academic background of students seeking employment in the interdisciplinary job markets associated with most plant and animal science majors. The minors provide adequate credits to meet most federal and state certification requirements for employment.

Minor in Entomology

Lower Division			**Credits**
BY	102	Attributes of Living Systems	4
		and	
BY	103A	Biology of Organisms-Animal	2
		or	
Z	110	Principles of Animal Biology	4

Upper Division			**Credits**
EN	302	Applied and General Entomology	2
EN	303A-C	Entomology Laboratory	3

Select 12-13 credits from the following:

EN	423	Evolution and Classification of Insects	4
EN	445	Aquatic Insects	4
EN	451	Insect Pest Management	4
Z	462/MB 462	Parasitology and Vector Biology	5

Minor in Plant Pathology

Lower Division			**Credits**
B	120	Principles of Plant Biology	4
		or	

BY	102	Attributes of Living Systems	4
		and	
BY	103B	Biology of Organisms-Plant	2

Upper Division			**Credits**
B	333	Introductory Mycology	4
PD	361	Elements of Plant Pathology	3

In addition, select a minimum of 10 credits from a list approved by the department. 5 credits of which must be departmental courses.

DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

Office in Clark Building, Room C 306
Professor S. Lee Gray, Chairman
Programs of study in agricultural and resource economics provide an understanding of economic and business principles, technical knowledge of agriculture and resource use, and in-depth knowledge of markets of the food, fiber, and natural resource systems. Understanding of these systems involves the study of the production, processing, marketing, and consumption of food and fiber products; conservation, consumption, and valuation of natural resources; and the study of the relationships between agriculture, natural resources, and the general economy.

Undergraduate majors are offered in agricultural business, agricultural economics, and farm and ranch management. Natural resource economics is a concentration in the agricultural economics major. A minor in agricultural and resource economics is also offered.

Each graduating senior in the department is required to participate in the senior seminar as part of the outcomes assessment. This seminar provides the student with the opportunity to demonstrate to peers his/her understanding of the appropriate theory and methods of analysis on a pertinent problem. The course provides an opportunity to demonstrate communication skills through written and oral presentations.

Major in Agricultural Business
This course of study prepares students for sales and management careers in industries and agencies closely related to agriculture including: agricultural finance.

machinery, chemicals, crop and livestock consulting, processing, outlook information, marketing, and international agricultural trade. The agricultural business major unites knowledge in business. agriculture, and economics.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
		or	
Z	110	Principles of Animal Biology	4
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
EC	100	Principles of Macroeconomics	3
M	120, 121	College Algebra. II	2
M	124	Logarithmic and Exponential FunctionI Physical education/wellness	2

Select six credits from the following:

AG	100	General Crops	4
AN	100	Animal Sciences	4
AN	200	Poultry Science and Production	2
FT	110	Introduction to Food Science and Technology	3
H	100	Basic Horticulture	4
H	130	Landscape Graphics Studio	4

Sophomore, Junior, and Senior Years			**Credits**
Agricultural Economies and Economics			**31**
including:			
EA	228	Agricultural Business Management 1	3
		or	
EA	300/EC 300	Managerial Economics	3
EA	375	Agricultural Law	3
EA	428	Agricultural Business Management II	3
EA	478	Agricultural Policy	3
EA	492	Seminar	1
EC	304	Intermediate Macroeconomics	3

EC	306	Intermediate Microeconomics	3

Agricultural Sciences	**15**
Arts and Humanities'	**6**
Behavioral and Social Sciences	**6**

Business			**18**
BA	210	Financial Accounting	3
BA	220	Managerial Accounting Concepts	3
BF	300	Principles of Finance	3
BK	300	Marketing	3
BL	300	Production Fundamentals	3
BN	300	Management Fundamentals	3

Communication Skills			**3**
CO 301A-C		Intermediate Composition	3
		or	
JT	301	Business Communication	3
		or	
SP	200	Public Speaking and Discussion	3

Quantitative Methods			**16**
Including:			
CS	110	Personal Computing I	4
CS		Computer applications or language	3
EA	335/EC 335	Introduction to Econometrics	3
M	141	Calculus in Management Sciences	3
ST	301	Introduction to Statistical Methods	3

1. At least nine credits must be taken in courses other than EA courses.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

3. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments. excluding EA and EC courses.

Major in Agricultural Economics
Agricultural Economics Concentration
This concentration prepares students to enter public and private agencies and businesses as professional agricultural economists. The concentration emphasizes quantitative and economic skills. The National Agricultural Statistics Service and the USDA Economic Research Service frequently recruit men and women with this concentration. The concentration is excellent preparation for graduate studies in agricultural economics, economics, and related fields.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
		or	
Z	110	Principles of Animal Biology	4
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
EC	100	Principles of Macroeconomics	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
		Physical education/wellness	2

Select six credits from the following:

AG	100	General Crops	4
AN	100	Animal Sciences	4

AN	200	Poultry Science and Production	2
FT	110	Introduction to Food Science and Technology	3
H	100	Basic Horticulture	4
H	130	Landscape Graphics Studio	4

Sophomore, Junior, and Senior Years			**Credits**
Agricultural Economies and Economies			**37**
EA	375	Agricultural Law	3
EA	478	Agricultural Policy	3
EA	492	Seminar	1
EC	304	Intermediate Macroeconomics	3
EC	306	Intermediate Microeconomics	3

Select at least three courses from the following:

EA	308	Agricultural Finance	3
EA	310	Agricultural Marketing	3
EA	405	Agricultural Production Management	3
EA	430	Agricultural Prices and Commodity Trading	3

Agricultural Sciences*	**15**
Arts and Humanities'	**6**
Behavioral and Social Sciences 3	**6**

Business			**6**
Including:			
BA	210	Financial Accounting	3
BA	220	Managerial Accounting Concepts	3
		Communication Skills	**3**
CO	301 A-C	Intermediate Composition	3
		or	
JT	301	Business Communication	3
		or	
SP	200	Public Speaking and Discussion	3

Quantitative Methods			**14**
CS	110	Personal Computing I	4
EA	335/EC 335	Introduction to Econometrics	3
M	141	Calculus in Management Sciences	3
ST	301	Introduction 10 Statistical Methods	3

1. At least six credits must be courses other than EA courses.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

3. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments, excluding EA and EC courses.

Natural Resource Economics Concentration

This concentration prepares students to be professional natural resource economists for employment with public and private agencies and businesses. The concentration emphasizes quantitative and economic skills related to problems of natural resource scarcity, utilization. environmental impacts, and policy analysis. This concentration is excellent preparation for graduate studies in natural economics, economics, and related fields.

Freshman Year			**Credits**
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
EC	100	Principles of Macroeconomics	3
M	120, 121	College Algebra I, II	2

M	124	Logarithmic and Exponential Function	11
		Behavioral and social sciences	6
		Biological and physical sciences 2	9
		Communication	3
		Physical education/wellness	2

Sophomore, Junior, and Senior Years			**Credits**
Agricultural Economics and Economics			**28**
EA	240/EC 240	Issues in Environmental Economics	3
EA	340/E.C 340	Introduction to Economics of Natural Resources	3
EA	492	Seminar	1
EC	304	Intermediate Macroeconomics	3
EC	306	Intermediate Microeconomics	3
		Electives	6

Include three of the following:

EA	342	Economic Analysis-Water Resource Development	3
EA	344/EC 344	Economics of Energy Resources	3
EA	346/EC 346	Economics of Outdoor Recreation	3
EA	348/EC 348	Economics of Urban and Regional Land Use	3
EA	478	Agricultural Policy	3

Arts and Humanitiess	**9**
Biological and Physical Sciences2	**15**

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Business and Law			**9**
AC	462	Environmental Law	3
		or	
EA	375	Agricultural Law	3
BA	210	Financial Accounting	3
		Business elective	3

Quantitative Methods			**13**
EA	335/EC 335	Introduction to Econometrics	3
M	141	Calculus in Management Sciences	3
ST	301	Introduction to Statistical Methods	3
		Elective	3

Social Science 4	**12**

1. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments, excluding EA and EC courses.

2. Select at least seven credits. including one laboratory course, from list of courses in category 11-A in the University Studies Program. Credits must be taken in at least two prefixes.

3. Select from list of courses in category I-D in the University Studies Program.

4. See department advising sheet for requirements.

5. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

Major in Farm and Ranch Management

This course of study prepares men and women to organize and manage farms and ranches in our complex economy. The major merges knowledge in technical agriculture and agricultural economics. Students in this major are prepared for positions as managers of farms and ranches, farm appraisers, and representatives of businesses that deal with farmers and ranchers.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
		or	
Z	110	Principles of Animal Biology	4
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
EC	100	Principles of Macroeconomics	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential	
		Function I Physical education/wellness	2

Select six credits from the following:

AG	100	General Crops	4
AN	100	Animal Sciences	4
AN	200	Poultry Science and Production	2
FT	110	Introduction to Food Science and Technology	3
H	100	Basic Horticulture	4
H	130	Landscape Graphics Studio	4

Sophomore, Junior, and Senior Years			**Credits**
Agricultural Economics and Economics			**31**
EA	375	Agricultural Law	3
EA	478	Agricultural Policy	3
EA	492	Seminar	1
EC	304	Intermediate Macroeconomics	3
EC	306	Intermediate Microeconomics	3

Select at least two courses from the following:

EA	205	Farm and Ranch Management	3
EA	305	Farm and Ranch Records and Analysis	3
EA	405	Agricultural Production Management	3

Agricultural Sciences			21
Arts and Humanities			**6**
Behavioral and Social Sciences			**6**
Business			**9**
BA	210	Financial Accounting	3
BA	220	Managerial Accounting Concepts	3
BF	300	Principles of Finance	3
Communication Skills			**3**
CO	301 A-C	Intermediate Composition	3
		or	
JT	301	Business Communication	3
		or	
SP	200	Public Speaking and Discussion	3
Quantitative Methods			**12**
EA	335/EC 335	Introduction to Econometrics	3
M	141	Calculus in Management Sciences	3
ST	301	Introduction to Statistical Methods	3
		Computer application or language	3

1. At least 15 credits must be courses other than EA courses.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

3. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments, excluding EA and EC courses.

Minor in Agricultural and Resource Economics
The minor identifies students who have completed an integrated set of courses in agricultural and resource economics. Areas of study in the minor include: agricultural production management, financial management, marketing management, international development and trade, natural resources, and environmental economics.

Lower Division			**Credits**
EA	102	Agricultural/Natural Resource Economics	3

Upper Division		**Credits**
EA*	Agricultural economics	15

Plus three credits to be determined in consultation with coordinator for this minor program of study.*

*Additional course work may be required because of prerequisites.

Graduate Programs in Agricultural and Resource Economics
The department offers graduate programs leading tomaster of science and doctor of philosophy degrees. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF AGRONOMY

Office in Plant Science Building, Room C 117 Professor Lee E. Sommers, Head

Major in Agronomy
Agronomy, the study of field crops and soils, is the foundation science underlying the production and management of food, feed, and fiber crops to meet human needs and to protect the environment.

With a national as well as world-wide role in improving crop and .soil technology, agronomy works to maximize the efficiency of soil and water resources for food production and other human needs. At the same time, it tries to protect and conserve these resources against deterioration, or even to improve them. This role is mandatory because the world's rapidly increasing population places great pressure on land for food supplies and on environmental quality for human comfort and well-being. Special emphasis is placed on improved production efficiency and the conservation of soil, chemicals, energy, and water.

The major in agronomy provides the required core courses and the flexibility to develop a broad-based understanding and appreciation for the basic natural and social sciences; communication skills; and to explore human interests and leadership potential.

Each 'graduating senior with a major in agronomy will participate in an assessment of the educational progress of students within this major. Presentations in senior seminar, performance in the senior-level crop and soil management courses, and performance on the exit evaluation will be used to assess student learning.

There are five concentrations that permit specialization in areas that require education in technical areas but continue to provide flexibility for students to develop broad-based interests.

Freshman Year			**Credits**
AG	100	General Crops	4
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
EA or EC		Elective	3
		or	
EA	102	Agricultural/Natural Resource Economics	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
PH	110	Descriptive Physics	3
		Physical education/wellness	2
		Biology electives	7
		Elective	2

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
C	245, 246	Organic and Biological Chemistry. Laboratory	5
CS		Computer science	3
ER	140	Physical Geology	4
SP	200	Public Speaking and Discussion	3
		Arts and humanities 3	6
		Behavioral and social sciences 4	3
		Electives	4-8

Junior and Senior Years			**Credits**
AG	330	Principles of Genetics	3
AG	492	Seminar	1
AG		Agronomy electives	15

B	440.441	Plant Physiology. Laboratory	5
JT	300	Technical Communication	3
ST		Statistics elective 0	3
		Technical electives 5	21
		Electives	13-18

1. Select from list of courses in category I-C in the University Studies Program.

2. Select ER 140 or B 440. B 441.

3. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

4. Select from list of courses in category IV-A in the University Studies Program. excluding EA and EC courses.

5. Select from the Colleges of Agricultural Sciences. Business, Engineering. Natural Resources, Natural Sciences, and/or Veterinary Medicine and Biomedical Sciences.

Agronomic Production Management Concentration
For students planning careers in production agriculture or agribusiness, this concentration provides the basic sciences, business. and economics as well as technical agronomy courses. Career opportunities exist in areas which include agricultural business managers in seed, chemical, and fertilizer companies, agricultural cooperatives, and agricultural consultant services.

Seed Science Option
The seed science option educates students in the basic and applied knowledge of the dynamic science of seeds. The commercial seed industry, along with public agencies, provide career opportunities in the development, production, conditioning, testing, marketing, and distribution of seeds.

Freshman Year			**Credits**
AG	100	General Crops	4
B	120	Principles of Plant Biology	4
C	107, 108	Fundamental Chemistry. Laboratory	5
		or	
C	111, 113	General Chemistry I, II	7
		and	
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
		Physical education/wellness	2

Select one course from the following:

A	300	Issues in Agriculture	2
AN	100	Animal Sciences	4
AN	200	Poultry Science and Production	2
FT	110	Introduction to Food Science and Technology	3
H	100	Basic Horticulture	4
H	130	Landscape Graphics Studio	4

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
BA	210	Financial Accounting	3
		or	
AG	320/RS 320	Forage and Range Management	4
MB	149	The Microbial World	3
		or	
MB	300	General Microbiology	4

PH	110	Descriptive Physics	3
		or	
PH	121	General Physics I	5
SP		Speech	3
		Agricultural economics, business, or economics	3
		Arts and humanities	3
		Behavioral and social sciences 2	3
		Computer language course	3-4

Junior Year			**Credits**
AG	330	Principles of Genetics	3
AG	350	Soil Fertility Management	3
AG	351	Soil Fertility Laboratory	1
AG	420	Crop and Soil Management Systems I	3
B	440, 441	Plant Physiology, Laboratory	5
C	245, 246	Organic and Biological Chemistry, Laboratory	5
JT	300	Technical Communication	3
ST	201	General Statistics	3
		or	
ST	301	Introduction to Statistical Methods	3
		Agricultural economics, business, or economics	3
		Arts and humanities	3

Senior Year			**Credits**
AG	370	Irrigation Principles and Management	3
AG	304	Seed Production. Conditioning, and Marketing	2
		and	
B	446	Physiology of Seeds 3	2
		and	
PD	424	Seed Technology	2
		or	
		Agricultural economics. business. or economics	6
AG	415	Crop Response to Environment	3
AG	421	Crop and Soil Management Systems II	4
AG	492	Seminar	I

Select three courses from the following:

B	223	Plant Identification	3
EN	302	Applied and General Entomology	2
		and	
EN	303C	Agricultural Entomology Laboratory	1
PD	361	Elements of Plant Pathology	3
W	308	Biology and Control of Weeds	4

Select one course from the following:

AG	414	Agricultural Experimental Design	3
AG	440	Soil Genesis and Survey	3
AG	460/H 460	Plant Breeding	3

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

3. Required for students in seed science option.

Crop Science Concentration

Crop science is the specialization for students interested in pursuing graduate studies or who may desire a greater concentration of courses in the basic sciences. This concentration integrates the

application of basic biological principles such as plant biotechnology to crop production systems. There are opportunities for well-trained crop scientists in the areas of seed production, crop management, and cultural practices including weed control, crop utilization, and graduate studies. Students who continue in graduate work specialize in such areas as crop physiology, plant breeding and genetics, crop ecology, and crop management and utilization.

Freshman Year			**Credits**
AG	100	General Crops	4
B	120	Principles of Plant Biology	4
		and	
B	223	Plant Identification	3
		or	
BY	102	Attributes of Living Systems	4
		and	
BY	103B	Biology of Organisms-Plant	2
C	111,113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
M	155	Calculus for Biological Scientists I	4
		Physical education/wellness	2

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
BY	310	Cell Biology	4
EA	102	Agricultural/Natural Resource Economics	3
MB	300	General Microbiology	4
PH	110	Descriptive Physics	3
		or	
PH	121	General Physics I	5
SP		Speech	3
		Arts and humanities 1	3
		Behavioral and social sciences:	3
		Computer language course	3-4

Junior Year			**Credits**
AG	330	Principles of Genetics	3
AG	331	Genetics Laboratory	1
AG	350	Soil Fertility Management	3
AG	351	Soil Fertility Laboratory	1
AG	420	Crop and Soil Management Systems I	3
C	331,332	Quantitative Analysis. Laboratory	5
C	341. 343	Organic Chemistry I, II	6
C	344	Organic Chemistry Laboratory	2
ST	301	Introduction to Statistical Methods	3

Senior Year			**Credits**
AG	421	Crop and Soil Management Systems II	4
AG	492	Seminar	1
B	440, 441	Plant Physiology, Laboratory	5
JT	300	Technical Communication	3
		Arts and humanities	3

Select two courses from the following:

AG	320/RS 320	Forage and Range Management	4
AG	414	Agricultural Experimental Design	3
AG	455	Soil Microbiology	3
AG	460/H 460	Plant Breeding	3

Select two courses from the following:

EN	302	Applied and General Entomology	2
		and	
EN	303C	Agricultural Entomology Laboratory	1
PD	361	Elements of Plant Pathology	3
W	308	Biology and Control of Weeds	4

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

2. "Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

Environmental Soil Science Concentration

Soil and groundwater pollution are among the most serious environmental problems facing the world today. Students in environmental soil science learn how they can contribute to preventing environmental degradation as well as cleaning up existing problems. By selecting from a set of technical electives, students may prepare for careers focusing on such soil-related problems as industrial and community waste disposal. cleanup of hazardous waste, land management to prevent water pollution, and reclamation of disturbed lands. Employment opportunities are available with a variety of organizations concerned with environmental issues, including government agencies, industry, and environmental consulting firms. The concentration also prepares students for graduate study in soil science and environmental areas. Summer internships with environmental consulting firms and government agencies are encouraged.

M 120 and M 121 are considered review courses; credits in these courses may not be used toward a degree in the environmental soil science concentration in the major in agronomy.

Freshman Year			**Credits**
AG	240	Introductory Soil Science	4
BY	102	Attributes of Living Systems	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
EA	240/EC 240	Issues in Environmental Economics	3
M	141	Calculus in Management Sciences	3
		Arts and humanities	3
		Behavioral and social sciences 2	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AG	350	Soil Fertility Management	3
AG	351	Soil Fertility Laboratory	1
BY	220	Ecology	3
EH	220	Environmental Health	3
ER	140	Physical Geology	4
M	125	Numerical Trigonometry	1
M	229	Matrices and Linear Equations	1
PH	121,122	General Physics I, II	10
SP	200	Public Speaking and Discussion	3
ST	301	Introduction to Statistical Methods	3
		or	
ST	307/EH 307	Introduction to Biostatistics	3
		Computer course	3

Junior Year			**Credits**
AG	440	Soil Genesis and Survey	3
AG	467	Soil Chemistry	3
AG		Agronomy elective	3
C	245, 246	Organic and Biological Chemistry, Laboratory	5

		or	
C	341. 343	Organic Chemistry I, II	6
		and	
C	344	Organic Chemistry Laboratory	2
C	331. 332	Quantitative Analysis. Laboratory	5
CO	301A-C	Intermediate Composition	3
		or	
JT	300	Technical Communication	3
MB	300	General Microbiology	4
		Technical electives	4-6

Senior Year			**Credits**
AE	462	Environmental Law	3
AG	455,456	Soil Microbiology, Laboratory	4
AG	470, 471	Soil Physics, Laboratory	4
AG	492	Seminar	I
AG		Agronomy elective	3
BC	301	Survey of Biochemistry	3
		or	
BC	351	Principles of Biochemistry	4
ST	305	Sampling Techniques	2
		Arts and humanities	3
		Technical electives	4-6

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

3. Can be satisfied with NR 260.

International Agronomy Concentration

Agronomists are needed in the developing nations. Agronomists with bachelor's degrees find jobs with the Peace Corps and other agencies working in demonstration and extension positions. As new crop varieties are developed or introduced into developing countries, appropriate agronomic practices may be designed, compatible with the farming systems which can succeed in those climatic and socioeconomic constraints. Research is needed on multiple cropping, mixed farming, irrigation, and fertility management, so that appropriate agricultural technology programs can be designed. Employment opportunities exist with agricultural industries operating in developing countries.

Freshman Year			**Credits**
AG	100	General Crops	4
B	120	Principles of Plant Biology	4
C	107, 108	Fundamental Chemistry. Laboratory	5
		or	
C	111. 113	General Chemistry I, II	7
		and	
C	111 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
		Physical education/wellness	2

Select one course from the following:

A	300	Issues in Agriculture	2
AN	100	Animal Sciences	4
AN	200	Poultry Science and Production	2
FT	110	Introduction to Food Science and Technology	3

H	100	Basic Horticulture	4
H	130	Landscape Graphics Studio	4

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
C	245, 246	Organic and Biological Chemistry, Laboratory	5
EC	100	Principles of Macroeconomics	3
MB	149	The Microbial World	3
		or	
MB	300	General Microbiology	4
PH	110	Descriptive Physics	3
		or	
PH	121	General Physics I	5
PO	131	Current World Problems	3
SP		Speech	3
		Arts and humanities	3

Junior Year			**Credits**
AG	330	Principles of Genetics	3
AG	350	Soil Fertility Management	3
AG	351	Soil Fertility Laboratory	1
AG	370	Irrigation Principles and Management	3
AG	420	Crop and Soil Management Systems I	3
B	440, 441	Plant Physiology, Laboratory	5
JT	300	Technical Communication	3
S	341	Sociology of Rural Life	3
ST	201	General Statistics	3
		or	
ST	301	Introduction to Statistical Methods	3
		Computer language course	3

Senior Year			**Credits**
AG	421	Crop and Soil Management Systems II	4
AG	440	Soil Genesis and Survey	3
AG	475	Tropical Soils, Crops, and Farming Systems	3
AG	492	Seminar	1
EA	460	Economics of World Agriculture	3
		or	
EC	460	Economic Development	3
PO	435	United States Foreign Policy	3
		Arts and humanities	3

Select two courses from the following:

EN	302	Applied and General Entomology	2
		and	
EN	303C	Agricultural Entomology Laboratory	1
PD	361	Elements of Plant Pathology	3
W	308	Biology and Control of Weeds	4

1. Select from list of courses in category III-A in the University S Indies Program. Credits must be taken in at least two departments.

Soil Resources and Conservation Concentration

This concentration provides training in planning. conservation, and management of soil and water resources. Background is given in classification of normal and disturbed soils and soil and water conservation, Emphasis is on interpretations of land suitability for agricultural, urban, industrial, recreational, waste disposal, water management systems, and other ecological purposes, and conservation of soil and water resources. Students prepare for positions with private, federal, or state natural resource agencies, and as farm managers, agricultural consultants, and county agricultural extension agents.

Freshman Year			Credits
AG	100	General Crops	4
B	120	Principles of Plant Biology	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
EC	100	Principles of Macroeconomics	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
		Physical education/wellness	2

Sophomore Year			Credits
AG	240	Introductory Soil Science	4
C	245	Organic and Biological Chemistry	4
ER	140	Physical Geology	4
MB	149	The Microbial World	3
		or	
MB	300	General Microbiology	4
PH	110	Descriptive Physics	3
		or	
PH	121	General Physics I	5
SP		Speech	3
		Arts and humanities	3
		Behavioral and social sciences'	3
		Computer language course	3-4

Junior Year			Credits
AG	320/RS 320	Forage and Range Management	4
AG	330	Principles of Genetics	3
AG	350	Soil Fertility Management	3
AG	351	Soil Fertility Laboratory	1
AG	370	Irrigation Principles and Management	3
AG	420	Crop and Soil Management Systems I	3
AG	440	Soil Genesis and Survey	3
ST	201	General Statistics	3
		or	
ST	301	Introduction to Statistical Methods	3
		Arts and humanities	3

Senior Year			Credits
AG	421	Crop and Soil Management Systems II	4
AG	470, 471	Soil Physics, Laboratory	4
AG	492	Seminar	1
B	440, 441	Plant Physiology, Laboratory	5
ER	454	Geomorphology	4
JT	300	Technical Communication	3

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

Minor in Soil Resources and Conservation

The purpose of the minor in soil resources and conservation is to give students with appropriate biological sciences background the opportunity to formalize their interests in an organized course of study.

Lower Division			Credits
AG	240*	Introductory Soil Science	4

Upper Division			Credits
AG	350	Soil Fertility Management	3
AG	351	Soil Fertility Laboratory	1
AG	421 *	Crop and Soil Management Systems II	4
AG	440	Soil Genesis and Survey	3
AG	442*	Forest and Range Soils	3
AG	470. 471*	Soil Physics, Laboratory	4
		or	
AG	467*	Soil Chemistry	3
B	440*	Plant Physiology	3
ER	454*	Geomorphology	4

Select one course from the following:

AG	320/RS 320	Forage and Range Management	4
AG	370*	Irrigation Principles and Management	3
AG	420	Crop and Soil Management Systems I	3
AG	455	Soil Microbiology	3

* Additional course work may be required because of prerequisites.

Graduate Programs in Agronomy

Programs in crop science, soil science, or plant genetics lead to master of science and doctor of philosophy degrees. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF ANIMAL SCIENCES

Office in Animal Sciences Building, Room 106C
Professor David R. Ames, Head

Major in Animal Science
Animal science majors may concentrate in industry or science. These curricula orient students in specific areas, thus providing backgrounds for a variety of employment opportunities. Since students have diverse backgrounds, electives in curricula provide individualization. Requirements include 24 upper-division credits in animal science to be taken at Colorado State (excluding variable credit courses). Internship credit may be allowed for off-campus educational experience involving production, industry, and other animal-related operations consistent with a student's educational objectives.

Students will obtain knowledge and skills in the animal disciplines (reproduction, breeding, nutrition, and products) and in one or more of the livestock species (beef cattle, dairy cattle, horses, poultry, sheep, and swine). A choice of concentrating in science or industry (livestock agribusiness) will develop additional knowledge and abilities in one of these areas. Off-campus internships provide educational experiences in management and problem solving.

Industry Concentration
This concentration emphasizes economics, business, and management associated with meat animal and poultry industries. Students are provided the background for employment in animal-related industries; livestock production; county extension work; livestock marketing; and farm, ranch, or feedlot management.

Freshman Year			**Credits**
AN	100	Animal Sciences	4
AN	192	Animal Sciences Preprofessional Seminar	1
BY	102	Attributes of Living Systems	4
C	107, 108	Fundamental Chemistry. Laboratory	5
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
		or	
EC	102	Principles of Microeconomics	3
M	120	College Algebra I	1
M		Mathematics	2
		Arts and humanities	3
		Behavioral and social sciences 2	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AN	220	Feeds and Feeding	2
AN	221	Feed Formulation	1
AN	250	Live Animal and Carcass Evaluation	3
AN	292	Career Identification and Preparation Seminar	1
AY	230/PS 230	Animal Anatomy and Physiology	5
SP	200	Public Speaking and Discussion	3
ST	201	General Statistics	3
		or	
ST	301	Introduction to Statistical Methods	3
		or	
ST	307/EH 307	Introduction to Biostatistics	3
		Agricultural economics. business, economics, or computer science	3
		Arts and humanities	3
		Behavioral and social sciences"	3
		Elective	3

Junior and Senior Years			Credits
AG	320/RS 320	Forage and Range Management	4
AN	310	Animal Reproduction	4
AN	320	Principles of Animal Nutrition	3
AN	330	Principles of Animal Breeding	3
AN	360/FT 360	Principles of Meat Science	3
AN	492	Professional Orientation Seminar	I
CS		Computer science	3
VS	300	Prevention and Control of Livestock Diseases	3
		Agricultural economics. business. economics. or computer science	6
		Electives	31

Select two courses from the following:

AN	371	Commercial Poultry Industry	3
AN	372	Sheep Production	3
AN	376	Dairy Farm Operations	3
AN	440	Equine Production and Industry	3
AN	474	Swine Production	3
AN	478	Beef Production and Management	3

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

3. Select six credits from departmental list of recommended courses.

Science Concentration

This concentration emphasizes basic sciences and provides background for students to enter graduate programs for advanced degrees. Students in this concentration can complete most of the preprofessional requirements for veterinary medicine. With this concentration and graduate school, the student is prepared for opportunities in research, university teaching, extension, and responsible positions in industrial and institutional agencies.

Students having less than a 2.75 cumulative grade point average after completion of 80 credits must change to the industry.concentration in animal science. M 120 and M 121 are considered review courses; credits in these courses may not be used toward a degree in the science concentration in the major in animal science.

Freshman Year			Credits
AN	100	Animal Sciences	4
AN	192	Animal Sciences Preprofessional Seminar	1
BY	102	Attributes of Living Systems	4
BY	103A-B	Biology of Organisms	4
C	107, 108	Fundamental Chemistry, Laboratory	5
		or	
C	111,113 and	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	155	Calculus for Biological Scientists I	4
		Arts and humanities'	3
		Physical education/wellness	2

Sophomore Year			Credits
AN	220	Feeds and Feeding	2

AN	221	Feed Formulation	1
AN	250	Live Animal and Carcass Evaluation	3
AN	292	Career Identification and Preparation Seminar	1
AY	230/PS 230	Animal Anatomy and Physiology	5
BY	310	Cell Biology	4
C	245, 246	Organic and Biological Chemistry. Laboratory	5
		or	
C	341,343	Organic Chemistry I, II	6
		and	
C	344	Organic Chemistry Laboratory	2
EA	102	Agricultural/Natural Resource * Economics	3
		or	
EC	102	Principles of Microeconomics	3
SP	200	Public Speaking and Discussion	3
		Arts and humanities	3
		Behavioral and social sciences 2	3

Junior and Senior Years			**Credits**
AN	310	Animal Reproduction	4
AN	320	Principles of Animal Nutrition	3
AN	330	Principles of Animal Breeding	3
AN	360/FT 360	Principles of Meat Science	3
AN	422	Animal Metabolism	3
AN	492	Professional Orientation Seminar	1
MB	300	General Microbiology	3
PH		Physics	5
ST	307/EH 307	Introduction to Biostatistics	3
		Agricultural economics. business, economics, or computer science	3
		Behavioral and social sciences:	3
		Electives	15-22

Select two courses from the following:

AN	371	Commercial Poultry Industry	3
AN	372	Sheep Production	3
AN	376	Dairy Farm Operations	3
AN	440	Equine Production and Industry	3
AN	474	Swine Production	3
AN	478	Beef Production and Management	3

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

3. Select six credits from departmental list of recommended courses.

Major in Equine Science

Equine science majors may concentrate in industry or science. These curricula orient students in specific areas, thus providing backgrounds for a variety of employment opportunities. Since students have diverse backgrounds, electives in curricula provide individualization. Animal science courses give students a general understanding of all species. Equine science courses give a more in-depth understanding of horses. Internship credit may be allowed for off-campus educational experience involving production, industry, and other equine-related operations consistent with a student's educational objectives. Requirements include 32-33 upper-division credits in equine and animal sciences 10 be taken at Colorado State (excluding variable credit courses).

Industry Concentration

This concentration emphasizes economics. business. and management associated with equine and food animal industries. Students are provided the background for employment in equine-related industries, management, production. marketing, and county extension work.

Freshman Year			**Credits**
AN	100	Animal Sciences	4
AN	192	Animal Sciences Preprofessional Seminar	1
BY	102	Attributes of Living Systems	4
C	107, 108	Fundamental Chemistry. Laboratory	5
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
		or	
EC	102	Principles of Microeconomics	3
M	120	College Algebra I	I
M		Mathematics	2
		Arts and humanities	3
		Behavioral and social sciences:	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AN	220	Feeds and Feeding	2
AN	221	Feed Formulation	1
AN	240	Equine Management	3
AN	245	Equine Evaluation	3
AN	250	Live Animal and Carcass (':.valuation	3
		or	
AN	360/FT 360	Principles of Meat Science	3
AN	292	Career Identification and Preparation Seminar	1
AY	230/PS 230	Animal Anatomy and Physiology	5
SP	200	Public Speaking and Discussion	3
ST	201	General Statistics	3
		or	
ST	301	Introduction to Statistical Methods	3
		or	
ST	307/EH 307	Introduction to Biostatistics	3
		Arts and humanities	3
		Behavioral and social sciences?	3

Junior and Senior Years			**Credits**
AG	320/RS 320	Forage and Range Management	4
AN	310	Animal Reproduction	4
AN	320	Principles of Animal Nutrition	3
AN	330	Principles of Animal Breeding	3
AN	346	Equine Disease Management	3
AN	440	Equine Production and Industry	3
AN	444	Equine Reproductive Management	3
AN	446	Equine Nutrition	2
AN	492	Professional Orientation Seminar	I
CS		Computer science	3
		Agricultural economics. business. economics. or computer science	9
		Electives	26

Select one course from the following:

AN	371	Commercial Poultry Industry	3
AN	372	Sheep Production	3
AN	376	Dairy Farm Operations	3
AN	474	Swine Production	3
AN 478	Beef	Production and Management	3

1. Select from list of courses in category III-A in the University Studies Program. Credits mum be taken in at least two departments.

2. Select from list of courses in category IV-A in the UniversityStudies Program, excluding EA and EC courses.

3. Select six credits from departments list of recommended courses.

Science Concentration
This concentration emphasizes basic sciences and provides background for students to enter graduate programs for advanced degrees. Students in this concentration can complete the preprofessional requirements for veterinary medicine. With this concentration and graduate school, the student is prepared for opportunities in research, university teaching, extension, and responsible positions in industrial and institutional agencies.

Students having less than a 2.75 cumulative grade point average after completion of 80 credits must change to the industry concentration in equine science. M 120 and M 121 are considered review courses; credits in these courses may not be used toward a degree in the science concentration in the major in equine science.

Freshman Year		**Credits**	
AN	100	Animal Sciences	4
AN	192	Animal Sciences Preprofessional Seminar	1
BY	102	Attributes of Living Systems	4
BY	103A-B	Biology of Organisms	4
C	107, 108	Fundamental Chemistry. Laboratory	5
		or	
C	111, 113	General Chemistry I, II	7
		and	
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	155	Calculus for Biological Scientists I	4
		Arts and humanities	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AN	220	Feeds and Feeding	2
AN	221	Feed Formulation	I
AN	240	Equine Management	3
AN	245	Equine Evaluation	3
AN	292	Career Identification and Preparation Seminar	1
AY	230/PS 230	Animal Anatomy and Physiology	5
BY	310	Cell Biology	4
C	245, 246	Organic and Biological Chemistry.	
		Laboratory	5
		or	
C	341,343	Organic Chemistry I, II	6
		and	
C	344	Organic Chemistry Laboratory	2
EA	102	Agricultural/Natural Resource Economics	3
		or	
EC	102	Principles of Microeconomics	3
MB	300	General Microbiology	4
SP	200	Public Speaking and Discussion	3
		Behavioral and social sciences-'	3

Junior and Senior Years			**Credits**
AN	310	Animal Reproduction	4
AN	320	Principles of Animal Nutrition	3

AN	330	Principles of Animal Breeding	3
AN	346	Equine Disease Management	3
AN	422	Animal Metabolism	3
AN	440	Equine Production and Industry	3
AN	4.44	Equine Reproductive Management	3
AN	446	Equine Nutrition	2
AN	492	Professional Orientation Seminar	1
PH		Physics	5
ST	307/EH 307	Introduction to Biostatistics	3
		Agricultural economics, business. economics, or computer science	3
		Arts and humanities	3
		Behavioral and social sciences:	3
		Electives	10- 17

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

3. Select six credits from departmental list of recommended courses.

Preveterinary Medicine

Preveterinary medical students interested in animal or equine science are encouraged to follow the science concentration listed under the animal science and equine science majors in this section of the catalog. Maximum flexibility in career direction can be obtained by meeting the requirements for a degree in animal or equine science while simultaneously completing the admission requirements for the professional veterinary medical program. Students accepted into the professional veterinary medical program after receiving this degree will benefit from the background in nutrition, breeding, marketing, and management of livestock or nutrition, genetics, and marketing. Students not entering the veterinary medical program use this background in pursuing career suggestions mentioned in the science concentration of the animal science or equine science majors.

Graduate Programs in Animal Sciences

The department offers graduate programs leading to the master of science and the doctor of philosophy degrees. Students interested in graduate work should refer to the *Graduate and Professional Bulletin.*

DEPARTMENT OF ENTOMOLOGY

Office in Plant Sciences Building, Room C 134
Professor Thomas O. Holtzer, Head
The Department of Entomology cooperates in offering concentrations in entomology and plant protection under the bio-agricultural science major. It also offers a minor in entomology. The department provides well-equipped laboratories and a large insect collection for the student's education.

Students are provided with a broad knowledge of insects, including basic biology and management of injurious species through a variety of strategies. Additional information about programs in entomology may be found under the bio-agricultural science major in this section of the catalog.

The department offers graduate programs leading to master of science and doctor of philosophy degrees. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF FOOD SCIENCE & HUMAN NUTRITION

Office in Gifford Building. Room 205
Professor Peter J. Bechtel, Head
The Department of Food Science and Human Nutrition is concerned with food from the time it leaves the farm until it is consumed by people. Included is the effect of good nutrition on health promotion and disease prevention. Because of the wide scope of departmental interests. it is the only department at Colorado State that is jointly administered *by* two colleges: the College of Agricultural Sciences and the College of Applied Human Sciences.

Three undergraduate degrees are offered leading to the bachelor of science degree: food science and technology described below, and human nutrition and dietetics. and restaurant and resort management, which are described in the College of Applied Human Sciences section. The minor programs of study are listed in both the College of Agricultural Sciences and the College of Applied Human Sciences. At the graduate level, both M.S. and Ph.D. degrees are offered in food science and nutrition. For more information about the graduate program, refer to the *Graduate and Professional Bulletin.*

Major in Food Science and Technology

The major in food science and technology provides a broad education in food science, a strong foundation in the biological and physical sciences, and a liberal education in the arts. humanities, and behavioral and social sciences.

The food industry is large and provides a considerable variety of good job opportunities. This includes positions in quality assurance, product development, research, food inspection, food plant management, and technical representatives for food companies.

For high technology jobs, such as in research and development, it is desirable to consider applying to graduate school for additional education.

The food science faculty provide job counseling, and the department provides information on the availability of specific job opportunities on a state and national basis.

Food Industries Management Concentration

The core courses in this concentration include food chemistry, food analysis, quality control, a series of food processing courses, and a series of business courses including accounting and management fundamentals. Emphasis is placed on students understanding basic food properties and rood processing methods plus business fundamentals.

The graduate in this concentration will have gained an understanding of the physical properties of food, food microbiology and safety, sensory evaluation, manufacturing principles, and business operations. This concentration is designed to provide a background in food science and technology principles for use in the food industry.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
		or	
BY	102	Attributes of Living Systems	4
		or	
Z	110	Principles of Animal Biology	4
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
		or	
EC	100	Principles of Macroeconomics	3
		or	
EC	102	Principles of Microeconomics	3
FT	110	Introduction to Food Science and Technology	3
M	120, 121	College Algebra I, II	2

M	124	Logarithmic and Exponential Function	1
PY	100	General Psychology	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AP	100	Introductory Cultural Anthropology	3
		or	
AP	320'	Nature of Culture	3
		or	
S	100	General Sociology	3
BD	140, 141	Computers in Business, Laboratory	3
		or	
CS	110	Personal Computing I	4
		or	
CS	150	Introduction to FORTRAN Programming	3
C	245, 246	Organic and Biological Chemistry, Laboratory	5
FN	150	Survey of Human Nutrition	3
PT	320	Sensory Evaluation of Food	2
JT	200	Professional Writing	3
SP	200	Public Speaking and Discussion	3
		Arts and humanitiesTM	6

Junior Year		**Credits**	
BA	210	Financial Accounting	3
BN	300	Management Fundamentals	3
PT	365	Food Processing Technology	3
PT	366	Food Processing Laboratory	2
MB	300	General Microbiology	4
ST	204	Statistics for Business Students	2
		or	
ST	301	Introduction to Statistical Methods	3

Select three courses from the following:

BA	220	Managerial Accounting Concepts	3
BF	300	Principles of Finance	3
BG	260	Legal Environment of Business	3
BK	300	Marketing	3
BK		Courses at 306 level or higher	3
BL	300	Production Fundamentals	3
BP	310	Human Resource Management	3
BQ	270	Basic Business Statistics	3
JT	300	Technical Communication	3
JT	301	Business Communication	3
JT	350	Public Relations	3
JT	414	Media Effects	3
SP	205	Group Communication	3
SP	303	Business and Professional Speaking	3

Senior Year			**Credits**
PT	334/MB 334	Food Microbiology	4
PT	400	Food Safety	3
PT	420	Quality Control of Food Products	3
PT	447, 448	Food Chemistry, Laboratory	3
PT	449	Food Analysis	3

Select four courses from the following professional electives:

PT	330	Alcohol Beverage Technology and Control	2
FT	360/AN 360	Principles of Meat Science	3
PT	460/AN 460	Meat Processing	3
PT	470	Cereal Technology	2
PT	472	Fruit and Vegetable Technology	2

PT	474	Food Fermentations	2
PT	476	Fish and Seafood Technology	2

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

Food Science and Technology Concentration
The core courses taken in the concentration include food chemistry, food analysis, quality control, food microbiology, a series of food processing courses, and human nutrition. Supporting courses are taken in mathematics, chemistry, biochemistry, physics, and engineering. Emphasis is placed on handling a wide variety of food ingredients using processing and preservation methods based on heat, cold. and dehydration.

The graduate in this concentration will have gained a scientific understanding of the chemical and physical properties of food, food microbiology, food engineering and manufacturing principles, and the sensory analysis and quality control of food systems. Graduates will also understand the role of nutrition in human health and demonstrate effective oral and written communications.

The food science and technology concentration is approved by the Institute of Food Technologists (IFT), making students eligible for IFT national scholarships. This concentration has a strong basic science core and is well-suited for students wanting to enter the technical areas of the food industry or attend graduate school in food science.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
		or	
BY	102	Attributes of Living Systems	4
		or	
Z	110	Principles of Animal Biology	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
		or	
EC	100	Principles of Macroeconomics	3
		or	
EC	102	Principles of Microeconomics	3
FT	110	Introduction to Food Science and Technology	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
M	141	Calculus in Management Sciences	3
		or	
M	155	Calculus for Biological Scientists I	4
		Physical education/wellness	2

Sophomore Year			**Credits**
BC	351, 352	Principles of Biochemistry, Laboratory	5
BD	140, 141	Computers in Business. Laboratory	3
		or	
CS	110	Personal Computing I	4
		or	
CS	150	Introduction to FORTRAN Programming	3
C	245, 246	Organic and Biological Chemistry, Laboratory	5
		or	
C	341, 343	Organic Chemistry I, II	6
		and	
C	344	Organic Chemistry Laboratory	2
FN	150	Survey of Human Nutrition	3
JT	200	Professional Writing	3

		or	
SP	200	Public Speaking and Discussion	3
MB	300	General Microbiology	4
PH	121, 122	General Physics I, II	10

Junior Year			**Credits**
BH	306	Bioprocess Engineering	4
FT	320	Sensory Evaluation of Food	2
FT	330	Alcoholic Beverage Technology and Control	2
FT	360/AN 360	Principles of Meat Science	3
FT	365	Food Processing Technology	3
FT	366	Food Processing Laboratory	2
MB	334/FT 334	Food Microbiology	4
PY	100	General Psychology	3
ST	301	Introduction to Statistical Methods	3
		Arts and humanities	6

Senior Year			**Credits**
FT	400	Food Safety	3
FY	420	Quality Control of Food Products	3
FF	447, 448	Food Chemistry, Laboratory	3
FT	449	Food Analysis	3
FT	460/AN 460	Meat Processing	3
FT	470	Cereal Technology	2
El'	472	Fruit and Vegetable Technology	2
FT	474	Food Fermentations	2
FT	476	Fish and Seafood Technology	2
FT	492	Seminar in Food Science	I
		Elective	3

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

Minor in Food Science

A minor is offered in food science to provide students from other disciplines with an opportunity to obtain formal training in the food science and technology area.

Lower Division			**Credits**
FT	110	Introduction to Food Science and Technology	3

Upper Division			**Credits**
BC	301*	Survey of Biochemistry	3
		or	
BC	351*	Principles of Biochemistry	4
BH	306*	Bioprocess Engineering	4
FT	420	Quality Control of Food Products	3
FT	447*	Food Chemistry	2
FT	449	Food Analysis	3
MB	300*	General Microbiology	4

*Additional course work may be required because of prerequisites.

DEPARTMENT OF HORTICULTURE

Office in Shepardson Building, Room 111
Professor Kenneth M. Brink, Head

Horticulture is the development and application of scientific principles in the culture and utilization of fruits, vegetables, flower and foliage plants, trees, shrubs, and turfgrasses. Students may major in horticulture with concentrations in floriculture, horticultural business management, horticultural food crops, and horticultural science, in landscape architecture, or in landscape horticulture with concentrations in landscape design and construction, nursery and landscape management, and turf management.

Instruction utilizes field, greenhouse, and laboratory facilities. Credit for supervised off-campus experience is also available through an internship program. Independent investigation is encouraged through H

495, Independent Study. Elective credits permit students to develop programs of special interest.

All undergraduate majors will acquire knowledge and understanding regarding the diversity of horticulture, principles and concepts of horticultural planl science, and technology of horticulture. Students will also acquire an ability to propagate, prune, and produce horticultural plants, and the basic skills relating to management, marketing, and use of intensely cultivated economic plants.

Major in Horticulture
Students in floriculture and horticultural food crops concentrations study propagation, production, utilization, and improvement of plants. Field and con-trolled-environment grown flower crops and foliage plants are emphasized in floriculture. The concentration in horticultural food crops emphasizes fruit and vegetable crops; the seed science option in this concentration will educate students in basic and applied knowledge of seeds. Students in horticultural business management take a core of business, computer, and economics courses and, in horticulture, choose a special area or spread courses over the broad field. Careful choice of business courses should allow students to complete a master of business administration degree in one year after completion 01 the B.S. degree in horticulture. The horticultural science concentration emphasizes basic biological and physical sciences and allows wide choice in horticulture courses with training in plant biotechnology. A minimum of 27 credits in horticulture is required.

Floriculture Concentration

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
C	107, 108	Fundamental Chemistry, Laboratory	5
		or	
C	111, 113	General Chemistry I, II	7
		and	
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
H	100	Basic Horticulture	4
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
		Physical education/wellness	2

Select one course from the following:

A	300	Issues in Agriculture	2
AG	100	General Crops	4
AN	100	Animal Sciences	4
AN	200	Poultry Science and Production	2
FT	110	Introduction to Food Science and Technology	3
H	130	Landscape Graphics Studio	4

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
B	223	Plant Identification	3
C	245, 246	Organic and Biological Chemistry, Laboratory	5
CS	110	Personal Computing I	4
H	260	Plant Propagation	4
MB	149	The Microbial World	3
PH	110	Descriptive Physics	3
SP	200	Public Speaking and Discussion	3
		Behavioral and social sciences	3

Junior Year			**Credits**
A	320A-E	Computer Applications in Agriculture	3
AG	330	Principles of Genetics	3
EN	302	Applied and General Entomology:	2
EN	303B	Horticultural Entomology Laboratory	1
H	310	Greenhouse Management	4
H	311	Plants for Interiors	3
H	411, 412	Floriculture I, II	8
H	486	Practicum (2 semesters)	4
		or	
H	487	Internship	4
PD	361	Elements of Plant Pathology	3

Senior Year			**Credits**
B	440	Plant Physiology	3
BN	300	Management Fundamentals	3
H	460/AG 460	Plant Breeding	3
H	492	Seminar	1
JT	300	Technical Communication	3
		or	
JT	301	Business Communication	3
		Arts and humanities	6

1. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

Horticultural Business Management Concentration

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
C	107, 108	Fundamental Chemistry. Laboratory	5
		or	
C	111, 113	General Chemistry I, II	7
		and	
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
EC	100	Principles of Macroeconomics	3
H	100	Basic Horticulture	4
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
		Physical education/wellness	2

Select one course from the following:

A	300	Issues in Agriculture	2
AG	100	General Crops	4
AN	100	Animal Sciences	4
AN	200	Poultry Science and Production	2

FT	110	Introduction to Food Science and Technology	3
H	130	Landscape Graphics Studio	4

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
BA	210	Financial Accounting	3
BG	260	Legal Environment of Business	3
		or	
EA	375	Agricultural Law	3
C	245	Organic and Biological Chemistry	4
CS	110	Personal Computing 1	4
H	260	Plant Propagation	4
SP	200	Public Speaking and Discussion	3
ST	204	Statistics for Business Students	2
		Arts and humanities	6

Junior Year			**Credits**
A	320A-E	Computer Applications in Agriculture	3
AG	330	Principles of Genetics	3
B	440	Plant Physiology	3
BF	300	Principles of Finance	3
		or	
EA	308	Agricultural Finance	3
BK	300	Marketing	3
BN	300	Management Fundamentals	3
EN	302	Applied and General Entomology	2
JT	300	Technical Communication	3
		or	
JT	301	Business Communication	3
PD	361	Elements of Plant Pathology	3
		Behavioral and social sciences	3

Senior Year			**Credits**
BG	305	Managerial Economics	3
H	460/AG 460	Plant Breeding	3
H	462	Postharvest Physiology of Horticultural Crops	3
H	475	Environmental Requirements of Horticultural Plants	3
H	492	Seminar	1
		Horticulture electives	9

1. A minimum of 20 credits in business is required.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

3. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

Horticultural Food Crops Concentration Core Curriculum

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
C	107, 108	Fundamental Chemistry Laboratory	5
		or	
C	111, 113	General Chemistry I, II	7
		and	
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
H	100	Basic Horticulture	4
M	120, 121	College Algebra, II	2
M	124	Logarithmic and Exponential Function	1

		Physical education/wellness	2.

Select one course from the following:

A	300	Issues in Agriculture	2
AG	100	General Crops	4
AN	100	Animal Sciences	4
AN	200	Poultry Science and Production	2
FT	110	Introduction to Food Science and Technology	3
H	130	Landscape Graphics Studio	4

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
C	245, 246	Organic and Biological Chemistry, Laboratory	5
H	260	Plant Propagation	4
MB	300	General Microbiology	4
SP	200	Public Speaking and Discussion	3
ST	201	General Statistics	3
	or		
ST	301	Introduction to Statistical Methods	3
		Behavioral and social sciences	3

Junior Year			**Credits**
AG	330	Principles of Genetics	3
B	440	Plant Physiology	3
CS	110	Personal Computing I	4
EN	302	Applied and General Entomology	2
EN	303B	Horticultural Entomology Laboratory	1
PD	361	Elements of Plant Pathology	3

Senior Year		**Credits**	
H	451	Vegetable Crops	3
H	460/AG 460	Plant Breeding	3
H	475	Environmental Requirements of Horticultural Plants	3
H	492	Seminar	1
JT	300	Technical Communication	3
		or	
JT	301	Business Communication	3
W	308	Biology and Control of Weeds	4
		Arts and humanities:	6

1. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

Production Option

In addition to the core curriculum, students in the production option must take the following courses:

Junior Year			**Credits**
A	320A-E	Computer Applications in Agriculture	3
AG	350	Soil Fertility Management	3
H	310	Greenhouse Management	4
H	462	Postharvest Physiology of Horticultural Crops	3

Senior Year			**Credits**
AG	370	Irrigation Principles and Management	3
H	452	Fruit Crop Production	3

Seed Science Option

In addition to the core curriculum, students in the seed science option must take the following courses:

Sophomore Year			**Credits**
B	223	Plant Identification	3

Junior Year			**Credits**
AG	304	Seed Production, Conditioning. and Marketing	2
B	446	Physiology of Seeds	2
PD	424	Seed Technology	2

Senior Year			**Credits**
Select 10 credits from the following:			
H	310	Greenhouse Management	4
H	321	Nursery Production and Management	4
H	341	Turfgrass Management	3
H	412	Floriculture II	4
H	452	Fruit Crop Production	3
H	461/AG 461	Plant Breeding Laboratory'	1
H	462	Postharvest Physiology of Horticultural Crops	3

Horticultural Science Concentration

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
CS	110	Personal Computing I	4
H	100	Basic Horticulture	4
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
M	155	Calculus for Biological Scientists I	4
		Physical education/wellness	2

Sophomore Year		**Credits**	
BC	351, 352	Principles of Biochemistry, Laboratory	5
C	245, 246	Organic and Biological Chemistry, Laboratory	5
		or	
C	341, 343	Organic Chemistry I, II	6
		and	
C	344	Organic Chemistry Laboratory	2
H	260	Plant Propagation	4
PH	121, 122	General Physics I, II	10
ST	301	Introduction to Statistical Methods	3
		Arts and humanities	6

Junior Year		**Credits**	
AG	240	Introductory Soil Science	4
AG	330	Principles of Genetics	3
AG	331	Genetics Laboratory	1
EN	302	Applied and General Entomology	2
EN	303B	Horticultural Entomology Laboratory	1
H	462	Postharvest Physiology of Horticultural Crops	3
JT	300	Technical Communication	3
		or	
JT	301	Business Communication	3
PD	361	Elements of Plant Pathology	3
		Behavioral and social sciences 2	6

Senior Year			Credits
B	440, 441	Plant Physiology. Laboratory	5
H	460/AG 460	Plant Breeding	3
H	475	Environmental Requirements of Horticultural Plants	3
H	492	Seminar	1
H		Horticulture electives	9

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

Major in Landscape Architecture
Landscape architecture is the design and planning profession concerned with human use/environmental relationships. Emphasis is placed on form and function of the physical environment and human interaction with it.

This curriculum prepares students for careers emphasizing design and planning of private and public landscapes. The bachelor of science degree in landscape architecture requires 131 credits.

Due to high demand for this professional degree program, enrollment is highly competitive and limited to space available for 30 students. Contact the department for information regarding the selection procedure.

Freshman Year			Credits
B	120	Principles of Plant Biology	4
C	107	Fundamental Chemistry'	4
CO	150	College Composition	3
IS	261	Construction Surveying	3
LA	120	History of the Landscape	3
LA	130	Visual Expression	4
LA	140	Landscape Architectural Basic Design	4
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
PH	110	Descriptive Physics	3
		Physical education/wellness	2

Summer Field Training Program, Pingree Park Campus			Credits
NR	220	Natural Resources Ecology and Measurements	5

Sophomore Year			Credits
BY	220	Ecology	3
EA	240/EC 240	Issues in Environmental Economics	3
ER	140	Physical Geology	4
H	221	Landscape Plants	4
LA	360	Landscape Architectural Design and Construction	4
LA	361	Computer-Aided Landscape Architecture	2
LA	362	Landscape Architecture Site Design	3
LA	363	Landscape Architectural Consruction	3
PY	100	General Psychology	3
ST	201	General Statistics	3

Junior Year			Credits
AE	364	Landscape Irrigation	3
AG	240	Introductory Soil Science	4
LA	364	Landscape Resource Analysis and Design	4
LA	365	Landscape Architectural Construction Details	3
LA	366	Landscape Architectural Planning and Design	5

LA	392	Seminar	2
PY	316	Environmental Psychology	3
SP	200	Public Speaking and Discussion	3
		Arts and humanities	6
		Electives	2

Senior Year			**Credits**
B	355	Ecology of Landscapes	3
LA	445	Methods of Landscape Analysis	3
LA	446	Landscape Architectural Urban Design	4
LA	447	Landscape Architectural Project Design	4
LA	449	Landscape Architectural Professional Practice	2
NR	323	Remote Sensing of Natural Resources	3
NR	440	Land Use Planning	3
		Elective	3

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

Major in Landscape Horticulture

Landscape design and construction emphasizes design principles, using plants to improve the exterior and interior environment aesthetically, biologically, and physically. Nursery and landscape management trains students in urban horticulture, and propagation. culture, maintenance. management, and marketing of landscape plants. Turf management emphasizes the establishment and maintenance of grass surfaces on public and private grounds, golf courses, and athletic fields, and for commercial sod production.

A minimum of 27 credits in horticulture is required.

Landscape Design and Construction Concentration

Freshman Year			**Credits**
C	107	Fundamental Chemistry	4
CO	150	College Composition	3
CS	110	Personal Computing I	4
H	100	Basic Horticulture	4
H	130	Landscape Graphics Studio	4
H	140	Principles of Landscape Design	4
M	120, 121	College Algebra I, II	2
M	125	Numerical Trigonometry	1
		Natural sciences	4
		Physical education/wellness	2

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
EA	102	Agricultural/Natural Resource Economics	3
H	221	Landscape Plants	4
H	230	History of Landscape Design	2
H	235	Landscape Grading and Drainage Studio	4
IS	133	Introductory Computer Graphics	3
IS	160	Construction Materials and Techniques	3
IS	261	Construction Surveying	3
SP	200	Public Speaking and Discussion	3

Junior Year			**Credits**
AE	364	Landscape Irrigation	3
H	311	Plants for Interiors	3
H	322	Herbaceous Plants	3
H	330	Computers for Landscape Design	2
H	335	Landscape Structures	3
H	341	Turfgrass Management	3

H	465	Landscape Business Practices	3
JT	300	Technical Communication	3
		or	
JT	301	Business Communication	3
		Arts and humanities	6
		Behavioral and social sciences:	3

Senior Year			**Credits**
BG	425	Starting and Managing Your Own Business	3
EN	302	Applied and General Entomology	2
EN	303B	Horticultural Entomology Laboratory	1
H	332	Planting Design Studio	4
H	432	Intensive Landscape Design Studio	4
H	464	Arboriculture and Urban Plant Management	4
H	492	Seminar	1

1. Select from list of courses in category II-A in the University Studies Program. excluding C courses. Course must have a Formal laboratory.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

3. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

Nursery and Landscape Management Concentration

Freshman Year		**Credits**	
B	120	Principles of Plant Biology	4
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
H	100	Basic Horticulture	4
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
		Physical education/wellness	2

Select one course from the following:

A	300	Issues in Agriculture	2
AG	100	General Crops	4
AN	100	Animal Sciences	4
AN	200	Poultry Science and Production	2
FT	110	introduction to Food Science and Technology	3
H	130	Landscape Graphics Studio	4

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
B	223	Plant Identification	3
C	245, 246	Organic and Biological Chemistry, Laboratory	5
CS	110	Personal Computing I	4
H	221	Landscape Plants	4
H	260	Plant Propagation	4
H	322	Herbaceous Plants	3
PH	110	Descriptive Physics	3
SP	200	Public Speaking and Discussion	3

Junior Year			**Credits**
B	440	Plant Physiology	3
H	310	Greenhouse Management	4
H	321	Nursery Production and Management	4
H	331	Landscape Design	2
H	465	Landscape Business Practices	3

		Arts and humanities	6
		Behavioral and social sciences 2	3

Senior Year		**Credits**	
BG	425	Starting and Managing Your Own Business	3
EN	302	Applied and General Entomology	2
EN	303B	Horticultural Entomology Laboratory	1
H	341	Turfgrass Management	3
H	464	Arboriculture and Urban Plant Management	4
H	492	Seminar	1
PD	361	Elements of Plant Pathology	3
W	308	Biology and Control of Weeds	4

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program. excluding EA and EC courses.

Turf Management Concentration

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
H	100	Basic Horticulture	4
M	120, 121	College Algebra I, II	2
M	125	Numerical Trigonometry	1
		Physical education/wellness	2

Select one course from the following:

A	300	Issues in Agriculture	2
AG	100	General Crops	4
AN	100	Animal Sciences	4
AN	200	Poultry Science and Production	2
FT	110	Introduction to Food Science and Technology	3
H	130	Landscape Graphics Studio	4

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
B	223	Plant Identification	3
C	245, 246	Organic and Biological Chemistry, Laboratory	5
CS	110	Personal Computing I	4
H	221	Landscape Plants	4
IS	261	Construction Surveying	3
PH	110	Descriptive Physics	3
SP	200	Public Speaking and Discussion	3
		Behavioral and social sciences	3

Junior Year			**Credits**
AE	364	Landscape Irrigation	3
AG	350	Soil Fertility Management	3
B	440	Plant Physiology	3
H	321	Nursery Production and Management	4
H	331	Landscape Design	2
H	341	Turfgrass Management	3
H	465	Landscape Business Practices	3
PD	361	Elements of Plant Pathology	3
		Arts and humanities:	6

Senior Year		**Credits**	

BN	300	Management Fundamentals	3
EN	302	Applied and General Entomology	2
EN	303B	Horticultural Entomology Laboratory	1
H	441	Turfgrass Science	3
H	464	Arboriculture and Urban Plant Management	4
H	492	Seminar	1
W	308	Biology and Control of Weeds	4

1. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

Minor Programs

A horticulture or landscape horticulture minor will serve to broaden the academic background of students seeking employment in interdisciplinary job markets associated with plant sciences or the art and science of landscape horticulture. A minor will allow students a maximum breadth and depth in the field while utilizing a limited number of requirements.

Minor in Horticulture

Lower Division			**Credits**
H	100	Basic Horticulture	4
H	260	Plant Propagation	4

Upper Division			**Credits**
H	310	Greenhouse Management	4
H	460/AG 460*	Plant Breeding	3

Select two courses from the following:

H	311	Plants for Interiors	3
H	411	Floriculture I	4
H	412	Floriculture II	4
H	451	Vegetable Crops	3
H	452	Fruit Crop Production	3
H	462	Postharvest Physiology of Horticultural Crops	3
H	475*	Environmental Requirements of Horticultural Crops	3

*Additional course work may be required because of prerequisites.

Minor in Landscape Horticulture

Lower Division			**Credits**
H	100	Basic Horticulture	4
H	221	Landscape Plants	4

Upper Division			**Credits**
H	341	Turfgrass Management	3
H	464*	Arboriculture and Urban Plant Management	4

Select a minimum of six credits (five must be upper division) from the following:

H	130	Landscape Graphics Studio	4
H	140*	Principles of Landscape Design	4
H	230	History of Landscape Design	2
H	235*	Landscape Grading and Drainage Studio	4
H	260	Plant Propagation	4
H	311	Plants for Interiors	3
H	321	Nursery Production and Management	4
H	322	Herbaceous Plants	3
H	331	Landscape Design	2

H	332*	Planting Design Studio	3
H	441*	Turfgrass Science	3
H	465	Landscape Business Practices	3

*Additional course work may be required because of prerequisites.

Graduate Programs in Horticulture
The department offers graduate programs leading to master of science and doctor of philosophy degrees. A description of the programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF PLANT PATHOLOGY AND WEED SCIENCE

Office in Plant Science Building, Room C 119A
Professor Gary A. McIntyre, Head
The Department of Plant Pathology and Weed Science cooperates in offering concentrations in plant pathology and plant protection under the bioagricultural science major. The plant pathology concentration is intended primarily for students who expect to pursue graduate work. Students are advised by faculty specializing in plant pathology and have the opportunity to do special field studies.

The plant protection concentration prepares students for a position at the bachelor's level. Weed and insect courses are added to disease studies, and advising is done by plant pathology and weed science faculty. Internships are available for interested students. Government agencies, industry, and agribusiness are prospective employers.

In addition, a minor in plant pathology is available. This minor provides interested students with maximum breadth and depth in plant pathology utilizing a limited number of requirements. The program also serves to broaden the academic background of students seeking employment in the interdisciplinary job market associated with the plant sciences.

Students interested in the concentrations or minor should refer to the bio-agricultural science major in this section of the catalog.

The department offers graduate programs leading to master of science and doctor of philosophy degrees in plant pathology and weed science. A description of these programs may be found in the *Graduate and Professional Bulletin.*

COLLEGE OF APPLIED HUMAN SCIENCES

Office in Gibbons Building, Room 104 Associate Professor Kevin Oltjenbruns, Interim Dean

UNDERGRADUATE MAJORS
Apparel and Merchandising
Construction Management
Consumer Sciences
Exercise and Sport Science
Home Economics
Human Development and Family Studies
Human Nutrition and Dietetics
Industrial Sciences and Technology
Industrial Technology
Interior Design
Occupational Therapy
Restaurant and Resort Management
Social Work

UNDERGRADUATE MINORS
Apparel
Coaching
Construction Management
Consumer Sciences
Food Science
Human Development and Family Studies
Merchandising
Nutrition
Restaurant and Resort Management

UNDERGRADUATE PROGRAMS
The college currently includes the Departments of Communication Disorders, Design, Merchandising, and Consumer Sciences, Exercise and Sport Science, Food Science and Human Nutrition, Human Development and Family Studies, Industrial Sciences, Occupational Therapy, and Social Work. These departments offer curricula that lead to the bachelor's degree. These degrees require a minimum of 128 credits with a minimum of 45 upper-division credits. Requirements for undergraduate majors are outlined in the departmental sections of this catalog.

The college also includes the School of Occupational and Educational Studies which administers undergraduate teacher preparation programs in 16 areas of endorsement. Due to its mission of offering service to students in many majors across the University, the school is included first in this section of the catalog.

Each of the administrative units in the college share an important mission - the enhancement of the quality of life through the application of science and technology. Curricula include courses in the natural sciences, the social sciences, and the arts and humanities. These courses, together with those specific to a given discipline, provide a strong foundation for professional careers. Each of the departments offers an opportunity to do field work in order to gain practical experience to complement the academic background gained in the classroom setting.

A student who wishes to pursue a career in a design-related field may choose either the concentration in apparel design and production or the major in interior design.

The college offers the only comprehensive program in home economics in the state of Colorado. At the undergraduate level students may complete either the home economics concentration or the vocational home economics education concentration. Each of those programs draws information

from the more specialized disciplines of apparel, merchan*d*ising, consumer sciences, interior design, food science and human nutrition. and human development and family studies.

If a student wishes to pursue a degree in a human services field, the college has majors/concentrations in: dietetics, human development and family studies, nutritional sciences, nutrition and fitness, occupational therapy, social work, and sports medicine.

Students who wish to incorporate a strong background in natural sciences and/or technology with professional preparation should consider programs in dietetics, food science and technology, industrial technology, nutritional sciences, or sports medicine.

For a student interested in management-related careers. the college offers programs in apparel design and production, construction management, consumer sciences, industrial sciences and technology, merchandising, restaurant management, and wellness program management.

The college also offers teacher preparation programs for students who wish to pursue in-depth study in human development and family studies, industrial sciences and technology, or teacher education in exercise and sport science with courses leading to certification. Additionally the college prepares students to teach in a variety of major areas offered through other colleges in the University.

Open Option Program
Students who wish to explore the wide variety of choices available to them may enroll in the Applied Human Sciences Open Option Program. Students will be encouraged to take electives that will help them explore the disciplines they are most interested in as possible career choices. At the same time, they will take courses common to one of the themes described earlier: design, home economics, human services, management, or natural sciences and technology.

GRADUATE PROGRAMS

Each of the administrative units in the college has a program leading to the master's degree. Additionally, the Department of Food Science and Human Nutrition offers a Ph.D. degree as does the School of Occupational and Educational Studies.

For detailed information about graduate programs, consult individual department/school descriptions in the *Graduate and Professional Bulletin.*

INTERDEPARTMENTAL MAJOR

Major in Home Economics
Office in Education Building, Room 25

A home economics career may lead to a teaching position in a high school, a Cooperative Extension agent position, or to a Peace Corps assignment in an underdeveloped area of the world. Challenging and stimulating jobs frequently held by home economists include representing a trade association or the manufacturer of housewares, foods, or home furnishings. Home economists own their own businesses where they test, develop. and market ideas and products. Home *economists* deal with constantly changing knowledge and products. The undergraduate degree at Colorado State prepares you to enter this field with the most up-to-date knowledge and skills.

The home economics program is interdisciplinary with a strong University Studies base. Students take courses in areas related to home economics. It is from these areas that students examine the roles and relationships of individuals, families and consumers, and their basic needs - food, clothing, and shelter -for daily living and for professional responsibilities.

Students who earn a degree in home economics will be able to use the knowledge gained in their interdisciplinary program to assist families with daily life challenges. Students will be able to examine the challenges faced by individuals and families based

on knowledge gained in human development and family studies, consumer sciences, apparel and merchandising, housing and interior design, human nutrition and foods, and balancing work and family.

Home Economics Concentration

The home economics concentration prepares students for positions in business, government, Cooperative Extension, and other agencies. These employers are seeking graduates with breadth in home economics to enable them to prevent and solve problems that affect daily living and needs. In addition to courses in each of the areas related to home economics. students select upper-division courses from one area. and courses related to a professional objective. Students may also select a second major or minor to expand knowledge and opportunities.

This concentration permits students to select courses in areas of particular interest that will focus on professional career areas such as cooperative extension, social and human services, international development, and home economics in business. Individuals with interest in Cooperative Extension (home economics and youth) may qualify to pursue an advanced degree in the master of home economics program.

Freshman Year			**Credits**
AM	120	Textiles	3
AR	101	Visual Form	3
C	103, 104	Chemistry and Society. Laboratory	4
		or	
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
FN	150	Survey of Human Nutrition	3
HD	101	Individual and Family Development	3
M	120, 121	College Algebra I, II	2
M		Mathematics	1
PY	100	General Psychology	3
SP	200	Public Speaking and Discussion	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AM	207	Apparel Production Fundamentals	3
AM	208A-B	Production Fundamentals Laboratory	I
BY	102	Attributes of Living Systems	4
		or	
Z	101	Humans and Other Animals	3
FN	200	Food Selection. Preparation. ,red Preservation	3
FN	201	Food Preparation Techniques	2
HC	250	Housing and Interiors	3
		or	
HC	340	Equipment and Energy	4
		or	
HC	360	Housing-Consumer Issues	3
HD	211	Infancy and Childhood	3
		or	
HD	311	Adolescence	3
		or	
HD	322	Adult Development and Aging	3
HM	179	Philosophy of Home Economics	2
S	100	General Sociology	3
		Arts and humanities	3

Junior Year			**Credits**
AM		Apparel and merchandising elective	2-3
AY	300/PS 300	Principles of Human Anatomy and Physiology	4
BD	140, 141	Computers in Business, Laboratory	3
		or	
CS	110	Personal Computing I	4
		or	
CS	150	Introduction to FORTRAN Programming	3
EC	100	Principles of Macroeconomics	3

		or	
EC	102	Principles of Microeconomics	3
FN		Elective	2
HC	320	Finance-Personal and Family	3
HC	330	Decision Making-Personal and Family	3
HM	379	Colloquium-Home Economics	1
S	310	Quantitative Sociological Analysis	3
		or	
ST	201	General Statistics	3

Senior Year			**Credits**
HD	321	*Marriage and Family Relationships	3
		or	
HD	434	Family Studies	3
		Arts and humanities	3
		Human resource sciences electives (12 credits to be selected from upper-division courses in AM. IN. HC, HD, HM. and ID prefixes)	14
		Supportive courses for professional objective - must be approved by adviser	9

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

Vocational Home Economics Concentration

This concentration. which requires 131 credits, prepares men and women for teaching youth and adults in the broad field of home economics. Graduates are employed as teachers in middle schools, junior or senior high schools, community or junior colleges, area vocational schools, and technical institutes. Combined with other majors, vocational home economics education provides background for entering a variety of careers. Graduates not interested in teaching find employment in specialized business and industry education programs, self-employment, and in programs such as the Agency for International Development and the Peace Corps.

Students are qualified for teacher certification, vocational credentialing, and for graduate study. Particular personal and professional qualifications are required for teaching. Students should confer with an adviser in vocational home economics education about choosing the teaching profession. Refer also to the School of Occupational and Educational Studies in this section of the catalog.

Freshman Year			**Credits**
AM	120	Textiles	3
CO	150	College Composition	*3*
FN	150	Survey of Human Nutrition	3
HD	101	Individual and Family Development	3
HD	211	Infancy and Childhood	3
HD	286	Practicum	1
M		Mathematics	3
PS	120	Human Health and Disease	2
PS	124	Sexuality and Health	2
SP	200	Public Speaking and Discussion	3
		Arts and humanities	3
		Home economics electives	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AM	250	Clothing and Human Behavior	3
C	103, 104	Chemistry and Society, Laboratory	4
ED	486C	Practicum-Exceptionality and Diversity	1
IN	200	Food Selection, Preparation, and	

		Preservation	3
FN	201	Food Preparation Techniques	2
HM	179	Philosophy of Home Economics	2
PY	100	General Psychology	3
VE	300	Principles of Vocational Education	2
		Arts and humanities	3
		Home economics electives	3
		Natural sciences 2	3

Junior Year			**Credits**
ED	355	Educational Psychology	3
ED	401A	Teaching Classroom Reading/Literacy Skills	2
ED	428	Exceptionality, Diversity, and Human Relations	3
HC	320	Finance-Personal and Family	3
HC	330	Decision Making-Personal and Family	3
HC	360	Housing-Consumer Issues	3
HD	311	Adolescence	3
HD	321	Marriage and Family Relationships	3
ID	275	Interior Design I	3
		or	
HC	250	Housing and Interiors	3
HM	379	Colloquium-Home Economics	1
VE	401	Instructional Aids in Vocational Education	2
VE	403	Coordination Techniques of Cooperative Programs	2
		Home economics electives, upper division	3
		Logic and critical thinking.'	3

Senior Year			**Credits**
VE	402	Student Organizations in Vocational Education	2
VE	408	Methods and Evaluation of Instruction	4
VE	409	Microteaching Laboratory	1
VE	451	Methods/Materials in Home Economics Education	3
VE	485	Student Teaching	14
VE	492	Seminar	1
		Home economics electives	6

1. Select from list of courses in category 111-A in the University Studies Program. Credit s must be taken in at least two departments.

2. Select from list of courses in category II-A in the University Studies Program. excluding C courses.

3. Select from list of courses in category I-C in the University Studies Program. Students selecting HC 300 must take BD 140 or CS 110 from this category.

4. hours of work experience is required for the vocational credential.

Graduate Program in Home Economics
Offic*e in Education Building, Room 25*

The distinguishing characteristic of the master of home economics degree is its interdisciplinary approach to home economics. Students select areas of emphasis *fr*om the related degree areas of apparel and merchandising, consumer sciences and housing, (hod science and human nutrition, human development and family studies, or interior design. For further information write the Coordinator of Home Economics, College of Applied Human Sciences or refer to the *Graduate and Professional Bulletin.*

Graduate Program in Home Economics Education
Graduate programs are offered in the College of Applied Human Sciences, School of Occupational and Educational Studies. Graduate study may lead to teaching positions at the high school and college level and supervisory positions at city or state levels.

SCHOOL OF OCCUPATIONAL AND EDUCATIONAL STUDIES

Office in Education Building, Room 209 Professor Nancy Hartley, Director Professor R. Brian Cobb, Assistant Director, Graduate Programs Professor Lonnie H. Wood Assistant Director, Teacher Certification Program

The School of Occupational and Educational Studies is responsible for administering and coordinating all programs in professional education within the. University, The primary mission of the school is to prepare teachers and other professional educators for roles in public schools, postsecondary institutions, business, and industry.

The school offers graduate programs leading to a master of education degree in vocational education, a master of science degree in student affairs in higher education, and a doctor of philosophy degree in vocational education. A description of these programs may be found in the *Graduate and Professional Bulletin.* Certification/endorsement programs are also offered in educational administration and counseling. For specific information or application materials for the masters', Ph.D., or certification/ endorsement programs, contact the Graduate Programs Office, Room 215, Education Building.

Teacher Certification
Teacher preparation programs leading to certification are offered in 16 areas of endorsement. All of the programs are accredited by the National Council for the Accreditation of Teacher Education and approved by the Colorado Department of Education.

All candidates for teacher certification must complete an academic degree program in an approved area of study and the professional education requirements for a teaching endorsement program. Candidates may complete a certification program while enrolled in an undergraduate program or after completing a bachelor's degree at Colorado State or any accredited institution.

Students may pursue endorsement programs in art, music education, and physical education to teach in kindergarten through twelfth grade.

All other endorsements lead to secondary teacher certification. Vocational programs also qualify graduates to be certified and credentialed as vocational teachers.

Outcomes assessment of students completing the teacher certification program in the School of Occupational and Educational Studies is based on a number of variables. Student teachers are evaluated by both a cooperating teacher and a University supervisor. Additionally, students who complete the program are asked to evaluate the student teaching experience and the quality of the teacher preparation program.

Teacher Endorsement Areas
Combined Kindergarten, Elementary, and Secondary

Endorsement Area	**Suggested College Undergraduate Major**
Art	All
Music Education	Music
*Physical Education	Exercise and Sport Science

Secondary

Endorsement Area	**Suggested College Undergraduate Major**
English	English. Arts and Humanities
Foreign Language	

French. German, or Spanish	French, German. Spanish
*Industrial Arts	Industrial Sciences and Technology (Education)
Mathematics	Mathematics, Physical Science
Science	Biological Science, Botany,
Biology	Chemistry, Geology
Biology/Natural Resources	Natural Resources
Chemistry	Management. Physical
General	Science, Physics
Geology	Zoology
Physics	
Social Studies	Anthropology, Economics
	History, Political Science
	Psychology. Social Sciences, Sociology
Speech	Arts and Humanities
	Performing Arts (Theatre)
	Speech Communication

Vocational Secondary

College Endorsement Area	**Undergraduate Major**
*Adult Technical Education	Industrial Sciences and Technology
*Business Education	Business Administration, General Business/
Entrepreneurship	Concentration
*Trade and Industrial	Industrial Sciences and
Education	Technology
*Vocational Agriculture	Agricultural Education
*Vocational Home Economics	Home Economics Education
*Vocational Marketing	Business Administration
Education	General Business/
	Entrepreneurship or Marketing Concentration

*Endorsement requirements for these programs are outlined in the department where the major is offered. All others are outlined in this section of the catalog.

Admission To Teacher Certification
Students who wish to pursue a secondary or K-12 teacher endorsement program should apply for admission to the Teacher Certification Program in the School of Occupational and Educational Studies.

Requirements for admission to teacher certification are available in the Education Building, Room 100. Students may not enroll in any education course except ED 255 and ED 355 or VE 300, VE 401, and VE 402 until they have been admitted to the teacher certification program.

Admission to teacher certification is based upon completion of a minimum of 30 semester credits, successful completion of the Basic Skills Competency Test, and evidence of successful experience with school-age students. Teacher certification students must be enrolled in or have completed SP 200 and either ED 255 or VE 300, and applied for admission through the School of Occupational and

Educational Studies. Grade point requirements and specific deadline dates for admission are available in the Teacher Certification Office, Education Building, Room 100.

General Education Requirements
A minimum of 42 credits is required. In addition to college composition, general psychology, and public speaking, courses should be selected in arts and humanities, behavioral and social sciences, and natural sciences (including mathematics). Courses selected to meet general requirements are to be from the University Studies Program. Specific requirements are available in the Teacher Certification Office, Education Building, Room 100.

Student Teaching

Secondary and K- 12 teacher certification students apply for student teaching placement to the School of Occupational and Educational Studies one semester before student teaching. Student teaching must be completed at an approved school, The experience is full time for the specific time period. Further information is available in the Education Building, Room 100.

Vocational teacher education students apply for student teaching through their respective vocational education programs.

Grade point requirements for placement in student teaching are available in the Teacher Certification Office, Education Building, Room 100. Additionally, students must demonstrate acceptable personal fitness. Placement is contingent upon acceptance of the student by a school system. All assignments are made by the University.

An opportunity is available to interested students to teach abroad.

Requirements for Certification
Colorado certification requires completion of an approved program and the recommendation of the institution at which the program was completed. The Director of Teacher Certification in the School of Occupational and Educational Studies serves as certification officer for the University.

Colorado State University's approved program requirements include completion of a baccalaureate degree, prescribed general education requirements, teaching endorsement requirements, the professional education sequence with at least a C in student teaching, and fulfillment of all other established program requirements.

The University reserves the right to not recommend a student for teacher certification on the basis of unacceptable personal fitness.

Professional Certification Requirements
The professional requirements listed below apply to all teaching endorsement areas except those in vocational education.

Students must be admitted to the Teacher Certification Program in the School of Occupational and Educational Studies before enrolling in any education courses except ED 255 and ED 355. Requirements for admission are available in the Education Building, Room 100.

			Credits
ED	255	Introduction to Education	2
ED	355	Educational Psychology	3
ED	401A or B	Teaching Classroom Reading/Literacy Skills	2-3
ED	428	Exceptionality, Diversity. and Human Relations	3
ED	450	Methods and Evaluation of Instruction	4
ED	451	Microteaching Laboratory	1
ED	485A	Student Teaching-Elementary	6-15
ED	485B	Student Teaching-Secondary 1	6-15
ED	486C	Practicum-Exceptionality and Diversity	1
ED	493	Seminar in Professional Relations	1
ED		Practicum	2
ED		Special methods course in the teaching field	2-4

1. Student leachers in *art.* music, and physical education must complete a semester of student teaching including an elementary' and a secondary experience. Student teachers completing secondary student teaching teach only at the secondary school level.

2. Students are encouraged to complete two credits of ED 386 or ED 486. Practicum, to fulfill the 100 clock hour field experience requirement.

3. Students must take the appropriate courses from the following list:

Credits

ED	460	Methods and Materials in Teaching Science	4
ED	462	Methods and Materials in Teaching Languages	4
ED	463	Methods in Teaching Language Arts	4
ED	464	Methods and Materials in Teaching Mathematics	4
ED	465	Methods and Materials in Social Studies	4
ED	466	Methods in Elementary and Secondary' School Art	4
ED	470	Methods in Elementary' Physical Education Curricula	3
ED	471	Methods in Secondary Physical Education Curricula	4
ED	475	Elementary School Music Methods	4
IS	471	Methods of Teaching Technology Education	2

4. In art education, music education. physical education, and industrial arts education. students are required to take some methods and related courses outside of the basic core of professional work prior to student teaching.

Students must complete 100 clock hours of approved field experiences alter admission to the Teacher Certification Program and before student teaching.

Information concerning field experiences is available in the Education Building, Room 100.

Student teachers in biology, biology/natural resources, chemistry, English, foreign language, general science, geology, industrial arts, mathematics, physics, social. studies. and speech must complete appropriate methods courses the semester prior to enrolling in student teaching. Student teachers complete 15 weeks of student teaching and a professional relations seminar, usually during their senior year.

Students planning to certify in art, music education, or physical education must complete appropriate methods courses the semester prior to enrolling in student teaching. During the student teaching semester, candidates complete both an elementary and secondary student teaching experience and enroll in a professional relations seminar.

Undergraduate Teaching Endorsement Area Requirements
Art (K-12)

			Credits
AR	110, 111	History of Western Art II	6
AR	135	Introduction to Drawing	3
AR	136	Introduction to Figure Drawing	3
AR	160	Foundations Painting	3
AR	170	Foundations Sculpture	3
AR	212	History of Western Art III	3
AR	230	Photo Image Making I	3
AR	240	Pottery I	3
AR	*260*	Painting I	3
AR	270	Sculpture I	3
AR	326	Art Education Studio	3
AR	492A	Seminar-Art Education	3
AR		Art electives	8
AR		Art history, upper division	3
AR		Studio teaching concentration:	8

1. Select one 200-level course from the following: fibers, metalsmithing, or printmaking.

2. Studio teaching concentrations may be at the 300 or 400 level in any studio other than graphic design.

Science: Biology (Secondary)

			Credits
AG	330	Principles of Genetics	3
		or	
B	350/Z 350	Molecular and General Genetics	3

		or	
Z	346	Evolution and Heredity	3
		or	
Z	455	Human Heredity and Birth Defects	3
AY	300/PS 300	Principles of Human Anatomy and Physiology	4
AY	301	Human Gross Anatomy	5
		or	
PS	302	Laboratory in Principles of Physiology	2
B	120	Principles of Plant Biology	4
		and	
Z	110	Principles of Animal Biology	4
		or	
BY	102	Attributes of Living Systems	4
		and	
BY	103A-B	Biology of Organisms	4
B	223	Plant Identification	3
B	450	Plant Ecology	4
		or	
BY	220	Ecology	3
		or	
Z	475	Animal Ecology	4
BC	301	Survey of Biochemistry	3
		or	
BC	351	Principles of Biochemistry	4
BC	352	Principles of Biochemistry Laboratory I	
BY	310	Cell Biology	4
BY	311	Developmental Biology	4
C	107, 108	Fundamental Chemistry, Laboratory	5
C	111, 113	General Chemistry I, II	7
		and	
C	112. 114	General Chemistry Laboratory I, II	2
C	245, 216	Organic and Biological Chemistry, Laboratory	5
		or	
C	341, 343	Organic Chemistry I. II	6
		and	
C	344	Organic Chemistry Laboratory	2
EN	302, 303A	Applied and General Entomology, Laboratory	4
		or	
Z	212	Animal Biology-Invertebrates	4
		or	
Z	214	Animal Biology-Vertebrates	4
ER	140	Physical Geology	4
M	155	Calculus for Biological Scientists I	4
MB	300	General Microbiology	4
PH	110	Descriptive Physics	3
		or	
PH	121	General Physics I	5

Science: Biology/Natural Resources (Secondary)

			Credits
AG	240	Introductory Soil Science	4
AG	330	Principles of Genetics	3
		or	
B	350/Z 350	Molecular and General Genetics	3
		or	
Z	346	Evolution and Heredity	3
		or	
Z	455	Human Heredity and Birth Defects	3
AY	300/PS 300	Principles of Human Anatomy and Physiology	4
AY	301	Human Gross Anatomy	5

		or	
PS	*302*	Laboratory in Principles of Physiology	2
B	120	Principles of Plant Biology	4
B	223	Plant Identification	3
BC	301	Survey of Biochemistry	3
		or	
BC	351	Principles of Biochemistry	4
BC	352	Principles of Biochemistry Laboratory	1
BY	220	Ecology	3
C	107, 108	Fundamental Chemistry, Laboratory	5
		or	
C	111. 113	General Chemistry I, II	7
		and	
C	112. 114	General Chemistry Laboratory I, II	2
C	245, 246	Organic and Biological Chemistry, Laboratory	5
EN	302, 303A	Applied and General Entomology, Laboratory	4
		or	
Z	212	Animal Biology-Invertebrates	4
		or	
Z	214	Animal Biology-Vertebrates	4
ER	140	Physical Geology	4
M	155	Calculus for Biological Scientists I	4
MB	300	General Microbiology	4
NR	120	Environmental Conservation	3
PH	110	Descriptive Physics	3
		or	
PH	121	General Physics I	5
Z	110	Principles of Animal Biology	4

Select nine credits from the following:

EC	240/EA 240	Issues in Environmental Economics	3
ER	304	Principles of Watershed Management	3
ER	424	Bioclimatology	3
FW	360	Principles of Wildlife Management	3
GR	210	Physical Geography	3
GR	241	Geography of Natural Resources	3
NR	220	Natural Resources Ecology and Measurements	5
RR	200	Introduction to Recreation Resources	3
RS	300	Principles of Range Management	3.

Science: Chemistry (Secondary)

			Credits
B	120	Principles of Plant Biology	4
		or	
BY	103A-B	Biology of Organisms	4
		or	
Z	110	Principles of Animal Biology	4
BC	301	Survey of Biochemistry	3
		or	
BC	351	Principles of Biochemistry	4
BC	352	Principles of Biochemistry. Laboratory	1
C	111, 113	General Chemistry I, II	7
C'	112, 114	General Chemistry Laboratory I, II	2
C	331	Quantitative Analysis	3
		and	
C	332	Quantitative Analysis Laboratory	2
		or	
C	334	Quantitative Analysis Laboratory	1
C	341, 343	Organic Chemistry I, II	6
C	344	Organic Chemistry Laboratory	2
C	471, 473	Physical Chemistry-Biological Orientation I, II	6

		or	
C	475, 477	Physical Chemistry I, II	6
ER	140	Physical Geology	4
M	160, 161	Calculus for Physical Scientists I, II	8
PH	141, 142	Physics for Scientists and Engineers I, II	10

Select five credits from the following:

CS	150	Introduction to FORTRAN Programming	3
M	260	Elementary Linear Algebra	2
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
PH	314	Introduction to Modern Physics	4
ST	201	General Statistics	3
ST	301	Introduction to Statistical Methods	3

English (Secondary)

			Credits
CO	301A-C	Intermediate Composition	3
E	140	Introduction to Literature	3
E	160	Mythical and Biblical Backgrounds	3
E	240	Introduction to Poetry	3
E	270	Introduction to American Literature	3
E	275	Introduction to British Literature	3
E	322, 323	English Language for Teachers I, II	6
E	341	Principles of Literary Criticism	3
E	342 or 343	Shakespeare I or II	3
E	402	Teaching Composition	3
E	405	Adolescents' Literature	3
E		Major author	3
E		English (include one course from each of the following categories: Medieval/ Renaissance British; 18th- and 19th-century British and American; 20th-century British and American; and comparative)	12
SP	231	Oral Reading	3

Foreign Language: French, German, or Spanish (Secondary)

		Credits
L	Second-year language	10
L	Upper-division courses must include 300- and 400-level courses in composition and conversation. phonetics, and civilization	32
	Supporting area 24 credits in teaching field; may include credits used to meet general education or departmental requirements. A course in linguistics is also required.	24

1. English is strongly recommended and should include E 321 and E 402.

Science: General (Secondary)

Common Science Requirements			**Credits**
B	120	Principles of Plant Biology	4
		and	
Z	I IO	Principles of Animal Biology	4
		or	
BY	102	Attributes of living Systems	4
		and	
BY	103A-B	Biology of Organisms	4

C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
ER	140	Physical Geology	4
M	155, 255	Calculus for Biological Scientists I, II	8
		or	
M	160, 161	Calculus for Physical Scientists I, II	8
PH	121, 122	General Physics I, II	10
		or	
PH	141, 142	Physics for Scientists and Engineers I, II	10

Complete minors in two of the following fields:
biochemistry. chemistry, computer science. geology.
mathematics. physics, statistics. '.2 42

1. Courses from the common science requirements may count toward completion of minors.

2. Additional course work may be required because of prerequisites.

Science: Geology (Secondary)

			Credits
AA	100	Introduction to Astronomy	4
AT	350	Introduction to Weather and Climate	2
		or	
AT	440	Meteorology	2
B	120	Principles of Plant Biology	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
ER	140	Physical Geology	4
ER	154	Historical and Analytical Geology	4
ER	232	Crystallography and Mineralogy	4
ER	272	Oceanography I	3
ER	342	Paleontology	3
ER	344	Stratigraphy and Sedimentation	4
ER	376	Geologic Field Methods	3
ER	454	Geomorphology	4
GR	210	Physical Geography	3
M	160	Calculus for Physical Scientists I	4
PH	121, 122	General Physics I, II	10
		or	
PH	141, 142	Physics for Scientists and Engineers I, II	10
Z	110	Principles of Animal Biology	4

Industrial Arts (Secondary)
For detailed four-year curriculum, see Department of Industrial Sciences, major in industrial sciences and technology.

Mathematics (Secondary)

			Credits
BF	250	Personal Investments	3
		or	
HC	320	Finance-Personal and Family	3
		or	
M	133	Consumer Mathematics	2
C	111, 113	General Chemistry I, II	7
		and	
C	112, 114	General Chemistry Laboratory I, II	2
		or	
PH	121, 122	General Physics I, II	10
		or	
PH	141, 142	Physics for Scientists and Engineers I, II	10

CS	110	Personal Computing I	4
		or	
CS	210	Personal Computing II	4
CS	151	Introduction to Pascal Programming	4
M	160, 161	Calculus for Physical Scientists I, II	8
M	229	Matrices and Linear Equations	1
M	260	Elementary Linear Algebra	2
		or	
M	369	Linear Algebra	3
M	317	Advanced Calculus of One Variable	4
M	366	Groups, Rings and Fields	3
M	425	History of Mathematics	3
M	470	Euclidean and Non-Euclidean Geometry	3
ST	301	Introduction to Statistical Methods	3

Select nine additional credits from the following:

CS	155	Computer Organization	4
CS	410	Introduction to Computer Graphics	4
M	261	Calculus for Physical Scientists III	3
M	301	Introduction to Combinatorial Theory	3
M	318	Advanced Multivariable Calculus	3
M	335	Projects in Applied Mathematics	3
M	340	Introduction to Ordinary Differential Equations	4
M	350	Introduction to Numerical Analysis I	4
M	351	Introduction to Numerical Analysis II	4
M	364	Number Theory	3
M	460	Applied Algebra	3
ST	220	Elementary Probabilistic Modeling	2
ST	302	Design of Expert ments	3
ST	304	Multiple Regression Analysis	3
ST	305	Sampling Techniques	2
ST	420	Probability and Mathematical Statistics I	3
ST	430	Probability and Mathematical Statistics II	3

Music Education (K-12)

			Credits
MU	117, 118	MusicTheory I, II	8
MU	131	Introduction to Music History and Literature	3
MU	150	Piano Class I	2
MU	204	Marching Band	2
		or	
MU		Ensemble	2
MU	217, 218	Music Theory III, IV	8
MU	252A-G	Instrumental Techniques	7
MU	254	Beginning Conducting	2
MU	265A	Diction-German/English	1
		or	
MU	496H	Group Study-Pedagogy (voice)	1
MU	272A-V	Applied Music Instruction (major instrument or voice) (4 semesters)	8
MU	286B	Practicum-Music Education	1
MU	334, 335	Music History I, II	6
MU	355	Choral Conducting and Literature	2
MU	356	Instrumental Conducting and Literature	2
MU	411	Orchestration	3
MU	416	Stylistic Analysis	3
MU	420	Marching Band Techniques	2
MU	469	Instrumental Literature	2
MU	472A-V	Applied Music Instruction (major instrument or voice) (2 semesters)	8

MU	486B	Practicum-Music Education	1
MU		Ensemble (6 semesters)	6

Physical Education (K-12)
For detailed four-year curriculum, see Department of Exercise and *Sport* Science, major in exercise and *sport* science.

Science: Physics (Secondary)

			Credits
AA	100	Introduction to Astronomy	4
B	121	Principles of Plant Biology	4
		or	
BY	103A-B	Biology of Organisms	4
		or	
Z	110	Principles of Animal Biology	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
C	245, 246	Organic and Biological Chemistry, Laboratory	5
		or	
C	341, 343	Organic Chemistry I, II	6
		and	
C	344	Organic Chemistry Laboratory	2
CS	150	Introduction to FORTRAN Programming	3
ER	140	Physical Geology	4
M	160, 161	Calculus for Physical Scientists I, II	8
M	261	Calculus for Physical Scientists I, II	3
M	340	Introduction to Ordinary Differential Equations	4
PH	141, 142	Physics for Scientists and Engineers I, II	10
PH	245	Introduction to Electronics	4
PH	314	Introduction to Modern Physics	4

Select 10 credits from the following:

AA	301	Astrophysics I	5
PH	315	Modern Physics Laboratory	2
PH	325	Advanced Physics Laboratory	2
PH	341	Mechanics	4
PH	351	Electricity and Magnetism	4
PH	361	Physical Thermodynamics	3
PH	451	Introductory Quantum Mechanics I	3
PH	452	Introductory Quantum Mechanics II	3

Social Studies (Secondary) **Credits**

Common Social Studies Requirements

U.S. History			**15**
HY	150	U.S. History to 1876	3
HY	151	U.S. History Since 1876	3
HY		Pre-1865 upper-division course	3
HY		Post- 1865 upper-division course	3
HY		Electives in topical or period courses.	

Upper division			**3**
AP	100	Introductory Cultural Anthropology	3
		or	
AP	320	Nature of Culture	3
EC	100	Principles of Macroeconomics	3
EC	102	Principles of Microeconomics	3
GR	100	Introduction to Geography	3
HY	100, 101	Western Civilization I, II	6
PO	101	American Government and Politics	3
S	100	General Sociology	3

Nine credits each in two of the following areas:

AP	Anthropology - minimum of 6 upper-division credits selected from social, cultural anthropology	9
EC	Economics (minimum of 6 upper-division credits)	9
GR	Geography (excluding GR 210)	9
HY	Non-U.S. history	9
PO	Political science (minimum of 6 upper-division credits)	9
PY	Psychology (minimum of 6 upper-division credits)	9
S	Sociology (minimum of 6 upper-division credits)	9

One course required from each of the following areas:

International Education			**2**
HY	215	Revolution and Conflict in the Middle East	3
HY	270	Colonial l.grin America	3
HY	271	Latin America Since Independence	3
HY	273	Asia-The Formative Years	3
HY	274	Asia-Years of Transformation	3
HY	34(3	Late Imperial China	3
HY	341	Revolutionary China	3
HY	342	Japan Since 1800	3
HY	350	Mexico	3
HY	352	Caribbean Civilization	3
HY	419	Africa	3
HY	445	Themes in World History	3
HY	453	Pacific Wars. 1937-1975	3
IE	270A-B	World Interdependence	3
IIE	271	India	3
PO	431	International Law	3
PO	433	International Organization	3

Research Approaches

EC	335/EA 335	Introduction to Econometrics	3
HY	200	Prologue	1
PL	327	Philosophy of Behavioral Sciences	3
S	311	Methods of Sociological Inquiry	3

1. Select one option: HY 273. HY 274 and one upper-division course in Asian history; *or* HY 270. HY 271 and one upper-division course in Latin American history; *or* three upper-division courses in pre-1600 European history; *or* three upper-division courses in post-1600 European history; *or* three upper-division courses, one each on contemporary Asia. Latin America. and Europe; *or* three upper-division courses. one each on China. USSR. and East Europe.

2. Contact your adviser to determine degree requirements.

Speech (Secondary)

			Credits
CO 301A-C		Intermediate Composition	3
E	270	Introduction to American Literature	3
E	275	Introduction to British literature	3
E	432	Teaching Composition	3
E		English	3
SP	201	Rhetoric in Western Thought	3
SP	207	Rhetoric and Argumentation	3
SP	231	Oral Reading	3
SP	241	Television and Radio in Society	3
TH	141	Introduction to Theatre	3

Students must complete either Option I or II: Option I - General Speech

SP	300	Advanced Public Speaking	3
SP	311	Historical Speeches on American Issues	3

SP	405	Interpersonal Communication	3
SP	409	Studies in Persuasion	3
SP	417	Communication, Language, and Thought	3
SP	450	Capstone Seminar	2
SP		Speech	10

Option 11 - Theatre

TH	151	Acting I	3
TH	161	Technical Theatre I	3
TH	255	Directing I	3
TH	341	History of Theatre I	3
		or	
TH	342	History of Theatre II	3
TH		Theatre	15

1. Maximum of three credits total from SP 215, SP 315. SP 384. SP 487, and SP 495 counted toward major requirement.

Teacher Certification and Credentialing in Vocational Education

As provided in an agreement with the Colorado Community College and Occupational Education System, Colorado State provides teacher education in adult technical education, business education, trade and industrial education, vocational agriculture, vocational home economics education, and vocational marketing education.

Students major in an approved program, complete the general education requirements, and the necessary professional education courses that lead to teacher certification and vocational credentialing. The teacher certification and vocational credentialing programs are administered by the School of Occupational and Educational Studies.

Vocational Credentialing

Individuals desiring to teach in or administer vocational programs in the state of Colorado must qualify for a vocational credential in addition to a teaching or administrative certificate. As provided for in an agreement with the Colorado State Board for Community College and Occupational Education, Colorado State has a credentialing office located in Room 115, Vocational Education Building. Those who plan to qualify as vocational teachers or administrators must meet the requirements for a vocational credential established by the Colorado Community College and Occupational Education System.

Credit for Merchandising, Selling, Managerial, Technical, Trade, or Industrial Work Experience

The importance of work experience to prepare for vocational education teaching has been recognized by Colorado State since 1928.

Evidence of a minimum of two to five years of approved full-time work experience is required before a credential can be granted in vocational education. A year is defined as 48 weeks of lull-time (or part-time equated to full-time) work experience; work experience of less than three months cannot be used to meet this requirement.

Students may receive academic credit for work experience and for successfully passing an appropriate competency examination administered by the School of Occupational and Educational Studies. The amount of credit to be awarded is determined by the University Committee on Undergraduate Work in Vocational Education; up to a maximum of 42 credits may be granted for this experience. Students may apply for the competency examination credit after they have completed *16* credits at Colorado State and have a total of 32 credits which are applicable in meeting degree requirements.

Nontransfer credits in technical/vocational courses from postsecondary institutions approved by a recognized accrediting agency may be used to meet the technical specialty requirement.

Students who have successfully completed a minimum of three or more years of teaching at an approved institution may qualify for eight credits in teaching and have the student teaching requirement waived.

Professional Core Requirements
The professional core requirements listed below apply to all teaching endorsement areas in vocational education.

			Credits
ED	355	Educational Psychology	3
ED	401 A-B	Teaching Classroom Reading/Literacy Skills	2-3
ED	486C	Practicum-Exceptionality and Diversity	1
VE	300	Principles of Vocational Education	2
VE	401	Instructional Aids in Vocational Education	2
VE	402	Student Organizations in Vocational Education	2
VE	485	Student Teaching	12-14

Adult Technical Education Concentration
Professor Duane G. Jansen. program chair

Work Experience Requirement
Applicants in adult technical education must have a minimum of three years of experience in a technical occupation. Applicants may be accepted provisionally with less occupational experience if they can reasonably expect to complete the requirements before the degree is granted.

For the detailed four-year curriculum, refer to the Department of Industrial Sciences, major in industrial sciences and technology. adult technical education concentration in this section of the catalog.

Business Education
Associate Professor Betty Fry program chair

Students majoring in business administration with a concentration in general business or a related business area. and desiring to teach business subjects at the secondary and postsecondary levels need to qualify for business education teacher certification and credentialing. In addition to majoring in business, students must meet the certification and credentialing requirements in one of the following areas: office administration, accounting, data processing, and management. Contact the School of Occupational and Educational Studies for specific certification and credentialing requirements for each area.

Professional Education Requirements
Students must complete the professional core requirements in vocational education plus the following specialized courses:

			Credits
VE	403	Coordination Techniques of Cooperative Programs	2
VE	408	Methods and Evaluation of Instruction	4
VE	409	Microteaching Laboratory	1
VE	431	Methods/Materials in Business Education	3
VE	485	Student Teaching	12
VE	492	Seminar	1

Work Experience Requirement
Students having 2,000.hours of successful, office-related work experience can qualify for a vocational credential issued by the Colorado Community College and Occupational Education System. Work experience may be acquired while attending Colorado State through part-time, office-related work experience during the school year and/or summers.

For the detailed curriculum requirements in business administration with a concentration in general business/entrepreneurship or a related business area, refer to the College of Business.

Trade and Industrial Education Concentration
Professor Duane G. Jansen, program chair

Work Experience Requirement
Students in trade and industrial education must have a minimum of three years of trade and/or industrial experience. Applicants should be engaged in teaching or preparing to be engaged in teaching or in supervising a vocational program. Applicants without vocational credentials must complete three years of occupational experience before completing the degree requirements.

For the detailed four-year curriculum, refer to the Department of Industrial Sciences, major in industrial sciences and technology, trade and industrial education concentration in this section of the catalog.

Vocational Agriculture (Secondary)
Associate Professor David Whaley. program chair

Students majoring in agricultural education are prepared to teach youth and adults in high schools, community colleges,junior colleges, area vocational schools, and technical institutes. Two years of occupational experience in the agriculture industry are required in addition to the agriculture curriculum and professional education courses.

For the detailed four-year curriculum, refer to the College of Agricultural Sciences, major in agricultural education.

VOCATIONAL HOME ECONOMICS EDUCATION (Secondary)
Professor Cathleen Love, program chair

Students majoring in home economics with a concentration in vocational home economics are prepared to be employed as teachers in middle schools, junior or senior high schools, community and junior colleges, area vocational schools, and technical institutes. Two years of occupational experience in consumer and homemaking related jobs are required in addition to the home economics curriculum and professional education courses.

For the detailed four-year curriculum, refer to the interdepartmental major in home economics, vocational home economics concentration in this section of the catalog.

Vocational Marketing Education
Associate Professor Betty Fry, program chair

Students majoring in business administration with a concentration in general business/entrepreneurship, marketing. or a related business area, and desiring to teach marketing education at the secondary or community and junior college levels need to qualify for vocational marketing education certification and credentialing. In addition to majoring in business, students must meet the certification and credentialing requirements in marketing education.

Professional Education Requirements
Students must complete the professional core requirements in vocational education plus the following specialized courses:

			Credits
VE	403	Coordination Techniques of Cooperative Programs	2
VE	408	Methods and Evaluation of Instruction	4
VE	409	Microteaching Laboratory	1
VE	441	Methods/Materials-Vocational Marketing Education	3
VE	485	Student Teaching	14
VE	492	Seminar	2

Work Experience Requirement

It is recommended that individuals complete a minimum of two years of work experience in merchandising, sales. or other marketing occupations prior to completion of the degree program in order to meet Colorado vocational credentialing requirements.

Graduate Programs

The School of Occupational and Educational Studies offers graduate programs leading to master of education and doctor of philosophy degrees in vocational education, and a master of science degree in student affairs in higher education. Master of education degree specializations are available in administration, adult education, counseling and career development, human resource development, instructional leadership, and occupational special needs.

Doctoral degree specializations are available in administration, community college administration, counseling and career development, human resource development and adult life-span learning, special needs, teacher education/staff development, and technology of industry. Regional Graduate Program status has been given to the doctoral degree by the Western Interstate Commission on Higher Education (WICHE). This arrangement, approved by the state of Colorado, permits citizens of other western states to pay resident tuition rates under certain conditions. Contact the School of Occupational and Educational Studies for further details.

Nondegree programs are also available that lead to certification/endorsement as a school principal, superintendent. school counselor, vocational guidance specialist. job development specialist, and local vocational director.

A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF COMMUNICATION DISORDERS

Office in Education Building. Room 138
Associate Professor Howard W. Larimore. Acting Head
Speech-language pathology and audiology are closely allied professions devoted primarily to the prevention, identification, evaluation, and treatment of the disorders of communication (i.e., speech, language, and hearing) suffered by more than twenty million children and adults in the U.S. While their interests and activities often overlap, speech-language pathologists work mainly with individuals who have speech and/or language problems. and audiologists deal principally with those who have hearing impairments. In addition to. or in place of, these clinical responsibilities, some speech-language pathologists and audiologists teach in colleges and universities, conduct research, and/or serve as program administrators.

Employment opportunities exist in public and private schools, hospitals. rehabilitation centers, college and university clinics. state and federal institutions and agencies, and, increasingly, private practice. The current job market for speech-language pathologists and audiologists ranges geographically from good to excellent, and many factors point to future increases in demand for these speech. language, and hearing professionals.

The Department of Communication Disorders is dedicated to the goal of preparing men and women for professional careers in speech and language pathology and audiology. In an effort to monitor the success of its endeavor, the department has developed an outcomes assessment process. Essentially this process involves internal and external evaluation procedures and plans to disseminate the results.

Preparation for a career as a certified speech-language pathologist or audiologist requires the completion of both the bachelor's and master's degrees.

Major in Communication Disorders

The preprofessional undergraduate major, which leads to the bachelor of science degree. provides both a broad liberal education and the introductory course work in the communication sciences and disorders that are prerequisite to professional education in speech-language or audiology at the graduate level. The freshman/sophomore curriculum is composed primarily of courses in the arts and sciences, while the junior/senior years provide a comprehensive overview of the disorders of speech, language, and hearing, and an introduction to clinical experience.

Freshman Year			**Credits**
C	103, 104	Chemistry and Society. Laboratory	4
CD	100	Introduction to Communication Disorders	3
CO	150	College Composition	3
CS	110	Personal Computing I	4
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
PY	100	General Psychology	3
Z	101	Humans and Other Animals	3
		Communication	3
		Physical education/wellness	2
		Electives	4

Sophomore Year			**Credits**
CD	302	Speech and Hearing Science	4
CD	312	Phonetics and *Phonology*	*3*
HD	101	Individual and Family Development	3
HD	211	Infancy and Childhood	3
		or	
PY	260	Child Psychology	3
OT	215	Medical Terminology	1
ST	201	General Statistics	3
		Behavioral and social sciences	6

		Electives	9

Junior Year			**Credits**
CD	300	Normal Language-Speech-Hearing Development	4
CD	305	Auditory Disorders and Hearing Measurement	4
CD	314	Articulatory-Phonological Disorders	3
CD	318	Child and Adult Communication	4
CO	301C	Intermediate Composition-Expository Writing in the Social Sciences	3
HD	301	Perspectives in Gerontology	3
		or	
HD	322	Adult Development and Aging	3
SW	320	Interviewing Methods	3
		Electives	8

Senior Year			**Credits**
CD	405	Introduction to Aural Rehabilitation	2
CD	406	Aural Rehabilitation Laboratory	1
CD	445	Education and Psychology of the Deaf	2
CD	492	Seminar-Speech and Language Pathology	2
E	320C	Introduction to the Study of Language Language and Society	3
		Arts and humanities	6
		Electives	16

1. Select from list of courses in category I-D in the University Studies Program.

2. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

3. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

Graduate Programs in Communication Disorders
Master of science degree programs are offered in speech-language pathology and audiology, both emphasizing the theoretical and practical aspects of developing clinical competence. A .description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF DESIGN, MERCHANDISING, AND CONSUMER SCIENCES

Office in Gifford Building, Room 314
Professor Antigone Kotsiopulos, Head
The department offers four academic programs: apparel design and production, consumer sciences, interior design. and merchandising. The programs, all leading to a bachelor of science degree, have in common an understanding of design, business practices, and the needs of the consumer. These programs lead to exciting professional careers and are not found in any other four-year college program in Colorado. Career preparation is facilitated by relevant course work and internship possibilities. The department has the faculty and facilities to prepare students for these careers.

The programs in this department have excellent teaching facilities including: computer labs for design, merchandising simulations, software evaluation, data analysis, and word processing; interior design studios and sample rooms; a laboratory for performance testing and evaluation of textiles; modern equipment for printing and other methods of applying design to fabrics; laboratories for instruction and research in fashion illustration and apparel design; industrial equipment to demonstrate methods of apparel production; and facilities for experimentation with visual merchandising techniques. The historic costume and textile collection is recognized as one of the largest and best at any American university; and the Gustarson Gallery presents a variety of exhibits and programs.

Major in Apparel and Merchandising
The merchandising concentration offers in-depth study of the process of planning, negotiating, acquiring, selling, and evaluating merchandise at both the wholesale and retail levels. The program assumes a global perspective, is complemented by business courses, and allows for career flexibility in a variety of product areas.

The concentration in apparel design and production offers opportunities for students to learn about all facets of the apparel and textile industries from the raw materials to the consumer. This encompasses knowledge of textile science and apparel design and production from product development through promotion and distribution.

As professionals in the industry, students must develop competencies which aid organizational and entrepreneurial endeavors by enhancing business profitability.

Apparel Design and Production Concentration
Students are provided a background in both the creative and technical aspects of apparel design. Current technology in computer-aided design is included in the curriculum. Additional course work may be selected from the areas of art, business, history, journalism, and theatre. Professional opportunities following graduation include various creative positions within the apparel industry.

Various measures are used to assess student learning in apparel design, production, and textiles, including a pre/post test, judges' comments on garments selected for the annual Design and Merchandising Association Fashion Show, senior portfolio review, and evaluation of interns from their on-site supervisors.

Freshman Year			**Credits**
AM	101	Fashion Industries	3
AM	120	Textiles	3
AR	101	Visual Form	3
AR	135	Introduction to Drawing	3
BD	140, 141	Computers in Business, Laboratory	3
CO	150	College Composition	3
IS	152	Industrial Materials=	3
M		Mathematics	3
SP	200	Public Speaking and Discussion	3
		Behavioral and social sciences-'	3

		Physical education/wellness	2

Sophomore Year			**Credits**
AM	207	Apparel Production Fundamentals	3
AM	208A	Production Fundamentals Laboratory-Shirt. Blouse, Dress	1
AM	208B	Production Fundamentals Laboratory-Women's Pants. Skirt	1
AM	242	Fashion Design and Visual Analysis	3
AM	250	Clothing and Human Behavior	3
C	103, 104	Chemisty and Society. Laboratory	4
EC	102	Principles of Microeconomics	3
		Arts and humanities	6
		Natural science 5	3

Junior Year			**Credits**
AM	313	Apparel Production Processes	3
AM	314	Apparel Production	3
AM	321	Textile Science	3
		or	
AM	421	Textile Analysis	3
AM	330	Textile and Apparel Economics	3
AM	340	Computer-Aided Apparel Design	2
AM	341	Flat Pattern Design	3
AM	363	Historic Costume 2	3
		or	
AM	460	Historic Textiles 2	3
AM	377	Professional Skill Development	3

Senior Year			**Credits**
AM	342	Computer-Aided Fabric Design	3
AM	415	Tailoring	4
AM	417	Apparel Production Management	2
AM	440	Fashion Illustration	3
AM	445	Draping Design	3
AM	446	Apparel Design and Production	3
AM	460	Historic Textiles	3
DM	487B	Internship-Apparel Design"	16
		or	
DM	487C	Internship-Apparel Production"	16
DM	492	Preinternship Seminar	1
IS	318	Manufacturing Facilities Planning	3
ST	301	Introduction to Statistical Methods:	3

1. For students in the apparel design option.

2. For students in the apparel production option.

3. Select from list of courses in category IV-A in the University Studies Program. excluding EA and EC courses.

4. Select from list of courses in category III-A in the University Studies Program.

5. Select from list of courses in category 11-A in the University Studies Program. excluding C courses.

6. Acceptance for DM 487B or C depends on the student's GPA and acceptance by a cooperating company. Students not enrolled in an internship will select 15 credits from departmental list.

Merchandising Concentration

This concentration is designed for students interested in merchandising at the wholesale or retail level. Traditionally, the merchandising internship involves participation in an executive development training program. The schedule of activities varies, but may include seminars; training manual assignments; experience in a buying office; department management; and rotation in the control, promotion, operations, and personnel divisions. Career paths follow an aspect of this training.

Freshman Year			**Credits**
AM	101	Fashion Industries	3
AM	120	Textiles	3
CO	150	College Composition	3
M		Mathematics	3
SP	200	Public Speaking and Discussion	3
		Arts and humanities	6
		Natural sciences	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AM	207	Apparel Production Fundamentals	3
AM	242	Fashion Design and Visual Analysis	3
AM	265'	Product Evaluation	3
AM	270	Merchandising	3
BA	210	Financial Accounting	3
BD	140, 141	Computers in Business. Laboratory	3
		or	
CS	110	Personal Computing I	4
C		Chemistry with laboratory	4
EC	102	Principles of Microeconomics	3
HC	250	Housing and Interiors	3
ST		Statistics 4	2-3
		Behavioral and social sciences	3

Junior Year			**Credits**
AM	321	Textile Science	3
		or	
AM	421	Textile Analysis	3
AM	330	Textile and Apparel Economics	3
AM	366	Merchandising Promotion	3
AM	371	Fashion Merchandising Systems	4
AM	377	Professional Skill Development	3
AM		Apparel and merchandising (which end in 00-81)	6
BK	300	Marketing	3
BK	360	Retailing	3
DM	492	Pre-internship Seminar	1

Senior Year			**Credits**
AM/HC/ID		Electives	6
BN	300	Management Fundamentals	3
DM	487A	Internship-Merchandising 6	12-16

1. Select from list of courses in category III-A in the University Studies Program, excluding AR courses.

2. Select from list of courses in category II-A in the University Studies Program, excluding C courses.

3. Select from list of courses in category 11-A in the University Studies Program.

4. Select from list of courses in category I-C in the University Studies Program.

5. Select from list of courses in category IV-A in the University Studies Program. excluding EA and EC courses.

6. Acceptance for DM 487A depends on the student's GPA and acceptance by a cooperating business. Students not enrolled in an internship will select 15 credits from departmental list.

Minors in Apparel and Merchandising

These minors seek to provide students in other majors an opportunity to expand their knowledge of textiles, apparel design and production, and merchandising. This should be especially applicable to majors in such areas as art, business, and theatre who could then integrate this information into their basic field of study. It is anticipated that an increased understanding of the relationship between the student's major and the apparel or merchandising minor will increase his/her ability to obtain a position in a wider variety of fields and that, once hired, the student will be more effective than someone without this background.

Minor in Apparel

Lower Division			**Credits**
Select nine credits from the following:			
AM	101	Fashion Industries	3
AM	120	Textiles	3
AM	207	Apparel Production Fundamentals	3
AM	208A-B	Production Fundamentals Laboratory	3
AM	242	Fashion Design and Visual Analysis	3
AM	250	Clothing and Human Behavior	3

Upper Division			**Credits**
AM	313	Apparel Production Processes	3
AM	341	Flat Pattern Design	3
		or	
AM 4	45	Draping Design	3
AM*		Electives	6

1. Select in consultation with department adviser.

*Additional course work may be required because of prerequisites.

Minor in Merchandising

Lower Division			**Credits**
AM	101	Fashion Industries	3
AM	120	Textiles	3
AM	270	Merchandising	3

Upper Division			**Credits**
AM	371	Fashion Merchandising Systems	4
AM*		Electives	6
BK	300*	Marketing	3

Select in consultation with department adviser.

* Additional course work may be required because of prerequisites.

Major in Consumer Sciences

A consumer sciences major studies consumer needs and goals, the resources available to consumers, and decision making. Courses provide an understanding of how to make choices about the goods and services vital to everyday living. In addition to a general education, an understanding is gained of the systems in which the consumer functions - the family, the community, and the political and economic systems. The professional working to promote consumer we 11-being may work with energy conservation, consumer relations. education or protection, financial counseling or planning, family economic well-being, or the marketing of goods and services.

A consumer sciences student will develop competence in representing consumers in a convincing manner. An understanding will be gained of state and federal legislative and political systems and reliable sources of information for effective decision making.

Freshman Year			**Credits**
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
HC	100	Consumer Choices	3
HD	101	Individual and Family Development	3
M	120, 121	College Algebra I, II	2
M		Mathematics	1
PY	100	General Psychology	3
S	100	General Sociology	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AM	120	Textiles	3
FN	150	Survey of Human Nutrition	3
HC	250	Housing and Interiors	3
HC	340	Equipment and Energy	3
		Natural sciences;	3

Select one course from the following:

EC	100	Principles of Macroeconomics	3
EC	102	Principles of Microeconomics	3

Select one course from the following:

PO	101	American Government and Politics	3
PO	103	State and Local Government and Politics	3

Select one course from the following:

SP	200	Public Speaking and Discussion	3
SP	207	Rhetoric and Argumentation	3

Junior and Senior Years			**Credits**
HC	300	Consumer Choices in Personal Computing	3
HC	320	Finance-Personal and Family	3
HC	330	Decision Making-Personal and Family	3
HC	360	Housing-Consumer Issues	3
HC	401	Consumer Issues and the Market	3
HC	411	Families and the Legal Environment	2
HC	430	Research and Problem Solving in Consumer Sciences	3
HC	479	Home Economics Communications	2
HD	434	Family Studies	3
HM	379	Colloquium-Home Economics	1
		Arts and humanities 2	6
		Logic and critical thinking 2	3

In addition. select 18 credits from DM 487A-E (6 credits maximum) and one of the following areas: a) consumer issues, b) equipment and energy. c) family resource management. d) housing. e) personal finance and management, f) residential interiors. Also select 12 credits in an area supportive of professional objectives or complete an interdisciplinary studies program or a minor complementary to the major. These choices are subject to adviser approval. The major requires a minimum of 50 upper-division credits.

1. Select from courses numbered M 124 or above. 2 Select from departmental list.

Minor in Consumer Sciences

The minor in consumer sciences expands knowledge in understanding the consumer role and the management of resources. It is especially useful if a student's major allows direct or indirect

contact with consumers through business, policy development and implementation, or provision of public services. In these areas, an understanding of consumer satisfaction and the way in which they use information is valuable.

Lower Division			**Credits**
EC	100*	Principles of Macroeconomics	3
		or	
EC	102*	Principles of Microeconomics	3
HC	100	Consumer Choices	3

Upper Division			**Credits**
HC	320	Finance-Personal and Family	3
HC	330	Decision Making-Personal and Family	3
HC	360	Housing-Consumer Issues	3

Select nine credits from the following:

HC	300*	Consumer Choices in Personal Computing	3
HC	340*	Equipment and Energy	4
HC	401	Consumer Issues and the Market	3
HC	410	Family Financial Resources and Public Policy	3
HC	411	Families and the Legal Environment	2
HC	430	Research and Problem Solving in Consumer Sciences	3

* Additional course work may be required because of prerequisites.

Major in Interior Design

The major in interior design is the only four-year FIDER-accredited program in the state of Colorado and one of the few in the Rocky Mountain region. Students who have design interests and talent will be able to prepare for a professional career in interior design.

Students will understand conceptual aspects of the design process and develop necessary technical, theoretical, and psychological skills required of an interior designer. The assessment of these emphases includes a portfolio evaluation occuring in the second semester of the sophomore year for the purpose of determining selection to the junior level of study; a grade of C or better in interior design courses; a portfolio review and comprehensive examination at the conclusion of the senior year; and participation in the Senior Show at the conclusion of the student's term of study.

Each sophomore interiordesign student will apply in the spring for entry into the junior level. Entry will be based on: (1) evidence of successful completion of or concurrent registration in AM 120, AR 101, ID 130, ID 266, ID 275, IS 130, IS 132, and IS 160; (2) a flat work portfolio including completed assignments reflecting the student's ability to apply knowledge and skills learned in the courses identified above; (3) a statement of reasons for studying interiordesign; and (4) cumulative grade point average. Students not selected for advancement into the junior level of the interior design major will receive advice and counseling regarding other study and career options in the Department of Design, Merchandising,. and Consumer Sciences and/or in other programs at the University.

A graduate of this major may work as a member of a design team in the development and implementation of design projects for residential and nonresidential projects, or as a designer working in the business and industry of interior design.

Professional organizations, including a student chapter of the American Society of Interior Designers, are represented in the program; involvement in these organizations can enhance the career development of the student.

Freshman Year			**Credits**
AR	101	Visual Form	3
AR	135	Introduction to Drawing	3
CO	150	College Composition	3
CS	110	Personal Computing I	4

ID	130	Design Appreciation	3
IS	130	Drafting Fundamentals	2
M	120	College Algebra I	1
PY	100	General Psychology	3
		Behavioral and social sciences II	3
		Communication:	3
		Natural sciences	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AM	120	Textiles	3
AR	110, 111	History of Western Art I, II	6
ID	266	Design Communications I	3
ID	275	Interior Design II	3
IS	132	Construction Graphics	2
IS	160	Construction Materials and Techniques	3
M		Mathematics	2
		Natural sciences	4
		Elective	3

Junior Year			**Credits**
DM	492	Pre-internship Seminar	**1**
ID	330	Color and Light	3
ID	340	Interior Materials and Market Study	3
ID	357	History of European Interiors	3
ID	358	History of American Interiors	3
ID	366	Design Communications II	3
ID	375, 376	Interior Design II, III	6
IS	232	Architectural and Construction Planning	4
		Electives	6

Senior Year			**Credits**
DM 487D		Internship-Interior Design 4	12
		or	
		Electives	12
HC	460	Housing and Design for Special Populations	3
ID	410	Computer-Aided Design and Drafting	3
ID	430	Environmental Technologies	3
ID	475	Interior Design IV	3
ID	476	Comprehensive Design Project and Portfolio	4
PY	316	Environmental Psychology	3
		Arts and humanities 5	3

1. Select from list of courses in category IV-A in the University Studies Program, excluding PY courses.

2. Select from list of courses in category I-D in the University Studies Program.

3. Select from list of courses in category II-A in the University Studies Program. Credits must be taken in at least two prefixes.

4. Acceptance for DM 487D depends on the student's GPA and placement with a cooperating firm.

5. Select from list of courses in category 111-A in the University Studies Program, excluding AR courses.

Graduate Program in Design, Merchandising, and Consumer Sciences

The department offers a graduate program leading to the master of arts or the master of science degree in design, merchandising, and consumer sciences, with specializations in apparel and textiles. consumer. sciences and housing. interior design. and merchandising. The student develops an individualized program within the general requirements of the department and Graduate School. For more information about the specializations and requirements write the department. A description of this program may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF EXERCISE AND SPORT SCIENCE

Office in Exercise and Sport Science Complex,
Room 207 Assistant Professor Cecelia Martin, Head

University Requirements in Physical Education/Wellness
These requirements are presented in the section on Undergraduate Degree Requirements in this catalog.

Major in Exercise and Sport Science
The undergraduate curriculum familiarizes and prepares students in the areas of exercise science. sport science. and the teaching of physical education. Students graduating with a major in exercise and sport science, which leads to the bachelor of science degree, will select a concentration in sports medicine, teacher education, or wellness program management.

Students graduating with a major in exercise and sport science are expected to demonstrate knowledge and skills required to be effective in their chosen professions/fields of study.

The following core requirements are required for all exercise and sport science majors. Students must select one of the three concentrations offered within the major.

Freshman Year			**Credits**
BY	102	Attributes of Living Systems	4
		or	
Z	101	Humans and Other Animals	3
		or	
Z	110	Principles of Animal Biology:	4
C	107, 108	Fundamental Chemistry Laboratory	5
CO	150	College Composition	3
EX	123	Essentials of Physical Activity	2
EX	145	Health and Wellness	3
M		Mathematics	3
PY	100	General Psychology	3
S	100	General Sociology	3

Sophomore Year			**Credits**
AY	300/PS 300	Principles of Human Anatomy and Physiology	4
AY	301	Human Gross Anatomy	5
EX	240	First Aid and Emergency Care	2
PS	302	Laboratory in Principles of Physiology. 2	
SP	200	Public Speaking and Discussion	3
		Arts and humanities	3

Junior Year			**Credits**
EX	303	Anatomical Kinesiology	3
EX	403	Physiology of Exercise	4
		Arts and humanities 2	3

Senior Year		**Credits**
EX	492	Seminar 1

1. Students selecting the sports medicine concentration must take BY 102 or Z 110.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

Sports Medicine Concentration
The sports medicine concentration offers the student a strong science-based education dealing specifically with applications of the natural sciences to the study of exercise and *sport.* This

concentration is designed to serve as a preprofessional degree, as well as for the student planning to continue with graduate study. It also provides course work for students in the athletic training program.

Course requirements are the same as the major in exercise and sport science plus the following:

Freshman Year			**Credits**
EX	111 A-D	Physical Education Laboratory (2 semesters)	2
		or	
EX	211A-G	Physical Education Laboratory (2 semesters)	2
EX	119	Games and Rhythmic Activities	2

Sophomore Year			**Credits**
CS	110	Personal Computing I	4
		or	
BD	140, 141	Computers in Business, Laboratory	3
EX	203	Motor Learning	3
PH	121, 122	General Physics I, II	10

Junior Year			**Credits**
BC	301	Survey of Biochemistry	3
		or	
BC	351	Principles of Biochemistry	4
C	245, 246	Organic and Biological Chemistry, Laboratory	5
EX	307	Biomechanical Principles of Human Movement	3
EX	375	Adapted and Corrective Exercise	3
HD	101	Individual and Family Development	3
		or	
PY	320	Abnormal Psychology	3
		Elective	3

Senior Year			**Credits**
EX	346	Training Room Methods	3
		or	
FN	450	Diet and Disease	4
		or	
PS	410	Physiological Responses to the Environment	3
		or	
PS	420	Cardiopulmonary Physiology	3
EX	405	Exercise Testing Instrumentation	2
EX	407	Biomechanics in Sport	3
		or	
EX	479	Psychology and Sport	3
EX	444	Exercise and Aging	3
EX	446	Performance Physiology	2
EX	453	Measurement and Evaluation	3
FN	350	Human Nutrition	3
		Electives	10-11

Teacher Education Concentration

The teacher education concentration is designed to prepare majors in exercise and sport science to teach a variety of skills in elementary and secondary schools. See also the Professional Certification Requirements section in the School of Occupational and Educational Studies in this section of the catalog. Students completing the teacher education concentration may elect to concurrently complete the requirements for the adapted-corrective or coaching concentrations.

This concentration, including the core, requires 136-138 credits. Course requirements are the same as the major in exercise and sport science plus the following:

Freshman Year			Credits
EX	119	Games and Rhythmic Activities	2
HD	101	Individual and Family Development	3
		Social science elective	3

Sophomore Year			Credits
ED	255	Introduction to Education	2
EX	203	Motor Learning	3
EX	260	History and Principles of Physical Education	2
EX	309	Methods of Coaching	2
		Logic and critical thinking	3-4

Junior Year			Credits
ED	355	Educational Psychology	3
ED	401 A	Teaching Classroom Reading/Literacy Skills	2
ED	428	Exceptionality. Diversity. and Human Relations	3
ED	486C	Practicum-Exceptionality and Diversity	1
EX	331, 332	Techniques of Teaching Team/ Individual Sports	8
EX	346	Training Room Methods	3
EX	365	Program Administration	2
EX	375	Adapted and Corrective Exercise	3

Senior Year			Credits
ED	450	Methods and Evaluation of Instruction	4
ED	451	Microteaching Laboratory	1
ED	470	Methods in Elementary Physical Education Curricula	3
ED	471	Methods in Secondary Physical Education Curricula	4
ED	485A-B	Student Teaching-Elementary and Secondary	15
ED	486E	Practicum-Elementary Physical Education	1
ED	486F	Practicum-Secondary Physical Education	1
ED	493	Seminar in Professional Relations	1
EX	344	Methods of Health Education	3
EX	479	Psychology and Sport	3

1. Select from list of courses in category I-C in the University Studies Program.

Wellness Program Management Concentration

The wellness program management concentration prepares individuals for careers in a variety of allied health fields. The options include: corporate fitness/ wellness programs, health promotion in hospital settings and with insurance companies, health clubs, cardiac rehabilitation, and exercise stress testing programs.

The minimum GPA for students in the wellness program management concentration must be 2.5 in the following courses before departmental approval will be given to register for EX 386B, Practicum-Wellness Program Management; EX 486B, Practicum-Wellness Program Management; and EX 487, Internship: AY 300/PS 300, AY 301, EX 11 I D, EX 123, EX 145, EX 21 IA, EX 240, and EX 340.

Course requirements are the same as the major in exercise and sport science plus the following:

Freshman Year			Credits
EC	102	Principles of Microeconomics	3
EX	111D	Physical Education Laboratory- Weight Training	1
PS	122	Drugs and the Human Body	2

Sophomore Year			Credits
CS	110	Personal Computing I	4
		or	
BD	140, 141	Computers in Business, Laboratory	3
EX	211A	Physical Education Laboratory- Aerobics	1
FN	150	Survey of Human Nutrition	3

SP	205	Group Communication	3

Junior Year			**Credits**
BA	210	Financial Accounting	3
BK	300	Marketing	3
BK	320	Advertising	3
EX	340	Exercise Prescription	1
EX	356	Wellness Programming	3
EX	386A	Practicum-Adult Fitness	2
EX	386B	Practicum-Wellness Program Management	2
VE	401	Instructional Aids in Vocational Education	2

Senior Year			**Credits**
EX	405	Exercise Testing Instrumentation	2
EX	453	Measurement and Evaluation	3
EX	456	Advanced Wellness Programming	3
EX	486B	Practicum-Wellness Program Management	2
EX	487	Internship	12
JT	200	Professional Writing	3
		or	
JT	301	Business Communication	3
		Electives	6-10

Adapted-Corrective Concentration

This concentration, taken concurrently with the teacher education concentration and which requires 148-150 credits, will assist exercise and sport science majors in developing programs for handicapped students. Course requirements are the same as those for the teacher education concentration plus the following:

			Credits
CD	496B	Group Study-Audiology	1
D	432	Dance Therapy	3
EX	476	Rehabilitation Exercise	2
EX	486A	Practicum-Adaptive Correctives	3
PY	320	Abnormal Psychology	3

Coaching Concentration

This concentration, taken concurrently with the teacher education concentration and which requires 146-148 credits, is offered for exercise and sport science majors desiring to develop coaching competencies. Course requirements are the same as those for the teacher education concentration plus the following:

Students must register with departmental coaching concentration adviser before taking any 300-400 level courses.

			Credits
CS	110	Personal Computing I	4
EX	486C	Practicum-Coaching	3
FN	150	Survey of Human Nutrition	3

Minor in Coaching

There is a need for competent coaches at the junior and senior high school levels. The minor may be taken by students majoring in disciplines other than exercise and sport science. However, coaches in junior and senior high schools should be certified in a teaching area.

Lower Division			**Credits**
EX	145	Health and Wellness	3
EX	240	First Aid and Emergency Care	2

Upper Division			**Credits**
EX	303	Anatomical Kinesiology	3

EX	309	Methods of Coaching	2
EX	346*	Training Room Methods	3
EX	365	Program Administration	2
EX	479	Psychology and Sport	3
EX	486C	Practicum-Coaching	3

*Additional course work may be required because of prerequisites.

Graduate Programs in Exercise and Sport Science
The department offers graduate programs leading to the master of science degree. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF FOOD SCIENCE AND HUMAN NUTRITION

Office in Gifford Building, Room 205
Professor Peter J. Bechtel, Head
The Department of Food Science and Human Nutrition is concerned with food from the time it leaves the farm until it is consumed by people. Included is the effect of good nutrition on health promotion and disease prevention. Because of the wide scope of departmental interests, it is the only department at Colorado State that is jointly administered by two colleges: the College of Agricultural Sciences and the College of Applied Human Sciences.

Three undergraduate majors, are offered leading to the bachelor of science degree: human nutrition and dietetics, restaurant and resort management described below, and food science and technology, which is described in the College of Agricultural Sciences section. At the graduate level, both M.S. and Ph.D, degrees are offered in food science and nutrition. For more information about the graduate program, refer to the *Graduate and Professional Bulletin.*

Major in Human Nutrition and Dietetics
The interest of the public in the relationship between good nutrition and health and fitness is at a high level and continues to increase. The field involves the integration and application of the biological, physical, and social sciences to the improvement of human nutrition leading to increased fitness. The field is both science oriented and human service oriented, and the need for individuals holding either a bachelor's or an advanced degree is high.

Careers range from nutritional consulting with an emphasis on working with people,'to basic research and teaching in nutrition science with a strong emphasis on the biological and physical sciences. In addition to the emphasis on nutrition, the dietetics concentration provides enough background in food service management to enable graduates to work in institutional or commercial food service. Students wanting to place primary emphasis on food service management in their program of study are advised to examine the major in restaurant and resort management, also offered in this department.

The individual graduating with the human nutrition and dietetics major will have gained a scientific understanding of the principles of human nutrition, the role of nutrition in disease, delivery of nutritional care, and the principles of nutrition assessment and food preparation. In addition to the other components of their University education, graduates will also know the techniques of interviewing, counseling, principles of information management, and effective communications.

Dietetics Concentration
Dietetics has two major dimensions: clinical nutrition and food service management. The dietetics concentration provides a broad background in both these areas along with supporting courses. It meets all the Didactic Program in Dietetics course requirements of the American Dietetic Association (ADA) for membership and is approved by ADA. To become ADA members, graduates need to complete a dietetic internship or an approved preprofessional practice program (AP4). For additional information refer to the *Graduate and Professional Bulletin.*

This concentration is designed particularly to prepare students for a dietetic internship and a professional career in dietetics or nutritional counseling. It also serves as preparation for graduate study.

Freshman Year			**Credits**
BY	102	Attributes of Living Systems	4
		or	
Z	110	Principles of Animal Biology	4
C	107, 108	Fundamental Chemistry. Laboratory	5
		or	
C	111, 113	General Chemistry I, II	7
		and	
C	112	General Chemistry Laboratory I	1
CO	150	College Composition	3

EC	100	Principles of Macroeconomics	3
		or	
EC	102	Principles of Microeconomics	3
FN	200	Food Selection, Preparation, and Preservation	3
FN	201	Food Preparation Techniques	2
IT	200	Professional Writing	3
		or	
SP	200	Public Speaking and Discussion	3
		or	
CO	301B	Intermediate Composition-Expository Writing in the Sciences	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
PY	100	General Psychology	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AP	100	Introductory Cultural Anthropology	3
		or	
AP	320	Nature of Culture	3
		or	
S	100	General Sociology;	3
AY	300/PS 300	Principles of Human Anatomy and Physiology	4
		or	
PS	310/Z 310	Fundamentals of Physiology	3
BD	140, 141	Computers in Business. Laboratory	3
		or	
CS	110	Personal Computing I	4
		or	
CS	150	Introduction to FORTRAN Programming	3
C	245, 246	Organic and Biological Chemistry, Laboratory	5
FN	310	Food Service Systems-Operations	5
FN	350	Human Nutrition	3
HD	101	Individual and Family Development	3
MB	300	General Microbiology	4
PS	302	Laboratory in Principles of Physiology	2

Junior Year			**Credits**
BA	210	Financial Accounting	3
		or	
FN	414	Food Service Systems-Operations Analysis	3
BC	301	Survey of Biochemistry	3
FN	311	Food Service Systems-Production and Purchasing	2
FN	360	Nutrition Assessment	3
FN	386	Practicum in Food Service Management	2
FN	410	Foods Theory and Application	3
FN	459	Nutrition in the Life Cycle	3

Senior Year			**Credits**
BN	300	Management Fundamentals	3
FN	428	Teaching Techniques in Nutrition	3
FN	440	Food Service Systems-Management	4
FN	450	Diet and Disease	4
FN	451	Community Nutrition	3
FN	492	Seminar in Nutrition	1
FT	447	Food Chemistry	2
ST	201	General Statistics	3
		or	
ST	204	Statistics for Business Students	2

Electives must include at least six credits selected from category 11I-A in the University Studies Program. Credits must be taken in at least two departments.

Nutritional Sciences Concentration
This concentration provides a strong background in natural and biomedical sciences as well as in nutrition, making it appropriate as preparation for graduate study and a career in nutritional research or college teaching. The concentration can form the basis for a premedical, predental, or preveterinary program, with a departmental adviser serving as preprofessional adviser. By addition of several elective courses, students can meet ADA course requirements making themselves eligible for dietetic internships and membership in ADA as well.

Following graduate study, students may enter college teaching or research. Other professional opportunities are in public health, nutrition education, Cooperative Extension, or nutrition consulting.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
		or	
BY	103A-B	Biology of Organisms	4
BY	102	Attributes of Living Systems	4
		or	
Z	110	Principles of Animal Biology	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
FN	200	Food Selection. Preparation. and Preservation	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
M	155	Calculus for Biological Scientists I	4
		Physical education/wellness	2

Sophomore Year			**Credits**
AY	300/PS 300	Principles of Human Anatomy and Physiology	4
		or	
PS	310/Z 310	Fundamentals of Physiology	3
C	341, 343	Organic Chemistry I, II	6
C	344	Organic Chemistry Laboratory	2
EC	100	Principles of Macroeconomics	3
		or	
EC	102	Principles of Microeconomics	3
FN	350	Human Nutrition	3
JT	200	Professional Writing	3
		or	
SP	200	Public Speaking and Discussion	3
		or	
CO 301 B		Intermediate Composition-Expository Writing in the Sciences	3
MB	300	General Microbiology	4
PS	302	Laboratory in Principles of Physiology	2
PY	100	General Psychology	3

Junior Year			**Credits**
B	350/Z 350	Molecular and General Genetics	3
BC	351, 352	Principles of Biochemistry, Laboratory	5
BY	310	Cell Biology	4
CS	110	Personal Computing I	4
		or	

CS	150	Introduction to FORTRAN Programming	3
FN	360	Nutrition Assessment	3
PH	121, 122	General Physics I, II	10

Senior Year			**Credits**
AP	100	Introductory Cultural Anthropology	3
		or	
AP	320	Nature of Culture	3
		or	
S	100	General Sociology	3
FN	428	Teaching Techniques in Nutrition	3
FN	450	Diet and Disease	4
FN	451	Community Nutrition	3
FN	459	Nutrition in the Life Cycle	3
FT	447	Food Chemistry	2
HD	101	Individual and Family Development	3
ST	301	Introduction to Statistical Methods	3
		Electives	3-4

Electives must include at least six credits selected from category 111-A in the University Studies Program. Credits must be taken in at least two departments.

Nutrition and Fitness Concentration

This concentration combines course work in both human nutrition and exercise science. Supporting courses are taken in the biological and physical sciences emphasizing human physiology, chemistry, and related subjects.

The curriculum is designed to prepare students for employment as nutrition and fitness counselors in both commercial establishments and public health settings or in private practice. It provides an excellent academic background on which to build a graduate program. By addition of several elective courses,

students can meet ADA course requirements making themselves eligible for dietetic internships and membership in ADA as well.

Freshman Year			**Credits**
BY	102	Attributes of Living Systems	4
		or	
Z	110	Principles of Animal Biology	4
C	107, 108	Fundamental Chemistry, Laboratory	5
		or	
C	111, 113	General Chemistry I, II	7
		and	
C	112	General Chemistry Laboratory I	1
CO	150	College Composition	3
EC	100	Principles of Macroeconomics	3
		or	
EC	102	Principles of Microeconomics	3
EX	123	Essentials of Physical Activity	2
FN	200	Food Selection, Preparation, and Preservation	3
FN	201	Food Preparation Techniques	2
JT	200	Professional Writing	3
		or	
SP	200	Public Speaking and Discussion	3
		or	
CO	301B	Intermediate Composition-Expository Writing in the Sciences	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
PY	100	General Psychology	3

Sophomore Year			Credits
AP	100	Introductory Cultural Anthropology	3
		or	
AP	320	Nature of Culture	3
		or	
HD	101	Individual and Family Development	3
		or	
S	100	General Sociology	3
AY	300/PS 300	Principles of Human Anatomy and Physiology	4
		or	
PS	310/Z 310	Fundamentals of Physiology	3
AY	301	Human Gross Anatomy	5
C	245, 246	Organic and Biological Chemistry, Laboratory	5
CS	110	Persona! Computing I	4
		or	
CS	150	Introduction to FORTRAN ' Programming	3
EX	111D	Physical Education Laboratory- Weight Training	1
FN	310	Food Service Systems-Operations	5
FN	350	Human Nutrition	3
MB	300	General Microbiology	4
PS	302	Laboratory in Principles of Physiology	2

Junior Year			Credits
BC	301	Survey of Biochemistry	3
EX	211A	Physical Education Laboratory- Aerobics	1
EX	240	First Aid and Emergency Care	2
EX	403	Physiology of Exercise	4
FN	360	Nutrition Assessment	3
FN	459	Nutrition in the Life Cycle	3
ST	201	General Statistics	3
		or	
ST	301	Introduction to Statistical Methods	3

Senior Year			Credits
EX	405	Exercise Testing Instrumentation	2
FN	428	Teaching Techniques in Nutrition	3
FN	450	Diet and Disease	4
.FN	451	Community Nutrition	3
FN	492	Seminar in Nutrition	1
FT	447	Food Chemistry	2
PS	420	Cardiopulmonary Physiology	3

Electives must include at least six credits selected from category 11I-A in the University Studies Program. Credits must be taken in at least two departments.

Major in Restaurant and Resort Management

The restaurant and resort management major combines special food service and lodging course work in the Department of Food Science and Human Nutrition. Courses in restaurant and resort management, basic food preparation principles, front desk and housekeeping operations, and hospitality marketing, in addition to an array of courses in business and an internship work experience provide a balanced curriculum. Course work provides a broad exposure to the liberal arts and sciences as they pertain to the hospitality industry. Elective credit allows students to tailor their own program of study to their particular career interest.

*The Department of Food Science and Human Nutrition maintains close ties with the restaurant and resort industry locally, statewide, and nationally in an effort to establish as many employment opportunities as possible. This expanding service industry encompasses commercial restaurants, cafeterias, hotels, and leisure-time industries such as clubs and resorts, health care facilities, and educational institutions.

The individual graduating with the restaurant and resort management major will have gained an understanding of the principles of food procurement and distribution systems, quality assurance, resort operations, and an understanding of the laws, regulations, and standards affecting restaurant and resort operations. Graduates will also have the business fundamentals of pricing and sales mix analysis, organization and personnel administration, cost control, financial management, and marketing. The use of computers in operations and effective oral and written communication are obtained in addition to the other components of their University education.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
		or	
Z	110	Principles of Animal Biology	4
C	107	Fundamental Chemistry	4
CO	150	College Composition	3
EC	100	Principles of Macroeconomics	3
FN	150	Survey of Human Nutrition	3
FN	200	Food Selection. Preparation. and Preservation	3
FN	201	Food Preparation Techniques	2
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
RM	101	Hospitality Industry	3
		Physical education/wellness	2

Sophomore Year			**Credits**
BA	210	Financial Accounting	3
BG	260	Legal Environment of Business	3
CS	110	Personal Computing I	4
EC	102	Principles of Microeconomics	3
FN	310	Food Service Systems-Operations	5
FT	320	Sensory Evaluation of Food	2
JT	200	Professional Writing	3
MB	149	The Microbial World	3
RM	200	Resort Operations	3
ST	204	Statistics for Business Students	2

Junior Year			**Credits**
AP	100	Introductory Cultural Anthropology	3
		or	
AP	320	Nature of Culture	3
		or	
S	100	General Sociology	3
BF	300	Principles of Finance	3
BK	300	Marketing	3
FN	311	Food Service Systems-Production and Purchasing	2
FN	386	Practicum in Food Service Management	2
FN	414	Food Service Systems-Operations Analysis	3
FT	330	Alcoholic Beverage Technology and Control	2
FT	400	Food Safety	3
RM	350	Restaurant and Resort Marketing	3
SP	200	Public Speaking and Discussion	3

Senior Year			**Credits**
BN	320	Organization Management	3
BP	310	Human Resource Management	3
EC	300/EA 300	Managerial Economics	3
FN	440	Food Service Systems-Management	4
RM	415	Catering Techniques and Culinary Arts	3
RM	492	Seminar on Restaurant and Resort Management	3

Electives must include at least six credits selected from category III-A in the University Studies Program. Credits must be taken in at least two departments.

Minor Programs

Minors are offered in nutrition and restaurant and resort management. Each of these curricula have a significant number of prerequisites that should be examined carefully before selecting a minor in this department. Although open to any interested student, the nutrition minor would be most easily taken by students majoring in a basic science such as physical or biological sciences, and the restaurant and resort management minor is most appropriate for a business major. Neither of these minors can be considered to provide professional-level competence in the stated area. However, they do provide an opportunity for a nonmajor to gain a significant orientation to an applied food- or health-related field.

Minor in Nutrition

Upper Division			**Credits**
AY	300	Principles of Human Anatomy	
PS	300*	and Physiology	4
BC	301*	Survey of Biochemistry	3
		or	
BC	351*	Principles of Biochemistry	4
FN	350*	Human Nutrition	3
FN	360*	Nutrition Assessment	3
FN	450	Diet and Disease	4
FN	451	Community Nutrition	3
FN	459	Nutrition in the Life Cycle	3

Minor in Restaurant and Resort Management

Lower Division			**Credits**
FN	200*	Food Selection. Preparation, and Preservation	3
RM	101	Hospitality Industry	3
RM	200	Resort Operations	3

Upper Division			**Credits**
FN	310	Food Service Systems-Operations	5
FN	311*	Food Service Systems-Production and Purchasing	'2
FN	386	Practicum in Food Service Management	'2
FN	414	Food Service Systems-Operations Analysis	3
FN	440	Food Service Systems-Management	4
RM	350	Restaurant and Resort Marketing	3

* Additional course work may be required because of prerequisites.

DEPARTMENT OF HUMAN DEVELOPMENT AND FAMILY STUDIES

Office in Gilford Building, Room 102
Professor Raymond Yang, Head

Major in Human Development and Family Studies
Human development and family studies is an inter-disciplinary department focusing on the development of families and individuals across the lifespan. Students learn to identify factors that influence cognitive, emotional, social, and physical development through infancy, childhood, adolescence, adulthood, and later adulthood in the contexts of culture and family.

In addition to courses in general education and the human development and family studies core requirements, each student, with the assistance of an academic adviser, completes a block of courses more individually related to their lifespan and career interests. Through this course work and supervised field experience, students gain skills in objective observation, needs assessment, program development and implementation, and social policy formation as these relate to diverse populations.

Graduates from human development and family studies work in a variety of human service settings. These include youth services organizations; early childhood, elementary, and parent education programs; allied health care settings; juvenile and adult corrections; family and community services; and long-term care facilities. Graduates are also well prepared to pursue an advanced degree in the behavioral and social sciences, or other professional programs.

In accordance with University guidelines regarding the outcome assessment of all students, seniors complete a capstone seminar. This is designed to allow students the opportunity to demonstrate their skills in oral and written communication, principles of human development and family studies, research methodology, and the professional skills necessary in human services settings.

Freshman Year			**Credits**
C		Chemistry with laboratory	4-5
CO	150	College Composition	3
FN	150	Survey of Human Nutrition	3
HD	101	Individual and Family Development	3
M		Mathematics	3
PY	100	General Psychology	3
S	100	General Sociology	3
		or	
S	105	Social Problems in Contemporary Society	3
Z	101	Humans and Other Animals	3
		or	
Z	110	Principles of Animal Biology	4
		Behavioral and social sciences/	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AY	300/PS 300	Principles of Human Anatomy and Physiology	4
		or	
HD	254/AY 254	Biological Aspects of Human Development	3
		or	
PY	454A	Physiological Psychology	3
HD	211	Infancy and Childhood	3
HD	277	Professional Skills Development I	2
HD	286	Practicum	1
HD	321	Marriage and Family Relationships	3
S	310	Quantitative Sociological Analysis	3
		or	
ST	201	General Statistics	3

SP	200	Public Speaking and Discussion	3
		Arts and humanities'	6-8
		One lifespan option course	2-3
		One career option course 4'	2-3
		Electives	3-6

Junior Year			**Credits**
HD	311	Adolescence	3
HD	334	Parenting-Theory and Application	3
HD	375	Children's Programming/Curriculum Development	3
		or	
SW	320	Interviewing Methods	3
HD	376	Professional Skills Development II	3
HD	387	Internship I	3-5
		One lifespan option course 4- 5	2-3
		One career option course 4'	2-3
		Electives	6

Senior Year			**Credits**
HC	411	Families and the Legal Environment	2
HD	322	Adult Development and Aging	3
HD	434	Family Studies	3
HD	492	Seminar	3
		Three lifespan option courses 4' 5	6-9
		Four career option courses'	8-12
		Electives	6

1. C 103, C 104 or above.

2. Select from AP, EC, GR, HY, IE, and PO courses in category IV-A in the University Studies Program.

3. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

4. Each student is to take 5 courses (a minimum of I I credits) from one lifespan option (infancy and childhood. adolescence. or adulthood and aging). Additionally, each student is to take 6 courses (a minimum of 13 credits) from one career option (early childhood education. community services, or child life).

5. The elementary education requirements may be different:consult with the departmental adviser.

Composite Option in Human Development and Family Studies with Elementary Education

In cooperation with Metropolitan State College in Denver, a student may choose a composite option in human development and family studies leading to certification in elementary education. This course of study normally requires two semesters at Metropolitan State College (equivalent to the student's senior year), and also includes a semester of student teaching. Two tracks, leading to certification, are possible: (1) preschool through second grade or (2) kindergarten through sixth grade. The bachelor of science degree is granted by Colorado State University, and elementary teacher certification can be applied for through the State Department of Education. A student should seek special departmental advisement early in this program of study.

Information on the courses required is available in the Department of Human Development and Family Studies at Colorado State. Students are not allowed to take more than 18 credits per semester at Metropolitan State without petitioning. Students must attain a 2.75 GPA prior to admission to Metropolitan State.

Minor in Human Development and Family Studies

This department provides a minor which emphasizes a broad interdisciplinary, lifespan approach to individual and family change over time, The minor requires a minimum core of 21 credits of which 15 credits are specified.

Lower Division			**Credits**
HD	101	Individual and Family Development	3
HD	211	Infancy. and Childhood	3

Upper Division			**Credits**
HD	311*	Adolescence	3
HD	321*	Marriage and Family Relationships	3
		or	
HD	434*	Family Studies	3
HD	322*	Adult Development and Aging	3
HD		Human development and family studies (at least three credits must be upper division)	6

* Additional course work may be required because of prerequisites.

GRADUATE PROGRAM IN HUMAN Development and Family Studies

The Department of Human Development and Family Studies offers a course of study leading to the master of science degree. Areas of emphasis include developmental processes, individual and family programming, and marriage and family therapy. A description of this program may be found in the *Graduate and Professional Bulletin,*

DEPARTMENT OF INDUSTRIAL SCIENCES

Office in Guggenheim Hall, Room 105
Professor John R. Suitera, Head

The department offers three majors - construction management, industrial sciences and technology, and industrial technology - which lead to a bachelor of science degree.

Industrial sciences integrates the technical and managerial phases of the construction and manufacturing industries. Students majoring in an industrial sciences program take a curriculum balanced between mathematics, physical sciences, arts and humanities, behavioral and social sciences, business, management, and technology. To supplement the academic program, students are encouraged to pursue cooperative education/internship opportunities by appropriate arrangements between the department and selected industries. Students are primarily educated for responsible positions in production management, scheduling, estimating, product development, construction project management, and teaching.

Students in the Department of Industrial Sciences will participate in the department's outcomes assessment process in three areas: (1) general testing in selected courses to determine subject matter knowledge, skills, and competency; (2) a required senior survey in which attitudes and academic experience are evaluated; and (3) an alumni survey on the value of University and department experiences in meeting career goals and plans.

Major in Construction Management
This interdisciplinary curriculum provides a background in the physical sciences, mathematics, engineering and architectural principles, construction administration, and construction technology. Technical education is enriched with courses in business, management, communications, arts and humanities, and behavioral and social sciences. This broad diversification provides the technical base needed for immediate employment as well as the managerial concepts for career development.

Graduates enter various phases of the construction industry. Initial employment positions may be in cost control, estimating, field engineering and supervision, and scheduling. In allied fields, positions are available in construction financing, construction product sales. quality control, and safety management. Students are encouraged to acquire construction experience before graduation.

The program is affiliated with the Associated Schools of Construction and follows guidelines of the Associated General Contractors-Associated Schools of Construction Joint Construction Education Committee. It is accredited by the American Council for Construction Education.

Freshman Year			**Credits**
CO	150	College Composition	3
CS	110	Personal Computing I	4
EC	100	Principles of Macroeconomics	3
		or	
EC	102	Principles of Microeconomics	3
IS	130	Drafting Fundamentals	2
IS	132	Construction Graphics	2
IS	160	Construction Materials and Techniques	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
		Arts and humanities	3
		Behavioral and social sciences 2	3
		Natural sciences	3
		Physical education/wellness	1

Sophomore Year			Credits
BG	260	Legal Environment of Business	3
CE	256	Statics for Nonengineers	3
IS	232	Architectural and Construction Planning	4
IS	261	Construction Surveying	3
IS	263	Construction Equipment and Methods	3
M	160	Calculus for Physical Scientists I	4
PH	121	General Physics I	5
SP	200	Public Speaking and Discussion	3
ST	204	Statistics for Business Students	2
		Arts and humanities	3
		Physical education/wellness	1

Junior Year			Credits
BA	210	Financial Accounting	3
BN	300	Management Fundamentals	3
CE	358	Mechanics of Materials for Nonengineers	3
CE	364	Properties of Construction Materials	2
CE	370	Elementary Structural Design	4
IS	360	Building-Electrical and Plumbing Systems	3
IS	362	Construction Contracts	2
IS	364	Commercial Construction Procedures	3
IS	365	Construction Estimating	4

Senior Year			Credits
BP	471	Labor Relations and Collective Bargaining	3
CE	350	Soil Engineering for Nonengineers	3
F	432	Design of Wood Structures	4
IS	317	Safety Management	2
IS	361	Building-Environmental Systems	3
IS	461	Construction Project Scheduling and Cost Control	4
IS	464	Construction Project Administration	3
JT	200	Professional Writing	3
		or	
JT	300	Technical Communication	3
		or	
JT	301	Business Communication	3
ME	310	Engineering Economy	2
		Business. upper division	3

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

3. Select from list of courses in category 11-A in the University Studies Program, excluding PH courses.

Minor in Construction Management

This program is designed to provide students an opportunity to study the basic concepts of construction materials, techniques, design, and management necessary to function in the construction industry. Total credits required are 30.

Lower Division			Credits
IS	130	Drafting Fundamentals	2
IS	132	Construction Graphics	2
IS	160	Construction Materials and Techniques	3
IS	232	Architectural and Construction Planning	4

Upper Division			Credits
IS	362	Construction Contracts	22
IS	364	Commercial Construction Procedures	3
IS	365*	Construction Estimating	4
IS	461	Construction Project Scheduling and Cost Control	4

Select six credits from the following:

BF	360*	Real Estate Principles	3
IS	361	Building-Environmental Systems	3
IS	464	Construction Project Administration	3
IS	466	Systems Building and Land Planning	2

* Additional course work may be required because of prerequisites.

Major in Industrial Sciences and Technology

The industrial sciences and technology curriculum provides graduates with the background necessary to become employed in educational settings related to applied technology in secondary schools and industry. The major emphasis is on teacher education; however, students may elect a concentration in industrial training. The technology education concentration requires 128-135 credits.

Approximately two thirds of the graduates are employed by secondary schools where they teach theoretical and abstract knowledge along with opportunities lot practical experience using technology. The other one third are employed in a variety of industry-oriented positions.

Adult Technical Education Concentration

Individuals with technical experience are prepared by this concentration to teach in technical education/ training programs at the postsecondary level in public, proprietary, and military settings. Refer to the School of Occupational and Educational Studies in this section of the catalog for information regarding the work experience requirement.

			Credits
General Education			**42**
CO	150	College Composition	3
M		Mathematics	3
PY	100	General Psychology	3
SP	200	Public Speaking and Discussion	3
		Arts and humanities	6
		Arts and humanities. behavioral and social sciences, natural sciences 2	9
		Behavioral and social sciences	3
		Logic and critical thinking	3
		Natural sciences 5	7
		Physical education/wellness	2

	Credits
Technical Specialty	**30**

Credit allowed for work experience and the competency examination may be used to meet this requirement up to a maximum of 30 credits. If the total work experience credit awarded is less than 30 credits. appropriate courses will be selected from the major specialty or closely related field. Work experience credits will be allocated equally to the junior and senior years.

			Credits
Professional Preparation			**56**
ED	355	Educational Psychology	3
		or	
PY	340	Organizational Psychology	3
		or	
PY	440	Industrial Psychology	3

VE	300	Principles of Vocational Education	2
VE	370	Laboratory Management, Safely. and Liability	3
		or	
IS	317	Safety Management	2
		or	
IS	472	Laboratory Organization and Management	2
VE	408	Methods and Evaluation of Instruction	4
VE	465	Competency-Based Curricula	3
VE	466	Innovative Teaching and Materials	3
VE	486E	Practicum-Technical Education	8
VE	492	Seminar	2
		Advanced technical electives	10
		Professional electives	10
		Electives	8-9

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select a minimum of five credits from categories II-IV A or B. Credits must be taken in at least two departments, excluding VE courses. An additional five credits must be taken in categories I-IV A or B.

3. Select from list of courses in category IV-A in the University Studies Program. excluding PY courses.

4. Select from list of courses in category I-C in the University Studies Program.

5. Select from list of courses in category 11-A in the University Studies Program. At least one course must have a formal laboratory and credits must be taken in at least two prefixes.

6. Industrial science courses or approved substitutions. All students must complete a minimum of nine semester credits in industrial sciences.

7. Select from one or more of the following areas: adult education. computer application. human resources development, industrial relations, industrial sciences, vocational education.

Industrial Training Concentration

Freshman Year			**Credits**
C	103, 104	Chemistry and Society. Laboratory	4
		or	
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
CS	110	Personal Computing I	4
IS	102	Technology and Society	1
IS	130	Drafting Fundamentals	2
IS	143	Energy and Transportation Systems	3
IS	152	Industrial Materials	3
IS	154	Product Design and Fabrication	3
M	120, 121	College Algebra I, II	2
M	125	Numerical Trigonometry	11
		Arts and humanities I, II	3
		Physical education/wellness	2

.

Sophomore Year			**Credits**
EC	100	Principles of Macroeconomics	3
IS	133	Introductory Computer Graphics	3
IS	142	Electricity/Electronics	3
IS	160	Construction Materials and Techniques	3
IS	242	Linear Circuit Applications	3
		or Electronics elective	3

IS	252	Manufacturing Processes	3
IS		Technical electives	3
PH	110	Descriptive Physics	3
		or	
PH	121	General Physics I	5
PY	100	General Psychology	3
SP	200	Public Speaking and Discussion	3

Junior Year			**Credits**
BA	210	Financial Accounting	3
IS	317	Safety Management	2
IS	371	Principles of Technology Education	2
IS	374	Technology Applications	3
IS	471	Methods of Teaching Technology Education	2
IS	472	Laboratory Organization and Management	2
JT	300	Technical Communication	3
		or	
JT	301	Business Communication	3
PY	340, 341	Organizational Psychology, Laboratory 2	4
		or	
PY	440, 441	Industrial Psychology, Laboratory	4
		Arts and humanities	3
		Technical electives from departmental list	6
		Upper-di vision elective	3

Senior Year			**Credits**
ED	410	Audiovisual Methods and Materials	2
IS	474	Product Development and Manufacturing	3
IS	487	Internship	6
		Technical electives from departmental list	12
		Upper-division electives	6-9

1. Select from list of courses in category 11I-A in the University Studies Program. Credits must be taken in at least two departments. Students may substitute ED 255 and ED 355.

Technology Education Concentration

Freshman Year			**Credits**
C	103, 104	Chemistry and Society, Laboratory	4
		or	
C	107, 108 *	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
CS	110	Personal Computing I	4
IS	102	Technology and Society	1
IS	130	Drafting Fundamentals	2
IS	143	Energy and Transportation Systems	3
IS	152	Industrial Materials	3
IS	154	Product Design and Fabrication	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
		or	
M	125	Numerical Trigonometry	1
		Arts and humanities	3
		Physical education/wellness	1
		Professional elective	3

Sophomore Year			**Credits**
ED	255	Introduction to Education	2
IS	133	Introductory Computer Graphics	3
IS	142	Electricity/Electronics	3
IS	160	Construction Materials and Techniques	3
IS	205	Occupational and Recreational Materials	3

IS	252	Manufacturing Processes	3
PH	110	Descriptive Physics	3
		or	
PH	121	General Physics I	5
PY	100	General Psychology	3
SP	200	Public Speaking and Discussion	3
		Behavioral and social sciences/	3
		Physical education/wellness	1
		Technical electives from departmental list	4

Junior Year			**Credits**
ED	355	Educational Psychology	3
ED	401A	Teaching Classroom Reading/Literacy Skills	2
ED	428	Exceptionality, Diversity, and Human Relations	3
ED	450	Methods and Evaluation of Instruction	4
ED	451	Microteaching Laboratory	1
ED	486C	Practicum-Exceptionality and Diversity	1
IS	242	Linear Circuit Applications	3
IS	317	Safety Management	2
IS	371	Principles of Technology Education	2
IS	374	Technology Applications	3
IS	471	Methods of Teaching Technology Education	2
IS	472	Laboratory Organization and Management	2
		Arts and humanities	3
		Technical electives from departmental list	3.

Senior Year			**Credits**
ED	485B	Student Teaching-Secondary	15
ED	493	Seminar In Professional Relations	1
IS	474	Product Development and Manufacturing	3
		Behavioral and social sciences'	3
		Professional elective?	1-3
		Technical electives from departmental list	4
		Elective	1-3

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select a minimum of five credits from categories II-IV B in the University Studies Program specifically in humanities, social sciences, science. mathematics, psychology, or journalism. Credits must be taken in at least two departments.

3. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

4. Students must complete 100 clock hours of approved field experiences before student teaching.

Trade and Industrial Education Concentration Individuals with business and industrial experience are prepared by this concentration to teach in vocational trade and industrial education programs at the secondary level in public and proprietary schools. Refer to the School of Occupational and Educational Studies in this section of the catalog for information regarding the work experience requirement.

General Education			**Credits 42**
CO	150	College Composition	3
M		Mathematics	3
PY	100	General Psychology	3
SP	200	Public Speaking and Discussion	3

Arts and humanities	6
Arts and humanities, behavioral and social sciences, and natural sciences"	9
Behavioral and social sciences	3
Logic and critical thinking	3
Natural sciences	7
Physical education/wellness	2

	Credits
Trade Specialty	**30**

Credit allowed for work experience and the competency examination may be used to meet this requirement up to a maximum of 30 credits. If the total work experience credit awarded is less than 30 credits, appropriate courses will be selected from the major specialty or closely related field. Work experience credits will be allocated equally to the junior and senior years.

			Credits
Professional Preparation			**56**
ED	355	Educational Psychology	3
ED	401 A	Teaching Classroom Reading Literacy Skills	2
ED	428	Exceptionality, Diversity, and Human Relations	3
ED	486C	Practicum-Exceptionality and Diversity	1
VE	30(3	Principles of Vocational Education	2
VE	370	Laboratory Management, Safety, and Liability	3
		or	
IS	317	Safety Management	2
		or	
IS	472	Laboratory Organization and Management	2
VE	386	Practicum	1
VE	402	Student Organizations in Vocational Education	2
VE	408	Methods and Evaluation of Instruction	4
VE	465	Competency-Based Curricula	3
VE	466	Innovative Teaching and Materials	3
VE	485	Student Teaching	12
		or	
VE	486F	Practicum-Trade and Industrial Education	8
VE	492	Seminar	2
		Advanced technical electives	10
		Electives	5-10

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select a minimum of five credits from categories II-IV A or B. Credits must be taken in at least two departments, excluding VE courses. An additional five credits must be taken in categories I-IV A or B.

3. Select from list of courses in category IV-A in the University Studies Program, excluding PY courses.

4. Select from list of courses in category I-C in the University Studies Program.

5. Select from list of courses in category 11-A in the University Studies Program. At least one course must have a formal laboratory and credits must be taken in at least two prefixes.

6. Industrial science courses or approved substitutions. All students must complete a minimum of nine semester credits in industrial sciences.

Major in Industrial Technology

This interdisciplinary curriculum is designed for students pursuing midmanagement careers in industrial technology related positions.

A functional knowledge and understanding of industrial materials and production processes, the physical sciences, communication skills, mathematics, computer sciences, safety procedures, human relations, engineering, quality control, management, and technology enables the graduate to respond effectively to the industrial-technical-managerial requirements in industry.

Graduates from the program find initial employment in supervision, production, materials control, CAD/ CAM, cost control, quality control, and product sales. Students are encouraged to acquire industrial experience in manufacturing firms before graduation.

M 120 and M 121 are considered review courses; these courses may be taken as electives.

The program is accredited by the National Association of Industrial Technology and affiliated with the Society of Manufacturing Engineers. and the Association of Quality Control.

Freshman Year			**Credits**
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
CS	110	Personal Computing 1	4
EC	102	Principles of Microeconomics	3
IS	142	Electricity/Electronics	3
IS	152	Industrial Materials	3
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
		Arts and humanities	3
		Behavioral and social sciences:	3
		Physical education/wellness	2

Sophomore Year			**Credits**
BG	260	Legal Environment of Business	3
CE	256	Statics for Nonengineers	3
IS	133	Introductory Computer Graphics	3
IS	210	Quality Improvement Techniques	3
IS	242	Linear Circuit Applications	3
IS'	244	Fluid Power	3
IS	252	Manufacturing Processes	3
M	141	Calculus in Management Sciences	3
		or	
M	160	Calculus for Physical Scientists I	4
PH	121	General Physics 1	5
		or	
PH	141	Physics for Scientists and Engineers I	5
SP	200	Public Speaking and Discussion	3

Junior Year			**Credits**
BL	300	Production Fundamentals	3
BN	300	Management Fundamentals	3
CE	358	Mechanics of Materials for Nonengineers	3
EC	300/EA 300	Managerial Economics	3
IS	233	Manufacturing Graphics	3
IS	310	Process Planning and Costing	3
IS	317	Safety Management	2
IS	318	Manufacturing Facilities Planning	3
IS	342	Industrial Electronics Control Circuits	3
IS	352	Advanced Manufacturing Processes	3
ST	301	Introduction to Statistical Methods	3

Senior Year			**Credits**
BL	471	Production Scheduling and Inventory Management	3

IS	333	Industrial-Mechanical Design	3
IS	353	Industrial Plastics	3
IS	410	Modern Manufacturing Management Strategies	3
IS	442	Digital and Microprocessor Controls	3
IS	452	Specialized Manufacturing Processes	3
JT	300	Technical Communication	3
		or	
JT	301	Business Communication	3
		Arts and humanities'	3
		Upper-division business elective	3
		Electives	4-5

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

Graduate Programs in Industrial Sciences

The Department of Industrial Sciences offers graduate programs leading to a master of science degree. Programs are designed for students with specialized studies in industrial sciences and technology education, construction management, and manufacturing/ industrial technology. Programs are designed to meet the individual needs of students with courses reflecting the currently accepted principles and techniques for solving problems in industry and education. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF OCCUPATIONAL THERAPY

Office in Occupational Therapy Building, Room 200
Professor Margaret Short DeGraff, Head
Occupational therapy, a health profession, is devoted to rehabilitation of persons with physical, emotional, social, developmental, and/or learning disabilities. Occupational therapists use activity and action as therapeutic media by which persons with special needs can influence their own state of health. Emphasis is placed on remediation and/or prevention of conditions which interfere with a person's achievement of maximum functioning and independent living skills. Occupational therapists work in many settings including hospitals, outpatient clinics, rehabilitation centers, community agencies, public/ private schools, home care, and in private practice. Entry to the profession requires a degree from an accredited program, a range of 6 to 12 months clinical internship, and successful completion of a national certification examination.

Formative evaluation processes have been implemented *by* the occupational therapy faculty to evaluate students' acquisition of learning objectives and curriculum goals/competencies. These processes include students' completion of course requirements; tests designed to measure the achievement of defined course objectives; and students' evaluation of each course. Summative evaluation processes conducted annually assess curricular outcomes, and include National Certification Examination for Occupational Therapists, Fieldwork Evaluation, and Student Evaluation of Fieldwork.

Major in Occupational Therapy

The undergraduate major consists of a two-year preprofessional course of study at the freshman and sophomore levels, and a two-year professional curriculum at the junior and senior levels. Additionally. full-time clinical fieldwork is scheduled and contracted by Colorado State for students in the program. The clinical fieldwork requirements are taken post degree in one or more of the 200 Colorado State-contracted clinical organizations.

The Occupational Therapy Program is accredited by the Committee on Allied Health Education and the American Medical Association in conjunction with the Accreditation Committee of the American Occupational Therapy Association. Graduates of the program are eligible to sit for the national certification examination for occupational therapists administered by the American Occupational Therapy Certification Board. After successful completion of this exam, the individual will be an Occupational Therapist, Registered (OTR). Many states require licensure in order to practice, but state licenses are usually based on the results of the AOTCB Certification Exam.

Preprofessional Curriculum

The two-year preprofessional course of study provides general education in sciences, arts and humanities, and beginning course work in occupational therapy. Students may complete their preprofessional training at any accredited institution; however, courses must be substantially equivalent in subject content and level to those required at Colorado State. Specific inquiries regarding equivalent or substitute courses should be directed to the Department of Occupational Therapy Advising Office or the Office of Admissions and Records' Transfer Evaluation section.

The minimum requirements for admission to the professional program include a total of 64 semester credits with successful completion of the following requirements:

Freshman Year			**Credits**
BY	102	Attributes of Living Systems	4
		or	
Z	110	Principles of Animal Biology	4
C	103	Chemistry and Society	3
		or	
C	107	Fundamental Chemistry	4
CO	150	College Composition	3
HD	101	Individual and Family Development	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1

		or	
M	125	Numerical Trigonometry	1
OT	110	Introduction to Occupational Therapy	3
PH	110	Descriptive Physics	3
		or	
PH	121	General Physics I	5
PY	100	General Psychology	3
S	100	General Sociology	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AY	300/PS 300	Principles of Human Anatomy and Physiology	4
AY	301	Human Gross Anatomy	5
IS	205	Occupational and Recreational Materials	3
IS	206	Occupational and Recreational Woods . 3	
OT	215	Medical Terminology	1
PL		Philosophy	3
ST		Statistics	3
		Arts and humanities	3
		Communication	3

1. Select from departmental list.

2. Select from list of courses in category III-A in the University Studies Program. excluding PL. courses.

3. Select from list of courses in category' I-D in the University Studies Program.

Professional Curriculum
Procedures for Admission to the Professional Program
Eligibility for application to the professional program includes:

1. A cumulative grade point average (GPA) of 2.70 or higher (A=4.00) for the most recent 45 semester credits (68 quarter credits);

2. A minimum of 27 semester credits (41 quarter credits).and ability to complete 64 semester credits (96 quarter credits) by the fall of entrance; and

3. The ability to complete the preprofessional course of study (see above) prior to the fall of entrance.

4. Work or volunteer experience with people with disabilities, and with OT practitioners.

Both Colorado resident and nonresident applicants are considered for admission. Enrollment is limited, and meeting minimum requirements does not guarantee admission to the professional program. Admission is based on academic and personal qualifications considered to be necessary for successful practice as an occupational therapist.

Application forms for admission to the Professional Occupational Therapy Curriculum are available after November 1 *only* from the Department of Occupational Therapy. Instructions accompanying the application form describe the application and selection process, requirements, and deadline dates. A $40 nonrefundable processing fee must accompany the application. Applicants also must submit two official transcripts coveting all work taken from each university or college attended. No pan of the previous collegiate record may be disregarded.

The department's admissions evaluation system is based upon a variety of factors, including: past academic records (GPA), and personal interests and characteristics including diversity. The GPA and other selection data are ranked and 70-75 persons are selected for the professional program. The candidates with the highest composite scores are notified of their selection. The 25-30 applicants with the next highest composite scores are placed on an alternate list. Alternates are notified if a position becomes available. Applicants are notified of selection results in March.

WICHE Affiliation

The state of Colorado and its agent. Colorado State, are affiliated with the Western Interstate Commission for Higher Education (WICHE). Under this plan, students may be selected from other WICHE states for the professional curriculum in occupational therapy. For WICHE application procedures, see WICHE in The University Section in this catalog.

Professional Occupational Therapy Curriculum

The professional curriculum in occupational therapy emphasizes theoretical and practical aspects of developing clinical competence as well as courses in neurology and psychology. Majors should be prepared to pay special course fees, purchase professional resource materials, and pay costs for field-work requirements. In addition, students in the curriculum must purchase professional liability insurance.

Junior Year			**Credits**
AY	445	The Human Brain and Its Disorders	3
OT	305	Sensorimotor Adaptation	3
OT	306	Theory and Practice in Pediatrics	4
OT	315	Survey of Human Disease	3
OT	330	Introduction to Treatment Planning	4
OT	335	Purposeful Activity and Action	3
OT	350	Concepts and Issues in Practice	2
OT	386	Practicum-Preparation for OT Practice. I	
PY	320	Abnormal Psychology	3
PY	325	Psychology of Personality	3

Senior Year			**Credits**
OT	425, 430	Theory and Practice-Psychosocial Dysfunction I, II	7
OT	435, 440	Theory and Practice in Physical Dysfunction I, II	8
OT	465	Theory and Practice in Gerontology	2
OT	475	Administration and Professional Issues	2
OT	486A-E	Practicum-OT Treatment	3

1. HD 211. HD 311. and HD 322 (nine credits) may be substituted for PY 325.

Graduate Programs in Occupational Therapy

The department offers both a professional master of science degree program in occupational therapy (entry level) for persons with degrees in other fields, and a post professional master of science degree program for persons with undergraduate degrees in occupational therapy. Applications and inquiries should be made to the Department of Occupational Therapy. A description of the programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF SOCIAL WORK

Office in Eddy Building, Room 202
Professor Ben P. Granger, Head

Major in Social Work
Social workers and social welfare programs help individuals, families, groups, and communities meet basic human needs. This generalist curriculum, which leads to the bachelor of arts degree, prepares students for employment in public and private agencies and community programs, and for admission to graduate school. Many social work graduate programs offer Colorado State graduates advanced standing or equivalent credit. The program provides a humanities and social sciences base for students not seeking a social work career. Students majoring in other areas find courses that orient them to various human service fields.

Students directly apply classroom knowledge, skills, and social work philosophy through a 6-credit planned practicum in the sophomore year and a 10-credit practicum (field work placement) in a social work agency or program, under an instructor, in the senior year. Some agencies and programs available for fieldwork in urban and rural settings are: hospitals, neighborhood centers, rehabilitation and mental health services, child welfare and public welfare programs, school social work, adolescent residential care and geriatric centers, and correction programs.

The primary mission of the program at Colorado State is to prepare students for entry-level professional practice in social work; a secondary objective is preparation for admission to graduate school. Outcomes assessment is based upon a number of measures indicating readiness for practice and acceptance of the responsibilities of professional practice, e.g., values, ethics.

The social work program is accredited at the baccalaureate level by the Council on Social Work Education. Upon graduation, students may join the professional organization, the National Association of Social Workers. Student membership is available for juniors and seniors.

See Courses of Instruction section in this catalog for prerequisites.

			Credits
Social Work			**50**
(Maximum of 60 credits allowed toward graduation)			
S	311	Methods of Sociological Inquiry	3
SW	150	Introduction to Social Work	4
SW	233	Systems Perspective for Social Work	3
SW	286A-B	Practicum (2 semesters)	6
SW	320	Interviewing Methods	3
SW	321	Generalist Social Work Perspective	3
SW	322	Generalist Activities and Skills for Practice	3
SW	330	Human Diversity Practice Issues	3
SW	350	Agency-Based Social Work Practice	3
SW	410	Social Welfare Policy	3
SW	470	Generalist Social Work Practice Application	3
SW	488	Field Placement	10
SW	492	Seminar	3

Select an additional course in racial/ ethnic or women's issues from a list approved by the department.

General Requirements			**Credits**
CO	150	College Composition	3
M		Mathematics	3
S	310	Quantitative Sociological Analysis	3
		or	
ST	201	General Statistics	3
		or	
ST	311	Statistics for Behavioral Sciences 1	3

		Communication	3
		Physical education/wellness	2

Arts and Humanities 2			**12**
Behavioral and Social Sciences			**Credits**
HD	101	Individual and Family Development	3
S	100	General Sociology	3
		or	
S	105	Social Problems in Contemporary Society	3
		Behavioral and social sciences	12

Natural Sciences 4			**Credits**
BY	102	Attributes of Living Systems	4
		or	
Z	110	Principles of Animal Biology	4

1. Select from list of courses in category I-D in the University Studies Program.

2. Select six lower-division and six upper-division credits in category 111 in the University Studies Program. Credits must be taken in at least two departments and a mini mum of six credits must be taken in subcategory A.

3. Select three lower-division and nine upper-division credits in category IV-A or IV-B in the University Studies Program. At least one course must be taken in each of the following areas: psychology;economics or political science; and anthropology or history. A minimum of six credits must be taken in subcategory A.

4. Select an additional three credits from list of courses in category II-A in the University Studies Program. The seven required credits in this category mast be taken in a minimum of two prefixes.

Graduate Programs in Social Work

The department offers an M .S.W. degree, accredited by the Council on Social Work Education, with a specialization in advanced generalist practice in rural and transitional communities. A description of this program may be found in the *Graduate and Professional Bulletin.*

COLLEGE OF BUSINESS

Office in Clark Building, Room B 217
Professor James C. Heird, Interim Dean
Professor Jon D. Clark, Acting Associate Dean

UNDERGRADUATE CONCENTRATIONS IN BUSINESS ADMINISTRATION
Accounting
Finance-Real Estate
General Business/Entrepreneurship
Information Systems
Management
Marketing

The College of Business is a member of the Accreditation Council of the American Assembly of Collegiate Schools of Business. Undergraduate and graduate programs are accredited by the AACSB and lead to bachelor of science, master of science, and master of business administration degrees.

Major in Business Administration
Preparing students for positions of business leadership is the primary purpose of the undergraduate curriculum. Additional objectives are to prepare students to teach business subjects in secondary school s, and to provide opportunities for nonbusiness majors to gain an understanding of the business environment as well as specific business and management activities.

The four-year curriculum leads to a bachelor of science degree with a major in business administration. Lower-division work provides a cultural and analytical foundation. Upper-division work provides sufficient specialized work in business and management to prepare students to enter their chosen field in the business world. At the same time, the program attempts to develop the attitudes and analytical ability required for future professional advancement.

Students graduating from the College of Business are expected to have obtained knowledge of the concepts, processes, and institutions involved in the production and marketing of goods and services. Students will understand the financing of organizations and the economic, legal, ethical, social, and organizational influences as they affect such organizations. The graduate is expected to have developed skills in the application of quantitative methods along with information systems and interpersonal communications. The attainment of these goals will be assessed through a senior capstone course. In the capstone course, students will integrate concepts and apply analytic skills to case studies of administrative processes under conditions of uncertainty.

All undergraduate business majors must complete 64 credits of nonbusiness courses as part of their graduation requirement. Coordinated with this general education, all business students take 33 credits of business core subjects plus a concentration with its specified course sequence. Fifty percent of the total credits required for the business core and concentration must be completed at Colorado State University.

Beginning with the junior year, each student selects an area of concentration in one of the following fields: accounting, finance-real estate, general business/entrepreneurship, information systems, management, or marketing. Additionally, students may qualify to teach business subjects at the secondary and postsecondary levels by completing the requirements for the business education and marketing education teacher certification and credentialing program. Admission to teacher certification is through the School of Occupational and Educational Studies, College of Applied Human Sciences.

The College of Business requires a minimum grade point average of 2.00 in business and economics courses as a graduation requirement. A student who has less than this average at the end of any term is subject to referral by the department head or college dean to the Scholastic Standards Committee of the University for consideration of academic dismissal from the College of Business.

M 120 and M 121 are considered review courses; credits in these courses may not be used toward a degree in business administration.

Admission

Direct entry as a new freshman or transfer to the College of Business is highly selective and only those students meeting academic requirements will be accepted. For details contact the Office of Admissions. Other students may be admitted to the College of Business provided adequate space and resources are available within the college and conditions for admission have been met. Conditions for admission include: (1) completion of 60 semester credits, (2) a cumulative grade point average at Colorado State of 2.70 for all work attempted and a cumulative 2.50 in business and economics courses, (3) completion of at least 33 of the 37 credits in the University Studies Program (USP) which must include BA 210, Financial Accounting, CO 150, College Composition, M 141, Calculus in Management Sciences, and ST 204, Statistics for Business Students. and (41 completion of at least five of the seven lower-division business core courses which are BA 210. BA 220. BD 140. BD 141. BG 200. BG 260, and BQ 270. Students in Open Option-Seeking Business who fail to meet any one of the aforementioned conditions will be denied admission to the College of Business. Students who have not completed all 37 credits of the University Studies Program and the seven lower-division business core courses must complete this work during the first semester in which they are enrolled in the college or face dismissal.

Course Requirements

The first two years of study include completion of the USP and the lower-division business core courses as outlined in the core curriculum below. Students must have junior or senior status and be admitted into the College of Business in order to choose a business concentration and take specialized course work in the business concentrations.

Core Curriculum

The following core curriculum sets the minimum course requirements for all business majors. With recommendations of the student's adviser. supplementary courses are selected to meet the total minimum of 128 credits required for the bachelor of science degree.

Freshman Year			**Credits**
BD	140, 141	Computers in Business, Laboratory	3
CO	150	College Composition	3
EC	100	Principles of Macroeconomics	3
EC	102	Principles of Microeconomics	3
M	141	Calculus in Management Sciences	3
		Arts and humanities	6
		Natural sciences	7
		Physical education/wellness	2

Sophomore Year			**Credits**
BA	210	Financial Accounting	3
BA	220	Managerial Accounting Concepts	3
BG	200	Business Communications and Report Writing	3
BG	260	Legal Environment of Business	3
BQ	270	Basic Business Statistics	3
SP	200	Public Speaking and Discussion	3
ST	204	Statistics for Business Students	2
		Anthropology. psychology. or sociology 4	3
		Economics. geography. history. or political sciences	3

All freshman and sophomore required courses must be completed prior to. or concurrent with. first enrollment in junior-senior required courses. By the beginning of junior year, students must select one of the concentrations described on the following pages.

Junior and Senior Years			Credits
BF	300	Principles of Finance	3
BG	479	Business Policy and Administration	3
BK	300	Marketing	3
BL	300	Production Fundamentals	3
BN	320	Organization Management	3
EC		Economics. upper division	3

Area Requirements

1. In addition to core requirements listed above and requirements listed for each concentration. all business majors are required to take one additional course in either anthropology. psychology, or sociology. and one additional course in either economics, geography. history. or political science. One-credit courses cannot be used to fulfill these requirements.

2. A "global" course of two or more credits. selected from a list of approved courses available in the College of Business. is required for all business majors. This course can be either a general elective or used to meet other requirements.

   All 300-level required courses must be completed prior to or concurrent with. first enrollment in 400-level courses.

Additional requirements which all business majors must complete are:

1. One of the concentrations described on the following pages.

2. A minimum of 64 credits outside the field of business.

3. Business majors may not utilize the pass-fail grading option in business courses and nonbusiness core courses.

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category II-A in the University Studies Program. At least one course must have a formal laboratory and credits must be taken in at least two prefixes.

3. Select from list of courses in category V in the University Studies Program.

4. Select any anthropology. psychology. or sociology course in Category.' IV-A in the University Studies Program.

5. Select any economics (excluding EC 100, EC 102). geography. history. or political science course in category IV-A in the University Studies Program.

General Business/Entrepreneurship Concentration

Students desiring a broad. nonspecialized program may elect the general business/entrepreneurship curriculum. The program is appropriate for students who may operate their own businesses or pursue graduate study in business. economics. or related * fields. It also is a satisfactory curriculum for prelaw students. especially those interested in corporate and business law.

In addition to the business core curriculum. the following courses are required:			**Credits**
BD	301	End User Computing	3
BP	310	Human Resource Management	3

Select one course from the following:

BA	430	Income Tax	3
BG	461	Legal Aspects of Commercial Transactions	3
BG	462	Legal Aspects of the Management Process	3

Select one course from the following:

BF	311	Investments-Fixed Income Securities	3
BF	355	Investments-Equity Securities	3
BF	370	Financial Management-Theory and Application	3

Select one course from the following:

BF	475	International Business Finance	3
BG	350	Travel Abroad-International Comparative Management	3
BK	470	International Markeling	3
BN	475	International Business Management	3

Select two courses from the following:

BG	410	Business Research Methods	3
BG	420	Entrepreneurship	3
BG	430	Business and Its Environment	3
BL	475	Managerial Decisions-Issues and Analysis	3
BP	451	Human Resource Planning and Development	3

Select one *course* from the following:

BK	306	Buyer Behavior	3
BK	310	Professional Selling	3
BK	320	Advertising	3
BK	360	Retailing	3
BK	450	Transportation and Dislribution Systems	3

General business majors' should confer with their advisers to develop a meaningful course sequence.

DEPARTMENT OF ACCOUNTING AND TAXATION

Office in Clark Building, Room B 262
Professor Terry L. Lantry, Acting Chairman

Accounting Concentration
The accounting curriculum is designed primarily to meet the needs of those who seek professional training to practice as public, private, or governmental accountants or expect to work in business managerial positions requiring an understanding of accounting.

Many accountants seek to gain professional recognition by becoming a Certified Public Accountant (CPA), a Certified Management Accountant (CMA), or a Certified Internal Auditor (CIA). Of course, many accountants practice without professional designations and are highly respected individuals within their organizations.

The CPA certificate *is* evidence of professional competence in the discipline of accounting. CPAs have a distinctive role in examining financial statements and in expressing independent opinions on their fairness. They also provide advice and consultations on various management problems. Tax planning and return preparation are a substantial part of the work load of many CPAs.

The CMA designates that the accountant is professionally competent in the field of management accounting. The CMA will generally have key responsibilities for developing, producing, and analyzing information for top management.

The CIA designation is a recognition of the professional competence of internal auditors. An internal auditor assists the management of an organization in discharging its responsibilities effectively by furnishing analyses, appraisals, and recommendations concerning activities reviewed. Internal auditors play a key role in insuring that organizations fulfill their fiduciary responsibilities.

The accounting curriculum at Colorado State University can satisfy the current educational requirements to become a CPA in Colorado and many other states. The curriculum can also satisfy the educational requirements to become a CMA and/or a CIA.

The accounting concentration offers four options to meet the various career interests of accounting students. In addition to the business core curriculum, the following courses are required for all accounting students:

Core Requirements			**Credits**
BA	311, 312	Intermediate Accounting I, II	6
BA	321	Cost Accounting	3
BA	350	Accounting Information Systems	3
BA	430	Income Tax	3

Select one of the following options:
Accounting Systems Option
The accounting systems option combines knowledge of accounting, information systems, and computer systems. The option could be used to prepare the student for careers in industry, government. or public accounting. The accounting systems curriculum is ideally suited forstudents who have an interest in a career in EDP auditing.

			Credits
In addition to the core requirements:			
BA	421	Advanced Cost Accounting	3
BA	300-400	level elective	3
BD	240	Business Computer Programming	3
BD	305	Hardware and Software Concepts	3

Select one course from the following:

BD	310	Microcomputer-Based Systems	3
BD	345	Job Control Systems	3
BD	445	Business Database Systems	3
BD	460	Systems Analysis and Design	3

Financial Accounting Option

The financial accounting option is intended for students who wish to pursue accounting careers primarily participating in the financial management of a corporation. This option is also intended for students who wish to pursue accounting careers in financial institutions.

			Credits
In addition to the core requirements:			
BA	411	Advanced Accounting	3
BA	431	Advanced Income Tax	3
Select one course from the following:			
BA	300-400	level elective	3
BG	461	Legal Aspects of Commercial Transactions	3
BG	462	Legal Aspects of the Management Process	3
Select two courses from the following:			
BF	311	Investments-Fixed Income Securities	3
BF	370	Financial Management-Theory and Application	3
BF	475	International Business Finance	3
BF	478	Case Studies in Financial Management	3

Managerial/Cost Accounting Option

The managerial/cost accounting option is intended for students who wish to pursue an accounting career in manufacturing organizations. Typically, graduates work within the controller function in a manufacturing company.

			Credits
In addition to the core requirements:			
BA	421	Advanced Cost Accounting	3
BA	300-400	level elective	3
BD	301	End User Computing	3
Select two courses from the following:			
BL	420	Macro Issues in Production Management	3
BE	471	Production Scheduling and Inventory Management	3
BI	475	Managerial Decisions-Issues and Analysis	3
BQ	375	Models and Applications in Management Science	3

Public Accounting Option

The public accounting option is designed primarily for students who desire to pursue a career in public ,recounting and obtain the CPA credential.

			Credits
In addition to the core requirements:			
BA	411	Advanced Accounting	3
BA	431	Advanced Income Tax	3
BA	441	Auditing	3
Select one course from the following:			
BG	461	Legal Aspects of Commercial Transactions	3
BG	462	Legal Aspects of the Management Process	3

Select one course from the following, but not one included above:

BA	300-400	level elective	3
BG	461	Legal Aspects of Commercial Transactions	3'
BG	462	Legal Aspects of the Management Process	3

DEPARTMENT OF COMPUTER INFORMATION SYSTEMS

Office in Clark Building, Room C 115 Associate
Professor John Plotnicki, Interim Chairman

Information Systems Concentration
Excellent career opportunities exist for students in the expanding field of information technology including programming, systems analysis and design, personal computing, networking, and systems integration. Managing these technologies to help solve business problems provides students concentrating in information systems with a wide variety of career opportunities.

The curriculum provides students with a broad understanding of business, a basic competence in business computer programming, a knowledge of information technology infrastructure, and a sound foundation in systems analysis and design. The course work requires extensive use of state-of-the-an computer hardware and software tools.

In addition to the business core curriculum, the following courses are required:

			Credits
BD	240	Business Computer Programming	3
BD	305	Hardware and Software Concepts	3
BD	340	Advanced Business Programming Applications	3
BD	345	Job Control Systems	3
BD	445	Business Database Systems	3
BD	460	Systems Analysis and Design	3
BD	462	Systems Development Project	3
BQ	375	Models and Applications in Management Science	3
		One approved upper-division BD course	3

Students should confer with their advisers to plan program electives.

DEPARTMENT OF FINANCE AND REAL ESTATE

Office in Clark Building, Room B 341
Professor J. Kenton Zumwalt, Chairman

Finance-Real Estate Concentration Finance Option
The finance function encompasses the financial management of firms and the management of investments.

In financial management, an analysis is made of such key issues as capital budgeting and the financing decisions of the firm. The program prepares students to identify relevant problems and to make and defend reasoned decisions in financial planning, financial control, and financial policy.

The study of financial institutions and markets develops an understanding of the strategy and policy of financial institutions. The key internal aspects of firms are examined as well as their responses to changing conditions in the money and capital markets.

Investment management focuses on the theoretical and practical aspects of investment in corporate securities, mutual funds, and other investment media that are relevant for individual investors and their institutional counterparts. Emphasis is placed on the role of the computer in the decision-making process. Analytical tools are developed to evaluate investment alternatives and to construct a portfolio of assets to meet investment objectives.

Finance students find initial employment opportunities as financial analysts, financial planning trainees, credit analysts, security analysts, loan analysts, and as assistants to senior finance officers. Positions may be found in the finance departments of business firms, governmental agencies, and in financial institutions such as savings institutions, finance companies, commercial banks, investment banks, stock brokerages, and investment departments of insurance and real estate companies.

Students preparing for a career in financial management, institutional finance, or investment management must complete the following courses in addition to the business and nonbusiness core curriculum:

			Credits
BA	311	Intermediate Accounting 1	3
		or	
BA	321	Cost Accounting	3
		or	
BA	430	Income Tax	3
BF	311	Investments-Fixed Income Securities	3
BF	355	Investments-Equity Securities	3
BF	370	Financial Management-Theory and Application	3
BF	475	International Business Finance	3
BF	478	Case Studies in Financial Management	3
		One approved 300-400 level economics course	3

Select one course from the following:

BF	342	Risk Management and Insurance	3
BF	360	Real Estate Principles	3
BF	455	Investments-Derivative Securities	3
BF	470	Management of Financial Institutions	3

Elective courses must be approved by the faculty adviser.

Real Estate Option

Real estate embraces the development, financing, management, and marketing of land resources. The utilization and disposition of these resources by developers, owners and managers, brokers and traders, and real estate financiers is analyzed.

College graduates are in great demand for professional services in property development, brokerage, appraising. property management, mortgage lending, and teaching and research in real estate related areas. Governmental activities in housing, planning, and home financing present other career opportunities.

Students preparing for the real estate field must complete the following courses in addition to the business and nonbusiness core curriculum:

			Credits
BF	311	Investments-Fixed Income Securities	3
BF	360	Real Estate Principles	3
BF	460	Real Estate Finance and Investment	3
BF	465	Real Estate Appraisal	3
BG	367	Real Estate Law	2

Select two courses from the following:

BA	421	Advanced Cost Accounting	3
BF	487	Internship	Var.
BF	495	Independent Study	Var.
BG	410	Business Research Methods	3
BG	420	Entrepreneurship	3
BG	461	Legal Aspects of Commercial Transactions	3
BK	310	Professional Selling	3
EA	348/EC 348	Economics of Urban and Regional Land Use	3
EA	409	Farm and Ranch Appraisal	3

1. Students selecting EA 409 in this sequence must also take EA 205 or EA 305.

DEPARTMENT OF MANAGEMENT

Office in Clark Building, Room B 210
Professor Steven F. Bolander, Chairman

Management Concentration
This concentration will develop students' skills and knowledge in the management functions of planning, organizing, leading, and controlling. These tools will assist managers in the acquisition, allocation, utilization, and maintenance of an organization's resources. In order to effectively manage the resources and work environment of an organization, a sound theoretical foundation as well as a practical business acumen is required.

Course work exposes students to actual problem situations that may be encountered by managers in both the private and public sectors. Three options (human resource management, organization management, and production/operations management) are offered that, when combined with electives, allow students to create an educational program which will enable them to perform effectively in any work environment.

In addition to the business core curriculum, the following courses are required:

Core Requirements			**Credits**
BG	305	Managerial Economics	3
BG	430	Business and Its Environment	3
BN	475	International Business Management	3

Select two courses from the following:

BD	301	End User Computing	3
BN	410	Organizational Behavior	3
BP	310	Human Resource Management	3
BQ	375	Models and Applications in Management Science	3

1. Can fulfill the 300-level economics requirement in the college core.

2. BD 301 is not required in the core for students in the organization management option.

Select one of the following options:

Human Resource Management Option
The human resource management option emphasizes personnel management functions and includes course work in compensation. human resource planning, training and development, employment law, and labor relations. Student projects provide experience in the design and administration of human resource programs.

			Credits
In addition to the core requirements:			
BP	350	Employment Law and Policy	3
BP	420	Compensation Management	3
BP	451	Human Resource Planning and Development	3
BP	471	Labor Relations and Collective Bargaining	3

Organization Management Option
The organization management option emphasizes general management decision making and provides a broad foundation for a variety of managerial careers in business, government, and nonprofit institutions. Course work includes organizational planning, the design of effective organizations, and the use of computerized information systems for planning and decision making. Students deal with cases and problems encountered by managers in both the public and private sectors.

Credits

In addition to the core requirements:

BD	301	End User Computing	3
BL	471	Production Scheduling and Inventory Management	3
BL	475	Managerial Decisions-Issues and Analysis	3
BN	330	Organizational Theory	3

Production/Operations Management Option

The production/operations management option focuses on management of the production facility and its coordination with engineering, finance, marketing, and related functions. This option prepares students to enter the field of materials management.

Students will analyze and solve problems related to production planning. material requirements planning. procurement, capacity planning, and the scheduling of work, equipment, and personnel. Other topics important to this option include: JIT; work methods; output standards; determining plant location, layout, and design; quality control; and firstline supervision in the plant.

Course work stresses application of analytical techniques (usually computer oriented). which include mathematical and statistical modeling, optimization techniques, and simulation. Operations principles are used to illustrate techniques applicable to manufacturing and service industries.

			Credits
In addition to the core requirements:			
BL	420	Macro Issues in Production Management	3
BL	471	Production Scheduling and Inventory Management	3
Select two courses from the following:			
BK	340	Sales Forecasting	3
BK	450	Transportation and Distribution Systems	3
BL	475	Managerial Decisions-Issues and Analysis	3
IS	318	Manufacturing Facilities Planning	3
ME	412	Quality Control	2

Students should confer with their advisers to plan program elective.

DEPARTMENT OF MARKETING

Office in Clark Building, Room B 225
Professor George J. Kress, Chairman

Marketing Concentration
Marketing is the process that delivers want-satisfying products and services to consumers. industrial customers, governments, and institutions in both domestic and international markets. Marketing includes activities such as planning and development, pricing, advertising, selling, promotion, research, and distribution. Marketing graduates find excellent career opportunities in managing these activity areas within both large and small organizations.

The curriculum examines marketing management problems, policies, and practices as well as economic, cultural, environmental, and political forces affecting marketing performance.

This educational experience prepares students for possible careers in retail management, international marketing, professional sales, sales management, advertising, marketing research, transportation and distribution, industrial marketing, marketing information systems, nonprofit marketing, brand and product management, purchasing, and small business marketing.

In addition to the business core curriculum, students must take a minimum of nine courses from the following:

			Credits
Marketing Management and Analysis			
(All four courses are required.)			
BG	305	Managerial Economics	3
BG	410	Business Research Methods	3
BK	Me	Sales Forecasting	3
BK	479	Marketing Management	3
Buyer Behavior and Marketing Communications			
Select a minimum of two courses from the following:			
BK	306	Buyer Behavior	3
BK	310	Professional Selling	3
BK	320	Advertising	3
Managerial and Functional Marketing			
Select a minimum of two courses from the following:			
BK	360	Retailing	3
BK	430	Sales Management	3
BK	435	Marketing to Businesses and organizations	3
BK	450	Transportation and Distribution Systems	3
BK	470	International Marketing	3
Other Marketing Courses			
(No minimum number of courses is required.)			
BG	350	Travel Abroad-International Comparative Management	23
BK	411	Research Applications	3
BK	487	Internship	3-6
BK	492	Seminar	3
BK	496	Group Study	3

1. Can fulfill the 300-level economics requirement in the core.

Graduate Programs in Business

The College of Business offers graduate programs in business administration leading to the degrees of master of science (M.S.) and master of business administration (M. B.A.). A description of these programs may be found in the *Graduate and Professional Bulletin.*

Students interested in a combined program in agriculture or engineering and business may consider obtaining a B.S. degree in agriculture or engineering and the M.B.A. degree. This program is jointly administered by the College of Business and the College of Agricultural Sciences or College of Engineering. Direct inquiries to the associate dean of one of these colleges.

COLLEGE OF ENGINEERING

Office in Engineering Building, Room 111
Professor Jorge L Aunon, Interim Dean
Professor Frederick W. Smith, Associate Dean for Graduate Studies and Research
Professor Johannes Gessler, Associate Dean for Undergraduate Studies

UNDERGRADUATE MAJORS
Agricultural Engineering
Chemical Engineering
Civil Engineering
Electrical Engineering
Engineering Science
Mechanical Engineering

UNDERGRADUATE MINOR
Environmental Engineering

COLLEGE PROGRAMS
Engineers are critically involved in every facet of modern technological society, processing information, designing systems and equipment, maintaining society's infrastructure, solving environmental and energy problems, and helping attain aspired levels of efficiency and comfort. The College of Engineering continues its tradition - a tradition as old as Colorado State -of providing broad training in the basic fields of engineering through both undergraduate instruction and graduate programs strongly supported by modern research facilities.

Undergraduate Majors
Undergraduate programs are administered by the Departments of Agricultural and Chemical Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering, These departments offer four-year programs leading to a bachelor of science degree. Although emphasis is on broad training in basic engineering, students may specialize to some extent by proper choice of technical electives.

A program leading to a bachelor of science degree with a major in engineering science is administered by a committee of the faculty under the chairmanship of the Associate Dean for Undergraduate Studies in the College of Engineering. This program offers five well-defined concentrations: computing systems engineering, engineering physics, environmental engineering, space engineering, and a dual degree (fiveyear) program leading to a B .A. degree in the College of Liberal Arts and a B.S. degree in the College of Engineering.

Students may consider simultaneously completing the requirements for a second major. See Second Major Requirements in the Graduation Requirements section of this catalog for a complete description of the program. A student may pursue a minor program of study inside or outside the College of Engineering in conjunction with the desired engineering major. See the Minor Program Requirements in the Graduation Requirements section of this catalog for details; the undergraduate minors available are listed in the various college sections.

Students interested in a broad education and training for the engineering profession may take a five-year program awarding a B.A. degree with a major in Arts and humanities or social sciences and a B.S. degree in engineering science. This program, which requires 162 credits, is administered jointly by the Colleges of Engineering and Liberal Arts. Direct inquiries to the associate dean of one of these colleges and refer to the program listings in the College of Liberal Arts section of this catalog. Students in this program must fulfill the requirements for both degrees in order to graduate.

Students interested in a combined program in engineering and business may consider obtaining a B.S. degree in engineering and the M.B.A, degree. This program is jointly administered by the

Colleges of Business and Engineering; direct inquiries to the associate dean of one of these colleges.

The programs in agricultural engineering, chemical engineering, civil engineering, electrical engineering, engineering science, and mechanical engineering 'are accredited at the basic level by the Accreditation Board for Engineering and Technology.

Interdepartmental Minor
The College of Engineering offers a minor in environmental engineering, available to undergraduate students in any of the engineering degree programs, with the exception of those in the environmental engineering concentration of the engineering science major. The minor is designed to broaden the academic background of undergraduate engineering students seeking a career in environmental fields, and to provide the foundation required to pursue a master's degree in environmental engineering or related disciplines.'

Registration as a Professional Engineer
The registration and licensing of an engineer is required under certain legally defined circumstances in order to practice as a professional engineer. The College of Engineering actively encourages all of its students to fulfill the necessary requirements as soon as they are eligible. The Fundamentals of Engineering Examination administered by the State Board of Registration for Professional Engineers and Professional Land Surveyors may be taken by seniors during the two semesters prior to graduation. After the required practical experience, the Principles and Practice of Engineering Examination for licensing may be taken.

Engineering Field Trips
The first Fridays of November and March are set aside for departmental field trips primarily to industrial and research organizations in Colorado. Specific requirements of the field trips are established by individual departments. Transportation expense of trips is borne by the student.

Graduate Programs
The college offers graduate programs leading to the degrees of master of science and doctor of philosophy in the Departments of Agricultural and Chemical Engineering, Atmospheric Science, Civil Engineering, Electrical Engineering, and Mechanical Engineering. For detailed information about graduate programs, contact individual departments. A description of the programs may be found in the *Graduate and Professional Bulletin.*

ADMISSION INFORMATION
Students may be admitted to one of the undergraduate majors in this college or as undecided freshmen (Engineering Open Option). Undecided engineering students must specify their choice of major prior to registration for the sophomore year. Should the demand for any engineering major exceed the capacity to maintain a high-quality education, the college may find it necessary to limit enrollment in some majors. The undecided engineering student who wishes to transfer to one of these majors may be at a disadvantage when demand exceeds capacity. A student who considers entering one of these majors should specify that major on the application form rather than select the Engineering Open Option.

High School Graduates
See Undergraduate Admissions Policy and Procedures section in this catalog for,specific College of Engineering requirements. The required units listed are minimums. Students desiring to enter the engineering curriculum are urged to take available advanced math and English classes as well as courses in computer programming, physics, and mechanical drawing or three-dimensional representation (an).

Course Placement and Advising for Freshmen
All entering freshmen are required to take composition and mathematics placement examinations prior to registration. The examination results, together with other information about students, are used by faculty advisers to counsel students. Those with weaknesses in mathematics will be advised to take up to five credits of review math (M 120, M 121, M 124, M 125, and M 126) before enrolling in calculus (M 160). Credits for review courses may not be used toward a degree in engineering.

Faculty advisers recommend programs suited to the student's background. Superior preparation is recognized and appropriate placement and/or credit is given.

Transfer Students
See the Undergraduate Admissions Policy and Procedures section and Change of Undergraduate Major in the Registration and Student Records section in this catalog for specific information.

Students who wish to transfer into engineering must have completed satisfactorily at least one semester of calculus and one semester of calculus-based physics. Transfer advisers in each department are available for assisting students who plan to transfer.

The college has transfer arrangements with several colleges in the state. Engineering students at these institutions may complete the first two years of the approved engineering curriculum and be candidates for transfer to the College of Engineering at Colorado State with junior standing. Contact the Associate Dean for Undergraduate Studies in the College of Engineering for information on these colleges. Students who are attending participating colleges and who plan to complete engineering degrees at Colorado State should consult the engineering advisers at their colleges for the list of courses approved for transfer.

Change of Major to Engineering
Students who wish to change from another major at Colorado State to an engineering major must have completed at least one semester each of calculus (M 160) and physics (PH 141) to be eligible for consideration. Students are selected for admission once each term by an engineering faculty committee; the number of students admitted is based on space available as well as academic criteria. Engineering courses are normally open to engineering majors only. The change of major must be initiated at the HELP/ Success Center.

CURRICULAR REQUIREMENTS
The curricula of the College of Engineering include courses in engineering. mathematics, science, humanities, and social sciences. During the first two years, all engineering students take a program emphasizing fundamental sciences- mathematics, physics. chemistry, and basic engineering since all branches of engineering rely on this foundation. The junior and senior years are devoted primarily to a balanced offering of specialized engineering courses. The minimum credits for graduation with a bachelor of science degree varies with the engineering major.

Good engineers are not only competent to render professional service in their field of specialization but are able to assume responsibilities as citizens. To broaden the student's perspectives in nontechnical areas, the program in engineering requires a minimum of 16 credits in arts and humanities and behavioral and social sciences to be selected from anthropology, economics, foreign languages, history, literature, philosophy, political science, psychology, and sociology; courses in art, geography, music, speech, and theatre may also be selected with the prior approval of the adviser. These courses must be selected in such a way that they also meet University Studies Program requirements.

The ability to express oneself clearly and concisely in both written and oral forms is an asset of great value to the engineer who is constantly called upon to prepare repons, papers, or specifications in which clarity, organization, and precision are essential. For this reason. engineering students must do more than meet the minimum English course requirements. In daily oral and written work, students must demonstrate acceptable skill. It is the college's policy that all instructors base 15 per cent of the final grade in each engineering course upon these skills. Any student found unable or unwilling to perform satisfactorily will be required to take additional course work in the deficiency.

The College of Engineering requires a minimum grade point average of 2.00 in required engineering, mathematics. chemistry, and physics courses as a graduation requirement. A student who has less than this average at the end of any term is subject to referral by the department head or college dean to the Scholastic Standards Committee for consideration of academic dismissal from the College of Engineering. Additional minimum grade requirements apply in some engineering majors.

An engineer applies physical understanding and analytical techniques to the *design* of devices and systems needed by modern society. The preparation of an engineer must then include engineering design experience. To meet this objective, all undergraduate engineering students must have 16 or more de-sign-related credits in their course work in order to graduate. Students may consult with their departmental advisers to ascertain the design content of their required and elective engineering courses.

INTERDEPARTMENTAL MAJOR

Major in Engineering Science

Office in Engineering Building Arcade, Room AR 115A

The engineering science program provides the opportunity to complete a degree in one of five areas of concentration emphasizing basic science aspects in engineering or in graduate studies. Graduates are prepared for careers in creative and advanced design, research and development, and comprehensive project and systems analysis. Preparation for graduate-level education is an attractive feature of the program. Students can undertake a master of science program related to their concentration without additional preparatory course work. In addition, students' programs can be arranged to satisfy requirements for prelaw, premedicine, and preveterinary medicine.

Early emphasis on fundamentals in physical science, mathematics, applied design, and analysis gives students a broad foundation in engineering. Concentration in subject matter, often interdisciplinary in nature, occurs in the junior and senior years. Analytical and experimental abilities are developed permitting students to solve problems which cross traditional lines of engineering.

Numerous electives are permitted during junior and senior years allowing students to acquire a strong background in one of the five available concentrations.

The five concentrations include computing systems engineering, engineering physics, environmental engineering, and space engineering. The fifth concentration consists of a dual degree in the Colleges of Engineering and Liberal Arts. In addition, it is possible to obtain a minor in mathematics by taking appropriate technical and science electives that meet both the engineering science and mathematics requirements.

Students who complete the curriculum are well-rounded in mathematics, sciences, humanities, and social and behavioral sciences. They are well prepared to take the fundamentals of engineering examination, to enter a career in engineering, or to proceed to graduate school in one of the traditional engineering disciplines.

To qualify for graduation, engineering science majors must achieve a minimum 2.00 grade point average at Colorado State in all courses in engineering, mathematics, computer science. statistics, physics, and chemistry as well as courses taken as technical electives.

All engineering science majors complete a common curriculum, mostly during their freshman and sophomore years. Students interested in the dual degree program are referred to the appropriate section under the College of Liberal Ans.

Core Curriculum
(for all engineering science majors)

Freshman and Sophomore Years			**Credits**
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CE	260, 261	Engineering Mechanics-Statics, Dynamics	6
CO	150	College Composition	3
M	160, 161	Calculus for Physical Scientists I, II	8
M	229	Matrices and Linear Equations	1
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
ME	237	Introduction to Thermal Sciences	3
PH	141, 142	Physics for Scientists and Engineers I, II	10
		Communication 3	3

		Physical education/wellness	2

Junior and Senior Years			**Credits**
CE	300	Fluid Mechanics	4
ST	309	Engineering Statistics	3
		Arts and humanities 4,5	3-6
		Behavioral and social sciences 4.6	3-6

1. Students in the computing systems. engineering physics. and space engineering concentrations take C 111. 112, and 113;

2. Students in the environmental engineering concentration take C 111,112. 113. and 114.

3. Students in the computing systems concentration will take CE 262 instead of CE 260. 261.

4. Select from CO 301A-C. JT 300. SP 200, SP 207. or any first through fourth year language (not literature) course. Credits in these courses beyond the first three may be used as free electives. Select courses with adviser's approval.

5. Students in the computing systems and environmental engineering concentrations take six credits; students in the engineering physics and space engineering concentrations take three credits.

6. Students in the space engineering concentration take three credits.

Computing Systems Engineering Concentration The use of computers in all engineering areas continues to grow at a rapid rate. Impacted areas include basic research, product development through computer-aided design, computer-aided manufacturing and testing, design automation, and microcomputers as embedded computers within products such as automobiles, household appliances, or related to communications. The objective of the computing systems engineering concentration is to provide the student with the opportunity to become thoroughly familiar with the computing tools within the engineering disciplines.

Freshman and Sophomore Years			**Credits**
ME	101	Engineering Computing	3
ME	102	Mechanical Engineering Design	3
ME	250	Computer Applications in Mechanical Engineering	2
		Computing electives	6
		Humanities and social sciences	4
		Technical electives	2

Junior and Senior Years			**Credits**
EE	204	Introduction to Electrical Engineering	3
ES	320	Software Tools for Engineers	3
ES	460	Communications and Networks	2
M		Mathematics electives	6
ME	304	Engineering Design I	3
ME	307	Instrumentation	4
ME	404, 405	Engineering Design II, III	6
		Computing electives	9
		Science elective	3
		Technical electives	9

1. Select courses with adviser's approval.

Engineering Physics Concentration
The engineering physics concentration is designed to prepare students to work in high technology areas in which a solid engineering training, combined with a broader background in physics, is valuable. The student has a choice of three specific areas in which to specialize through appropriate selection of technical electives: modern physics (laser), solid-state electronics, or energy conversion. Technical electives are chosen from a broad range of courses offered

predominantly in the Departments of Computer Science, Electrical Engineering, Mathematics, Mechanical Engineering, and/or Physics.

Freshman and Sophomore Years			Credits
EE	101/CS 101	Engineering Computing	3
EE	102	Digital Circuit Logic	4
EE	201, 202	Circuit Theory, Applications	7
PH	314, 315	Introduction to Modern Physics, Laboratory	6
		Arts and humanities	3

Junior and Senior Years			Credits
EE	341, 342	Electromagnetic Fields and Devices I, II	6
EE	401, 402	Senior Design Project I, II	6
M		Mathematics elective (300 level or higher)	3
PH	353	Optics and Waves	4
		Humanities and social sciences	4
		Technical electives	18
		Electives	5

1. Select courses with adviser's approval.

Environmental Engineering Concentration

The environmental engineering concentration prepares students for career opportunities and graduate studies in the broad area of environmental engineering. The curriculum focuses on the problems of wise use of natural resources in order to preserve environmental quality, The student is provided with a strong background in the natural sciences, culminating in upper-division engineering courses dealing with control of both air and water pollution. Technical electives allow some degree of specialization in a particular area of interest. The majority of environmental engineers find it essential to earn at a later time a master's degree in environmental engineering.

Freshman and Sophomore Years			Credits
AC	101, 102	Agricultural and Chemical Engineering I, II	5
AC	201	Material and Energy Balances	3
B	120	Principles of Plant Biology	4
		or	
BY	102	Attributes of Living Systems	4
		or	
Z	110	Principles of Animal Biology	4
C	245	Organic and Biological Chemistry	4

Junior and Senior Years			Credits
AC	305	Unit Operations and Transport Phenomena II	3
AC	307	Mass Transfer Laboratory	2
AC	405	Nonpoint Source Pollution	3
AE	470, 471	Engineering Design I, II	4
C	471	Physical Chemistry-Biological orientation I	3
		or	
C	475	Physical Chemistry I	3
CE	438	Water Supply and Wastewater Removal	4
CH	310	Chemical Engineering Thermodynamic Fundamentals	3
		or	
ME	337	Thermodynamics	3
EE	204	Introduction to Electrical Engineering	3
MB	300	General Microbiology	4
		Humanities and social sciences	4
		Technical electives	15
		Elective	1

1. Select courses with adviser's approval.

Space Engineering Concentration

This concentration provides the student with a broad background in aerospace and space engineering. The curriculum is based on a firm foundation of engineering disciplines, applied mathematics, and computer science. Aerospace and space engineering are undergoing rapid changes due to innovations in aircraft design and propulsion, ongoing programs in the development of a space station, and the planning of missions to the moon and Mars. Graduates enter engineering careers or proceed to graduate school.

Freshman and Sophomore Years			**Credits**
CE	101, 102	Civil Engineering Principles I, II	6
EE	204	Introduction to Electrical Engineering	3
ME	250	Computer Applications in Mechanical Engineering	2
		Arts and humanities	3
		Humanities and social sciences	4

Junior and Senior Years			**Credits**
CE	360	Mechanics of Solids	3
CE	367	Structural Analysis	4
CE	469, 470	Design Practice I, II	3
EG	350	Computer-Aided Design	3
M		Mathematics electives	6
ME	307	Instrumentation	4
ME	337	Thermodynamics	3
ME	344	Heat and Mass Transfer	3
ME	417	Control Systems	3
ME	460	Aeronautics	3
PO	371	U.S. Space Policy	3
		Technical electives	16

1. Select courses with adviser's approval.

Interdepartmental Minor in Environmental Engineering

In order to permit undergraduate students in any engineering major to take advantage of Colorado State's environmental expertise, the College of Engineering offers a minor in environmental engineering. The minor is designed to broaden the academic background of undergraduate engineering students seeking a career in environmental fields, and to provide fundamentals required to pursue a master's degree in environmental engineering or related fields.

Lower Division			**Credits**
C	245, 246*	Organic and Biological Chemistry, Laboratory 2	5

Upper Division			**Credits**
C	471 *	Physical Chemistry-Biological Orientation I	3
CE	438*	Water Supply and Wastewater Removal	4
MB	300*	General Microbiology	4

Select five credits from the following:

AC	305*	Unit Operations and Transport Phenomena II	3
AC	307*	Mass Transfer Laboratory	2
AC	405*	Nonpoint Source Pollution	3
AC	462*	Environmental Law	3
BC	351	Principles of Biochemistry	4
CE	439/CH 439	Environmental Engineering Chemical Concepts	3
EH	446	Environmental Toxicology	3
MB	432	Aquatic Microbiology	4
PL	345	Environmental Ethics	3

* Additional course work may be required because of prerequisites.

1. Minor based on freshman chemistry sequence of C 111. C 112, C 113, C 114. *C* 341.

2. C 344 may be substituted for C 245. C 246.

3. C 475 may be substituted for C 471.

4. Civil engineering majors cannot take CE 438 for credit in the minor. and therefore must take nine credits from the elective list.

5. Students cannot select courses offered by their department that are required by their major.

DEPARTMENT OF AGRICULTURAL AND CHEMICAL ENGINEERING

Office in Glover Building, Room 100
Professor Jim C Loftis, Head
The department offers two majors: agricultural engineering and chemical engineering. An interdepartmental minor in environmental engineering is also available.

Major in Agricultural Engineering
Agricultural engineers apply engineering principles to the production and processing of food and fiber. Training in both engineering and agricultural sciences is required.

The undergraduate agricultural engineering curriculum is structured to prepare students for the practice of agriculturally related engineering and the integration of appropriate technology into modern society. The curriculum is designed to provide a foundation in science, humanities, social sciences, engineering sciences, and engineering design methods, as well as preparation in higher-level agricultural engineering specialization.

Basic engineering subjects are required by all students pursuing the bachelor of science degree in agricultural engineering. Students can prepare themselves for careers in several specializations within the field through selection of appropriate required technical electives and the topic for their senior design project. These specializations include: *soil and water engineering* encompassing irrigation, drainage, salinity control, groundwater hydrology, and analysis and control of nonpoint source pollution; *power and machinery* involving machine design and dynamics, agricultural power utilization, tillage operations, and instrumentation and control systems; *biological and food engineering* emphasizing food processing and manufacture and the handling and conversion of biological materials; and *environmental engineering,* focusing on water quality, waste management, and impacts of toxic chemicals on the environment.

Graduates find employment with private industry, government agencies, and consulting engineering firms. Many students also find rewarding careers in international development.

A maximum of four credits of advanced ROTC can count toward credit requirements. The major in agricultural engineering requires 131 credits.

Freshman Year			**Credits**
AC	101, 102	Agricultural and Chemical Engineering I, II	5
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
M	160, 161	Calculus for Physical Scientists I, II	8
PH	141, 142	Physics for Scientists and Engineers I, II	10
		Communication	3
		Physical education/wellness"	2

Sophomore Year			**Credits**
AC	201	Material and Energy Balances	3
AE	204	Agricultural and Environmental Measurements	3
AG	240	Introductory Soil Science	4
B	120	Principles of Plant Biology	4
CE	262	Engineering Mechanics	4
CO	150	College Composition	3
EE	204	Introduction to Electrical Engineering	3
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
ME	237	Introduction to Thermal Sciences	3

Junior Year			**Credits**
AC	304	Unit Operations and Transport Phenomena I	3
AC	306	Momentum and Heat Transfer Laboratory	2
AE	430	Soil-Water Engineering	4

AE	440/ME 440	Design of Off-Highway Vehicles	4
AE	470	Engineering Design I	1
CE	300	Fluid Mechanics	4
CE	360	Mechanics of Solids	3
		Humanities. social sciences	4
		Technical electives	3

Senior Year			**Credits**
AC	405	Nonpoint Source Pollution	3
AE	471	Engineering Design II	3
EG	410	Systems Engineering and Optimization	3
ME	310	Engineering Economy	2
		Arts and humanities	6
		Behavioral and social sciences 5	6
		Technical electives	9

1. Select from list of courses in category I-D in the University Studies Program.

2. Select from list of courses in category V in the University Studies Program.

3. Select from approved departmental list.

4. Select from list of courses in category 11I-A in the University Studies Program. Credits must be taken in at least two departments.

5. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

Graduate Programs in Agricultural Engineering
Programs leading to the master of science and doctor of philosophy degrees are offered in many areas of specialization. A description of these programs may be found in the *Graduate and Professional Bulletin.*

The department publishes a descriptive brochure, which may be obtained by writing to the department head.

Major in Chemical Engineering
Chemical engineers are concerned with processing raw materials into usable products. A few examples include producing methane from natural gas, fine chemicals and plastics from crude oil, natural sweeteners from corn starch, diagnostic and therapeutic agents from controlled fermentations, and electronic devices from silicon substrates. These processes must be designed in a socially and environmentally acceptable manner. Thus, chemical engineering is a blend of chemistry, biological science, physics, and mathematics tempered by economic, social, and environmental factors.

The undergraduate chemical engineering curriculum is structured to prepare students for the practice of chemically related engineering and the integration of appropriate technology into modern society. The curriculum is designed to provide a foundation in science, humanities, social sciences, engineering sciences, and engineering design methods, as well as preparation in higher-level chemical engineering specialization.

Chemical engineering graduates find employment with oil, chemical, food. biotechnology. microelectronics, environmental consulting, and other private industries, as well as with government agencies. The graduate's work may be in research, design, development, construction, sales, technical service, or in operation of manufacturing plants. The program also provides an excellent preparation for other professions such as medicine and law.

The program offers an excellent opportunity to specialize in biochemical and food engineering, advanced materials processing. and hazardous waste management. Students are encouraged to choose technical elective courses in these areas. A maximum of four credits of advanced ROTC can count toward credit requirements. The major in chemical engineering requires 129-132 credits.

Freshman Year			**Credits**
AC	101, 102	Agricultural and Chemical Engineering I, II	5
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
M	160, 161	Calculus for Physical Scientists I, II	8
PH	141, 142	Physics for Scientists and Engineers I, II	10
		Physical education/wellness	2

Sophomore Year			**Credits**
AC	201	Material and Energy Balances	3
C	341, 343	Organic Chemistry I, II	6
C	344	Organic Chemistry Laboratory	2
CE	262	Engineering Mechanics	4
CH	202	Chemical Process Analysis	3
CO	150	College Composition	3
EE	204	Introduction to Electrical Engineering	3
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
		Communication 2	3

Junior Year			**Credits**
AC	304, 305	Unit Operations and Transport Phenomena I, II	6
AC	306	Momentum and Heat Transfer Laboratory	2
C	475	Physical Chemistry I	3
CE	300	Fluid Mechanics	4
CH	310	Chemical Engineering Thermodynamic Fundamentals	3
		Arts and humanities 3	6
		Technical electives 4	3

Select one pair of courses from the following:

BC	351, 352	Principles of Biochemistry, Laboratory	5
C	331, 332	Quantitative Analysis, Laboratory	5
C	477, 478	Physical Chemistry II. Laboratory	5
MB	300	General Microbiology	4
		and	
MB	432	Aquatic Microbiology	4
		or	
MB	436	Industrial Microbiology	4
PH	314, 315	Introduction to Modern Physics, Laboratory	6

Senior Year			**Credits**
AC	307	Mass Transfer Laboratory	2
CH	406	Rate Phenomena	3
CH	420	Chemical Reactor Design	3
CH	430	Process Control and Instrumentation	3
CH	471	Chemical Engineering Design	4
CH	493	Seminar	I
		Behavioral and social sciences	6
		Humanities. social sciences	4
		Technical electives	3

1. Select from list of courses in category V in the University Studies Program,

2. Select from list of courses in category 1-D in the University Studies Program.

3. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

4. Three credits must be in the biological, food, or environmental sciences and three credits must be in the engineering sciences.

5. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

Graduate Programs in Chemical Engineering
Programs leading to the master of science and doctor of philosophy degrees are offered in many areas of specialization. A description of these programs may be found in the *Graduate and Professional Bulletin.* The department publishes a descriptive brochure, which may be obtained by writing to the department head.

DEPARTMENT OF ATMOSPHERIC SCIENCE

Office in Atmospheric Science Building. Foothills Campus. Room 305
Professor Stephen K. Cox, Head
No undergraduate major is offered. Undergraduates interested in atmospheric science at the graduate level are encouraged to major in engineering, physics, chemistry, or mathematics.

Graduate Programs in Atmospheric Science
The department offers graduate programs leading to the master of science and doctor of philosophy degrees in atmospheric science. Since the graduate degrees are primarily research degrees, the specialization opportunities for students generally reflect the research interests and expertise of their adviser. A description of these areas of interest may be found in the *Graduate and Professional Bulletin.*

The academic curriculum and the research training for atmospheric science graduate students are closely integrated. Graduates of the program typically find employment in government research laboratories, academic institutions, military services, and private industry. Students with a baccalaureate degree in mathematics. the natural sciences, or engineering are encouraged to apply for admission.

For additional information on graduate programs, interested students should write to the Department of Atmospheric Science and request *The Department of Atmospheric Science Graduate. Student Guide.*

DEPARTMENT OF CIVIL ENGINEERING

Office in Engineering Building, Room AR 204
Professor Neil S. Grigg, Head
Civil engineers are typically involved in the design, construction, and operation of large-scale, one-of-a-kind projects. These projects fall into one or more of the several disciplines within civil engineering, e.g., environmental engineering, fluid mechanics and wind engineering. geotechnical engineering, groundwater engineering, hydraulics, hydrology, structural engineering, solid mechanics. water resources planning and management. and transportation engineering.

Many urban problems, particularly those concerned with developing a suitable living environment, are civil engineering problems. Civil engineers are employed in city planning, urban hydrology, water supply and wastewater disposal systems. solid waste disposal, general urban development, structural systems, and transportation engineering. The infrastructure challenges receiving increased attention U.S. largely involve civil engineering efforts providing and maintaining large and shared facilities such as roads, buildings, and utilities.

Civil engineering projects frequently are of large scale - both in physical size and in cost. projects such as large dams, tall buildings, airports, harbors, water resource projects, hydroelectric systems, and many others typically include considerations in most or all civil engineering disciplines. Often civil engineers work with the management and operation of large systems ranging constructed transportation networks to natural river basins. The size and cost of the projects dictate the use of the most advanced design tools, including heavy reliance on computer-assisted design a ualization procedures.

Environmental topics addressed by civil engineers grown far beyond municipal water and waste is also include stream and groundwater quality, pretion and enhancement of environmental conditions remediation of harmful past human activities.

Civil engineers are employed in many different organizations - in small and large consulting engineering firms within the private sector, in g mental agencies at the federal, state, and local and by industrial companies, including construction petroleum, and aerospace industries. Civil engineers also find opportunities in specialized design search. and teaching.

The Civil Engineering Department includes the center for Engineering Infrastructure and Sciences in Space (CEISS) and, through this Center. coon the University's participation in the NASA Co Space Grant Consortium. Information on em undergraduate educational opportunities in civil engineering and other space-related stud can be obtained through CEISS.

The undergraduate civil engineering program vides a solid base of the sciences, mathem engineering fundamentals, design and manage concepts, and humanities/social sciences. Graduates are prepared for a career in civil engineering, a instilled with a sensitivity to the increasing challenges of providing facilities and services for) society, consistent with protection of the environment. Program graduates are prepared for firm employment as an entry-level engineer or continue into a graduate program for further stud civil engineering specialty area. The undergr program also seeks to instill in the student,, inquisitiveness and an increased ability to along with the desire to continue their educational efforts throughout their career.

The undergraduate curriculum provides the scientific and professional education necessarry to practice the engineering profession in any branch of civil engineering. With additional experience and passing of two standard examinations, civil engineering graduates can qualify for registration first as an engineer-in-training, and then as a professional engineer in one or more states.

Civil engineering students with a special interest in environmental engineering should take the two-semester C 111 through C 114 chemistry sequence (instead of C 109, 110), and are advised to consider the environmental engineering minor available through the College of Engineering and/or graduate work in an environmental-related area.

Major in Civil Engineering

Freshman Year			Credits
CE	101, 102	Civil Engineering Principles I, II	6
CE	260	Engineering Mechanics-Statics	3
CO	150	College Composition	3
M	160, 161	Calculus for Physical Scientists I, II	8
PH	141, 142	Physics for Scientists and Engineers I, II	10
		Arts and humanities	3

Sophomore Year			Credits
C	109, 110	General Chemistry for Engineers, Laboratory	5
CE	261	Engineering Mechanics-Dynamics	3
CE	360	Mechanics of Solids	3
EE	204	Introduction to Electrical Engineering	3
M	229	Matrices and Linear Equations	1
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
ME	237	Introduction to Thermal Sciences	3
		Behavioral and social sciences	3
		Communication:	3
		Physical education/wellness	2

Junior Year			Credits
CE	300	Fluid Mechanics	4
CE	301	Hydraulic Engineering	4
CE	362	Properties of Materials	2
CE	367	Structural Analysis	4
CE	422	Basic Hydrology	3
CE	450	Introduction to Geotechnical Engineering	4
CE	466	Design and Behavior of Steel Structures	3
CE	474	Engineering Planning and Management	3
ST	319	Engineering Statistics	3

Senior Year			Credits
CE	438	Water Supply and Wastewater Removal	4
CE	467	Design of Reinforced Concrete Structures	3
CE	469, 470	Design Practice I, II	3
CE	478	Transportation Engineering	3
		Arts and humanities I, II	3
		Behavioral and social sciences	3
		Behavioral and social sciences or arts and humanities	4
		Technical electives	9

1. Select courses with adviser's approval.

2. Select from CO 301A-C. IT 300. SP 200. SP 207. or any first through fourth year language(not literature)course.

3. Select from approved departmental list.

Graduate Programs in Civil Engineering

Programs leading to the master of science and doctor of philosophy degrees are offered in environmental engineering; fluid mechanics and wind engineering; geotechnical engineering; groundwater; hydraulics; hydrologic science and engineering; engineering mechanics; structural engineering; and water resources planning and management. A graduate study program is also offered in space civil engineering topics.

Students with a baccalaureate degree in engineering are eligible to apply. Graduates of some science programs are also eligible, but are typically required to also complete some background courses at the undergraduate level.

For more information on the various graduate programs available in the department, interested students should write to the Department of Civil Engineering and request a copy of the Civil Engineering *Graduate Studies Bulletin.*

DEPARTMENT OF ELECTRICAL ENGINEERING

Office in Engineering Building, Room C 105
Professor Jorge I. Aunon, Head
Electrical engineering is undergoing rapid change due to continuing advances in computers and micro-electronics. Fueled by the multidisciplinary application of microelectronics, the electronics industry is one of the largest industries in the world. As such. solutions to many of society's technological problems rely upon solid-state electronics. computer systems, and signal processing. Electrical engineers learn the fundamentals and applications of these fields, and graduates readily find employment in every facet of industry, education. government. and service, working in systems analysis, bioengineering, aerospace, energy sources and systems, environmental remote sensing, computers, lasers, communications, transportation, and solid-state electronics. In addition, many students pursue the M .S. and Ph.D. degrees.

The undergraduate electrical engineering curriculum is structured to prepare students for the practice of electrical engineering and the integration of appropriate technology into modern society. The curriculum is designed to provide broad coverage of mathematics and science, considerable depth in electrical engineering and other engineering disciplines, and a general knowledge of the humanities and social sciences. The year-long senior design project relates course content to problems encountered in an engineering career. Upon graduation, students are equipped to enter a career in electrical engineering or to proceed to graduate school.

Major in Electrical Engineering
Students choose the computer engineering. electrical engineering, or optoelectronic engineering concentration, which lead to the bachelor of science degree. The computer engineering concentration requires 129-130 credits, the electrical engineering concentration requires 128 credits, and the optoelectronic engineering concentration requires 131 - 132 credits. Since the first year of all three programs is common, the student need not make his or her choice until the sophomore year. In the senior year, the electrical engineering students select courses relating to their particular career interests. These courses may be in the following fields: analog and digital electronics, microelectronics, computers. automatic controls, communications, lasers, power generation and distribution, optical electronics, or semiconductor processing, antennas. and radar. The computer engineering students are required to take four computer science courses and choose senior elective courses in computer-related areas. The optoelectronic engineering students take an additional phys**ics** course, senior-level courses in optical electronics and optical processing, and technical electives in the optical area. All students complete a year-long senior design project under the direction of an electrical engineering faculty member in the area of their concentration.

Students may broaden their education by completing a minor in computer science, mathematics, physics, or statistics. The requirements for these minors are outlined in the College of Natural Sciences section in this catalog. A maximum of six credits in ROTC courses may be used to meet the total credit requirement. (Not all ROTC courses fulfill the requirement.) At least one course in economics is required.

In order to maintain professional standards required of practicing engineers. the Department of Electrical Engineering requires a cumulative grade point average of at least 2.00 in electrical engineering courses as a graduation requirement. It is the responsibility of any student who fails to maintain a 2.00 average to work with his or her adviser to correct grade point deficiencies. In addition, it is required that students retake any electrical engineering course at the 300 level or below in which they receive a grade below a C.

Computer Engineering Concentration

Freshman Year			**Credits**
CO	150	College Composition	3
EC	100	Principles of Macroeconomics	3
		or	
EC	102	Principles of Microeconomics	3
EE	101/CS 101	Engineering Computing	3

EE	102	Digital Circuit Logic	4
M	160, 161	Calculus for Physical Scientists I, II	8
PH	141, 142	Physics for Scientists and Engineers I, II	10
		Physical education/wellness	1

Sophomore Year			**Credits**
C	109, 110	General Chemistry for Engineers, Laboratory	5
CE	262	Engineering Mechanics	4
		or	
ME	237	Introduction to Thermal Sciences	3
EE	201	Circuit Theory	3
EE	202	Circuit Theory Applications	4
EE	251	Introduction to Microprocessors	4
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
		Arts and humanities	3
		or Behavioral and social sciences 2	3
		Communication	3
		Physical education/wellness	1

Junior Year			**Credits**
CS	200	Algorithms and Data Structures	4
EE	303/ST 303	Introduction to Communication Principles	2
EE	311, 312	Linear System Analysis I, II	6
EE	331, 332	Electronics Principles I, II	8
EE	341, 342	Electromagnetic Fields and Devices I, II	6
M	350	Introduction to Numerical Analysis I	4

Senior Year			**Credits**
CS	451	Operating Systems	4
EE	401, 402	Senior Design Project I, II	6
EE	451	Digital System Design	3
		Arts and humanities	7
		or Behavioral and social sciences:	7
		Technical electives'	14

1. Select from list of courses in category III in the University Studies Program. At least six credits must be taken from subcategory A in at least two departments.

2. Select from list of courses in category IV in the University Studies Program. At least three credits must be taken from subcategory A, excluding EA, EC. and HD courses.

3. Select from departmental list of approved courses.

4. Must be related to computer engineering.

Electrical Engineering Concentration

Freshman Year			**Credits**
CO	150	College Composition	3
EC	100	Principles of Macroeconomics	3
		or	
EC	102	Principles of Microeconomics	3
EE	101/CS 101	Engineering Computing	3
EE	102	Digital Circuit Logic	4
M	160, 161	Calculus for Physical Scientists I, II	8
PH	141, 142	Physics for Scientists and Engineers I, II	10
		Physical education/wellness	1

Sophomore Year	**Credits**

C	109, 110	General Chemistry for Engineers. Laboratory	5
CE	262	Engineering Mechanics	4
EE	201	Circuit Theory	3
EE	202	Circuit Theory Applications	4
EE	251	Introduction to Microprocessors	4
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
ME	237	Introduction to Thermal Sciences	3
		Arts and humanities	3
		or Behavioral and social sciences:'	3
		Physical education/wellness	1

Junior Year			**Credits**
EE	303/ST 303	Introduction to Communication Principles	2
EE	311, 312	Linear System Analysis I, II	6
EE	331, 332	Electronics Principles I, II	8'
EE	341, 342	Electromagnetic Fields and Devices I, II	6
EE	362	Electromechanical Devices	3
		Arts and humanities	3
		or Behavioral and social sciences:	3
		Communication 4	3
		Mathematics elective (300 or 400 level)	2

Senior Year			**Credits**
EE	372	Physical Electronics	3
EE	401, 402	Senior Design Project I, II	6
		Arts and humanities	4
		or Behavioral and social sciences:	4
		Networks. computers. and systems	6
		Physical science	6
		Technical electives	3
		Elective	1

1. Select from list of courses in category 111 in the University Studies Program. At least six credits must be taken from subcategory A in at least two departments.

2. Select from list of courses in category IV in the University Studies Program. At least three credits must be taken from subcategory A. excluding EA. EC. and HD courses.

3. EE 362 and EE 372 may be taken in either the junior or senior year.

4. Select from departmental list of approved courses.

5. EE 411. EE 412. EE 421. EE 451, EE 462

6. EE 441. EE 444. EE 461. EE 471. EE 472

7. Any of the courses listed in footnotes 5 and 6 or courses in other majors approved by the senior adviser.

Optoelectronic Engineering Concentration

Freshman Year			**Credits**
CO	150	College Composition	3
EC	100	Principles of Macroeconomics	3
		or	
EC	102	Principles of Microeconomics	3
EE	101/CS 101	Engineering Computing	3
EE	1()2	Digital Circuit Logic	4
M	160, 161	Calculus for Physical Scientists I, II	8
PH	141, 142	Physics for Scientists and	

		Engineers I, II	10
		Physical education/wellness	1

Sophomore Year			**Credits**
C	109, 110	General Chemistry for Engineers. Laboratory	5
CE	262	Engineering Mechanics	4
		or	
ME	237	Introduction to Thermal Sciences	3
EE	201	Circuit Theory	3
EE	202	Circuit Theory Applications	4
EE	251	Introduction to Microprocessors	4
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
PH	353	Optics and Waves	4
SP	200	Public Speaking and Discussion	3
		or	
SP	207	Rhetoric and Argumentation	3
		Physical education/wellness	1

Junior Year			**Credits**
EE	303,ST 303	Introduction to Communications Principles	2
EE	311, 312	Linear System Analysis I, II	6
EE	331, 332	Electronics Principles I, II	8
EE	341, 342	Electromagnetic Fields and Devices I, II	6
EE	372	Physical Electronics	3
M		Mathematics elective (301-400 level)	2
		Arts and humanities I, II	6

Senior Year			**Credits**
EE	362	Electromechanical Devices	3
EE	401, 402	Senior Design Project I, II	6
EE	404	Experiments in Optical Electronics	2
EE	441	Optical Electronics	3
EE	457	Optical Information Processing	3
		Arts. humanities. or social sciences (300-400 level)	3
		Behavioral and social sciences 3	3
		Technical electives	9

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

2. Must be on an optoelectronic topic.

3. Select from list of courses in category IV-A in the University Studies Program, excluding EA. EC. and HD courses.

4. Select from departmental list of approved courses.

Graduate Programs in Electrical Engineering

Graduate programs leading to the master of science and doctor of philosophy degrees are offered in several areas. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF MECHANICAL ENGINEERING

Office in Engineering Building, Room AR 201
Professor C. Byron Winn, Head
Mechanical engineers are involved in virtually all aspects of energy conversion, environmental control, heat and mass transfer, propulsion, system dynamics and design, manufacturing systems, and computing engineering. They design the machinery and instrumentation that runs factories, transportation systems, mining operations, .and utilities. Strong emphasis in the 1990s is in the areas of energy, computer-aided design, and manufacturing. Mechanical engineers are the principal contributors to the engineering of systems in these areas.

Mechanical engineers make significant contributions in design, production, sales, management, and research and development in a wide variety of industrial and governmental enterprises.

Major in Mechanical Engineering
The undergraduate curriculum provides a broad education in basic sciences, mathematics, fundamental principles and practice of engineering, and Arts and humanities and behavioral and social sciences. During the first two years, the student learns the fundamentals necessary for an understanding of the more advanced technical material presented in the junior year. In addition, emphasis is placed on arts and humanities and behavioral and social science subjects in order to help ensure that the mechanical engineering student is aware of the social responsibilities commensurate with an engineering degree. During the junior year, the student concentrates on developing the basic engineering sciences which were introduced during the first two years. The senior year centers around two engineering design courses in which students work with faculty on group design projects throughout the year. The project area may be supplemented by technical electives. Students must choose two areas of technical electives from energy. industrial engineering, materials, mechanics and controls, and thermal sciences. Courses in computer-aided design are also available. Students will be expected to have a programmable hand-held calculator for use in many of the classes. The major in mechanical engineering requires 133-134 credits.

Graduates from the Mechanical Engineering Department are expected to have the fundamental knowledge required for the successful practice of mechanical engineering. The faculty will assess the students' design skills in a senior-year capstone course. This course will further enhance skills learned during the undergraduate studies.

Freshman Year			**Credits**
CO	150	College Composition	3
M	160, 161	Calculus tar Physical Scientists I, II	8
ME	101	Engineering Computing	3
ME	102	Mechanical Engineering Design	3
PH	141, 142	Physics for Scientists and Engineers I, II	10
		Arts and humanities'	3
		Physical education/wellness	2

Sophomore Year			**Credits**
C	111, 113	General Chemistry I, II	3
C	112	General Chemistry Laboratory I	1
CE	260	Engineering Mechanics-Statics	3
CE	261	Engineering Mechanics-Dynamics	3
EE	204	Introduction to Electrical Engineering	3
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
ME	237	Introduction to Thermal Sciences	3
ME	250	Computer Applications in Mechanical Engineering	2
		Communication	3 -4

Junior Year			**Credits**
CE	360	Mechanics of Solids	3
CE	363	Material Properties	1

ME	304	Engineering Design I	3
ME	307	Instrumentation	4
ME	324	Dynamics of Machines	4
ME	325	Machine Design and Manufacturing	4
ME	331	Introduction to Engineering Materials	4
ME	337	Thermodynamics	3
ME	338	Thermosciences Laboratory	1
ME	342	Mechanics and Thermodynamics of Flow Processes	3
ME	344	Heat and Mass Transfer	3

Senior Year			**Credits**
ME	404, 405	Engineering Design II, III	6
ME	410	Engineering Economy for Engineers	2
		Arts and humanities	3-4
		Behavioral and social sciences	6-7
		Technical electives:	15

1. Select arts and humanities, behavioral and social sciences. and' communication and reasoning from approved departmental list. Courses must total a minimum of 16 credits.

2. Select courses with adviser's approval.

Graduate Programs in Mechanical Engineering
Programs are offered leading to the degrees of master of science and doctor of philosophy. A description of these programs may be found in the *Graduate and Professional Bulletin.*

COLLEGE OF LIBERAL ARTS

Office in Clark Building, Room C 130
Professor Loren W. Crabtree, Dean
Professor Robert W. Hoffert, Associate Dean
Professor Robert R. Keller, Associate Dean

UNDERGRADUATE MAJORS
Agricultural/Natural Resources Journalism
Anthropology
Art
Arts and Humanities
Economics
English
French
German
History
Music'
Performing Arts
Philosophy
Political Science
Social Sciences
Sociology
Spanish
Speech Communication
Technical Journalism

UNDERGRADUATE MINORS
Anthropology
Art History
Dance
Economics
English
French
General Philosophy
German
History
Japanese
Music'
Musical Theatre
Political Science
Religious Studies
Russian
Sociology
Spanish
Studio Art
Theatre-Acting/Directing
Theatre-Design/Technical Theatre

The college educates citizens for file through studies and experiences which lead to an understanding of people, their history. literature, and art; their social,

political. and economic systems; and their relationship to a social and physical environment. Specific college functions tire:

1. To provide through courses in the arts, humanities, and social sciences a broad, liberal education *fo*r all students, both in its own majors and those of other Colorado State colleges.

2. To provide concentrated study in the arts, humanities. and social sciences, preparing students for a wide selection of careers in teaching, research. music therapy, journalism, the creative arts, business, industry, and government.

3. To provide graduate study in disciplines of the arts. humanities, and social sciences.

4. To offer preprofessional training for advanced study of law and foreign service and professional training in technical journalism.

COLLEGE PROGRAMS

Undergraduate Majors

Undergraduate majors lead to one of three degrees: bachelor of arts, bachelor of fine arts, and bachelor of music. These degrees require a minimum of 128 credits with a minimum of 45 in upper-division courses. Some programs of study require more than the 128-credit minimum. Descriptions of departmental and interdepartmental majors and concentrations are given on the following pages.

Students should consider simultaneously completing the requirements of a second major, either in the College of Liberal Arts or in another college. Numerous combinations, all of which enhance the value of the University experience, are available with careful planning. Some of these may be completed within, or close to, the normal lout years of study - for example. English/computer science, or social sciences/ history. Some combinations permit students to acquire a liberal education and vocational preparation at the same time. See Second Major Requirements in the Graduation Requirements section of this catalog for a complete description of the program.

Graduation Average Requirement

The minimum scholastic average acceptable for graduation in any college program is a 2,00 average in all major courses in addition to the overall grade point average requirement of 2.00 lot Colorado State courses.

Foreign Service Officer Career

Students wishing a foreign service officer career may prepare for both the general Foreign Service Officer Examination and the associated language examination within the following majors: economics. foreign languages. history. political science. social sciences. sociology. or technical journalism.

Prelaw

Offices in Clark Building. Rooms C 346 and B 352

Students preparing for law school usually major in business administration. economics. history. political science. or a planned program in social sciences. Law schools seek above average students with a broad background. Prelaw students. regardless of major. should design a course of study which develops their basic skills with language and symbolic forms. technical fiscal skills. insight into cultural. economic. and political forms. and analytical capabilities.

Some law schools admit college graduates only. while others admit superior students with three years of college.

Freshman Seminars

Freshman seminars are offered to first-semester students in majors or in the Open Option Program of the College of Liberal Arts. Each seminar. limited to fifteen students, explores topics designed to integrate and emphasize the traditions and concepts of the liberal arts. Challenging literate activities - reading, writing, and critical thinking - are required in all seminars. Professors chosen as seminar instructors agree to function as mentors for seminar students throughout their undergraduate education.

College Core Curriculum

All majors administered by the College of Liberal Arts must satisfy the requirements of the college core curriculum. The program of study specified by each major in the college fully incorpororates all core curriculum requirements, and also fulfills the requirements of the University Studies Program. Thus, students will know they have satisfied core curriculum requirements by satisfying all the requirements of their major. Students in majors administered by the college may apply a

maximum of 20 credits in serospace studies and/or military science courses toward satisfaction of graduation requirements.

			Credits
Communication and Reasoning'			**12**
CO	150	College Composition	3
M		Mathematics	3
		Communication	3
		Logic and critical thinking	3

	Credits
Arts and Humanities	**12**

Select from courses with at least two of the prefixes AR. DE. L. LB. MU. PL. SP. and TH.

	Credits
Behavioral and Social Sciences	**12**

Select from courses with at least two of the prefixes AP, EC. GR, HY. JT. LB. PO, PY. and S.

	Credits
Natural Sciences"'	**10**

At least one course must have a regular formal laboratory component.

	Credits
Physical Education/Wellness	**2**

1. Courses are to be selected from options designated by student's major program.

2. Course credits used to meet requirements in Communication and Reasoning cannot be used to fulfill these requirements.

3. At least three credits of studio courses may be selected from prefixes AR. D, MU. and TH.

4. Prefixes are to be selected by the student's major degree program.

Courses from the student's major degree program may not be used to satisfy core curriculum requirements. Core curriculum credits must be allowed for applicable course work completed by examination at Colorado State. Courses for a second major or minor or interdisciplinary studies program may be used to satisfy core requirements.

Graduate Programs

A variety of programs lead to advanced degrees. Academic degrees offered are doctor of philosophy. master of arts, master of science, master of fine arts, and master of music. The last two are generally considered professional degrees.

The Departments of English. Speech Communication. and Technical Journalism cooperate to offer a master's degree program in communication development for teachers of communication skills in high schools. junior colleges. and some four-year colleges. The program. interdepartmentally administered. consists of 32 semester credits with at least one course from each of the three departments other than the department of admission. Information may be obtained from any participating department.

For detailed information about graduate programs. contact individual departments. See also the *Graduate and Professional Bulletin.*

OPEN OPTION PROGRAM

Office in Clark Building, Room C 130

This program is for freshmen and sophomores with undeclared majors but with interests in the general areas of the College of Liberal Arts. Students may declare a specific major any time after freshman fall registration and must do so no later than the second semester of the sophomore year.

The general studies curriculum for the full 64 credits normally earned during freshman and sophomore years is as follows:

	Credits
College core curriculum	**48**
Electives	**16**

INTERDEPARTMENTAL MAJORS

Major in Arts and Humanities

Office in Clark Building, Room C 130

In the tradition of liberal education, this major, which leads to the bachelor of arts degree, prepares for positions requiring broad rather than specialized training. The curriculum offers freedom and responsibility to shape an individual educational experience. The arts and humanities major is not recommended for those who plan to teach.

Arts and Humanities Concentration

Freshman and Sophomore Years			**Credits**
Required Courses			**8**
CO	150	College Composition	3
M		Mathematics	3
		Physical education/wellness	2
Communication and Reasoning			**6**
Arts and Humanities			**27**
Including at least one studio. one literature, and one philosophy course.			
Behavioral and Social Sciences			12
HY	100, 101	Western Civilization I, II	6
		or	
HY	150	U.S. History to 1876	3
		and	
HY	151	U.S. History Since 1876	3
		or	
HY	273	Asia-The Formative Years	3
		and	
HY	274	Asia-Years of Transformation	3
		or	
HY	270	Colonial Latin America	3
		and	
HY	271	Latin America Since Independence	3
		Electives	6
Natural Sciences			**10**
Junior and Senior Years			**Credits**
Arts and Humanities 2			**30**
		Option	12
		Electives	18
Courses Other Than Arts and Humanities:			**15**
Electives			**20**

1. See the College Core Curriculum and the University Studies Program for requirements in these areas.

2. Courses must be upper division.

3. Courses must be taken in at least three disciplines.

Engineering Science Concentration

Students interested in a broad education and training for the engineering profession may take a five-year program awarding a B.A. with a major in arts and humanities and a B.S. in engineering science. This program, which requires 162 credits, is administered jointly by the Colleges of Liberal Arts and Engineering. Direct inquiries to the Dean's Office of one of these colleges. Students in this concentration must fulfill the requirements for both degrees in order to graduate.

Freshman and Sophomore Years			**Credits**
General Requirements			**29**
CE	101, 102	Civil Engineering Principles I, II	6
CO	150	College Composition	3
EG	192	Seminar	1
M	160, 161	Calculus for Physical Scientists I, II	8
M	229	Matrices and Linear Equations	1
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
SP	200	Public Speaking and Discussion	3
Arts and Humanities			**15**
Including at least one studio, one literature, and one philosophy course.			
Behavioral and Social Sciences			6
HY	100, 101	Western Civilization I, II	6
		or	
HY	150	U.S. History to 1876	3
		and	
HY	151	U.S. History Since 1876	3
		or	
HY	270	Colonial Latin America	3
		and	
HY	271	Latin America Since Independence	3
		or	
HY	273	Asia-The Formative Years	3
		and	
HY	274	Asia-Years of Transformation	3
Natural Sciences			**18**
C	111, 113	General Chemistry I, II	7
C	112	General Chemistry Laboratory I	1
PH	141, 142	Physics for Scientists and Engineers I, II	10

Junior, Senior, and Fifth Years			**Credits**
Arts and Humanities			**36**
Lower-division electives			6
Upper-division option			12
Upper-division electives			18
Behavioral and Social Sciences Electives [2]			**6**
Additional Requirements			**52**
AE	470, 471	Engineering Design I, II	4
CE	260	Engineering Mechanics-Statics	3
CE	261	Engineering Mechanics-Dynamics	3
CE	300	Fluid Mechanics	4
EE	204	Introduction to Electrical Engineering	3
ME	237	Introduction to Thermal Sciences	3
ST	309	Engineering Statistics	3
		Physical education/wellness	2
		Technical electives in engineering	27

1. Courses must be taken in at least two disciplines other than option.

2. At least one course in a department other than history.

Major in Social Sciences

Office in Clark Building, Room C 130

Engineering Science Concentration Students interested in a broad education and training for the engineering profession may take a five-year program awarding a B.A. with a major in social sciences and a B.S. in engineering science. This program, which requires 162 credits, is administered jointly by the Colleges of Liberal Arts and Engineering. Direct inquiries to the Dean's Office of one of these colleges. Students in this concentration must fulfill the requirements for both degrees in order to graduate.

Freshman and Sophomore Years			**Credits**
General Requirements			***29***
CE	101, 102	Civil Engineering Principles I, II	6
CO	150	College Composition	3
EG	192	Seminar	1
M	160, 161	Calculus for Physical Scientists I, II	8
M	229	Matrices and Linear Equations	1
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
SP	200	Public Speaking and Discussion	3
Arts and Humanities			**6**
Behavioral and Social Sciences			**15**
HY	100, 101	Western Civilization I, II	6
		or	
HY	150	U.S. History to 1876	3
		and	
HY	151	U.S. History Since 1876	3
		or	
HY	270	Colonial Latin America	3
		and	
HY	271	Latin America Since Independence	3
		or	
HY	273	Asia-The Formative Years	3
		and	
HY	274	Asia-Years of Transformation	3
		Select from AP 100, EC 100, EC 102, GR 100, JT 100, PO 101, PY 100. S 100	9
Natural Sciences			**18**
C	111, 113	General Chemistry I, II	7
C	112	General Chemistry Laboratory I	1
PH	141, 142	Physics for Scientists and Engineers I, II	10

Junior, Senior, and Fifth Years			**Credits**
Arts and Humanities			**6**
Social Sciences			**36**
Lower-division electives			6
Upper-division option			12
Upper-division electives 2			**18**
Additional Requirements			**52**
AE	470, 471	Engineering Design I, II	4
CE	260	Engineering Mechanics-Statics	3
CE	261	Engineering Mechanics-Dynamics	3
CE	300	Fluid Mechanics	4
EE	204	Introduction to Electrical Engineering	3
ME	237	Introduction to Thermal Sciences	3

ST	309	Engineering Statistics	3
		Physical education/wellness	2
		Technical electives in engineering	27

1. Including at least one studio, one literature, and one philosophy course.

2. Courses must be taken in at least two disciplines other than option.

Social Sciences Concentration
This concentration in the social sciences major, which leads to the bachelor of arts degree, studies the forces shaping human institutions. and offers a breadth of educational experience appropriate to a leadership role. A flexible curriculum offers individualized programs.

Freshman and Sophomore Years			**Credits**
Required Courses			**8**
CO	150	College Composition	3
M		Mathematics	3
		Physical education/wellness	2
Communication and Reasoning			**6**
Arts and Humanities			**12**
Including at least one studio, one literature, and one philosophy course.			
Behavioral and Social Sciences			**27**
HY	100, 101	Western Civilization I, II	6
		or	
HY	150	U.S. History to 1876	3
		and	
HY	151	U.S. History Since 1876	3
		or	
HY	273	Asia-The Formative Years	3
		and	
HY	274	Asia-Years of Transformation	3
		or	
HY	270	Colonial Latin America	3
		and	
HY	271	Latin America Since Independence	3
		Select from AP 100. EC 100. EC 102. GR 100, JT 100, PO 101. PY 100, S 100	12
		Electives	9
Natural Sciences			**10**

Junior and Senior Years	**Credits**
Social Sciences	**30**
Option	12
Electives	18
Non-Social Sciences2	**15**
Electives	20

1. See the College Core Curriculum and the University Studies Program for requirements in these areas.

2. Courses must be upper division.

3. Courses must be taken in at least three disciplines.

DEPARTMENT OF ANTHROPOLOGY
Office in Clark Building, Room C 207

Professor Jeffrey L, Eighmy Chair

Major in Anthropology
The anthropology major, which leads to the bachelor of arts degree, provides a perspective on the biological, social, and cultural aspects of the human heritage. Courses enhance the understanding of the human community and knowledge of the diversity of human experiences in a variety of societies, past and present. Field classes involving the excavation of archaeological sites are offered during the summer term. Career-related employment and internships are encouraged as a part of the program.

At the culmination of their program of study, all anthropology majors participate in a capstone senior seminar. The seminar explores the fundamental concepts and theories of anthropology for the purposes of summarizing the students' training in anthropology and measuring the degree to which they have mastered the discipline. Graduating seniors are expected to be able to view the human condition with equal ability from its behavioral, biological, and historical perspectives.

Anthropology is also extremely useful to students pursuing careers in which they anticipate contact with non-Western cultures. Individuals contemplating such careers should consider completing the requirements for a second major. See Second Major Requirements in the Graduation Requirements section of this catalog for a complete description of the program,

General Requirements			**Credits**
College Core Curriculum and:			
S	310	Quantitative Sociological Analysis:	3
		or	
ST	311	Statistics for Behavioral Sciences I	3
		Arts and humanities	3
		Behavioral and social sciences	3
		Natural sciences	3

Anthropology Requirements			**Credits 32**
AP	100	Introductory Cultural Anthropology	3
		or	
AP	320	Nature of Culture	3
AP	150, 151	Beginnings of Humankind, Laboratory	4
AP	250	Introduction to Archaeology	3
AP	493	Seminar	1
AP		Upper-division cultural anthropology	3
AP		Upper-division physical anthropology	3
AP		Upper-division archaeology	3
AP		Upper-division anthropology electives	12

1. Select any mathematics course or courses that add up to three credits excluding M 133.

2. These courses may not be used to meet the College Core Curriculum requirements.

3. See departmental advising sheet.

Minor in Anthropology
Anthropology focuses on a cross-cultural view of humanity, and broadly conceived dimensions of human behavior. Description and explanation of human activities in other societies provide a sense of perspective for individuals operating within their own culture. A minor may be focused on one or more of the subdisciplinary divisions such as physical, archaeology, ethnology, or applied anthropology; or it may be distributed across the fields like the major requirements.

Lower Division			**Credits**
AP	100	Introductory Cultural Anthropology	3
		or	

AP	320	Nature of Culture	3
AP	150. 151	Beginnings of Humankind. Laboratory	4
AP	250	Introduction to Archaeology	3

Upper Division Credits

* Any combination of upper-division anthropology courses 12
* Additional course work may be required because of prerequisites.

Graduate Programs in Anthropology

The department offers graduate programs leading to the master of arts degree. A description of these programs may be found in the *Graduate and Professional Bulletin.* Applications and inquiries should be directed to the department.

DEPARTMENT OF ART

Office in Visual Arts Building, Room G 100
Professor Phil Risbeck. Chair

The visual arts and art history affect and enliven the lives of individuals. communities, and society. Programs reflect this by serving varied educational and career goals. Professionally oriented programs lead to careers as artists. teachers of art, museum positions, and other art-related areas. Other programs offer a liberally oriented education in art along with studies in other disciplines. The department also offers courses in art for other students in the University. Art foundation courses in design and drawing and art history are open to all Colorado State students.

Specific program requirements are available from the department office.

The Department of Art is committed to providing an exceptional educational program in the visual arts and an history. The department has initiated a required portfolio review of all graduating seniors in the studio disciplines. This review allows instructors to assess the quality of graduating seniors' work and determine if the goals established by the department and specific studio areas have been met. In the art history concentration. majors take a comprehensive written exam that is administered at the end of the senior year. The Department of Art's ongoing goal is to graduate highly motivated. professionally oriented students who are well prepared to assume careers in art.

The department reserves the right to keep for demonstration and exhibition examples of student work used in meeting course requirements.

Major in Art

Programs lead to either the bachelor of arts or bachelor of fine arts degree with various concentrations. The B.F.A. is a professional degree for careers in art. The B.A. concentration in art education is also professional, leading to certification to teach in Colorado public schools. Concentrations in studio or history of art also are available in the liberal arts B.A. program. The art history concentration prepares students for graduate study leading to professional work.

The bachelor of arts program includes the following three concentrations.

Art Education Concentration

Teaching visual arts to young people in elementary and secondary schools can be a rewarding. though demanding, career. Schools need teachers who are capable artists and who also know much *about art.* Teachers must find satisfaction in seeing and helping young people grow. whether they are potential professional artists or future citizens of other occupations. In doing this, teachers contribute not only to art students and programs but also to a school and community. This concentration requires 143 credits.

See also the Teacher Certification section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies. College of Applied Human Sciences section of this catalog.

Freshman Year			**Credits**
AR	110, 111	History of Western Art I, II	6
AR	135	Introduction to Drawing	3

AR	136	Introduction to Figure Drawing	3
AR	160	Foundations Painting	3
AR	170	Foundations Sculpture	3
CO	150	College Composition	3
PY	100	General Psychology	3
		Communication and reasoning	3
		Natural sciences	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AR	230	Photo Image Making I	3
AR	240	Pottery I	3
AR	260	Painting I	3
AR	270	Sculpture I	3
AR		Art elective 2	3
ED	255	Introduction to Education	2
M		Mathematics	3
		Arts and humanities	6
		Behavioral and social sciences	3
		Natural sciences'	7

Junior Year			**Credits**
AR	212	History of Western Art III	3
AR	492A	Seminar-Art Education	3
AR		Art electives 2	5
AR		Art history. upper division	3
AR		Studio teaching concentration	8
ED	355	Educational Psychology	3
SP	200	Public Speaking and Discussion	3
		Arts and humanities	6
		Behavioral and social sciences	3

Senior Year			**Credits**
AR	326	Art Education Studio	3
ED	401A	Teaching Classroom Reading/Literacy Skills	2
ED	428	Exceptionality, Diversity. and Human Relations	3
ED	450	Methods and Evaluation of Instruction	4
ED	451	Microteaching Laboratory	1
ED	466	Methods in Elementary and Secondary School Art	4
ED	485A	Student Teaching-Elementary	6-9
ED	485B	Student Teaching-Secondary 4	6-9
ED	486A	Practicum-K-12 Classroom	1
ED	486C	Practicum-Exceptionality and Diversity	1
ED	493	Seminar in Professional Relations	1
		Behavioral and social sciences 1	3

1. See departmental advising sheet for requirements in these areas.

2. Select one 200-level course from the following: fibers. metalsmithing. or printmaking.

3. Studio teaching concentrations may be at the 300 or 400 level in any studio other than graphic design.

4. Fifteen credits of student teaching (nine credits at one level and six credits at the other) must be completed.

Art History Concentration

This provides a basic preparation in art history for graduate studies;for careers in research and teaching at the college level; for positions in museums. libraries, or private collections; or for writing and criticism in the ans. Graduate studies or advanced-level **classes** are necessary for advancement.

Freshman Year			Credits
AR	110, 111	History ofWesternArt I, II	6
AR	135	Introduction to Drawing	3
AR	160	Foundations Painting	3
AR	170	Foundations Sculpture	3
CO	150	College Composition	3
M		Mathematics	3
		Behavioral and social sciences	6
		Logic and critical thinking	3
		Physical education/wellness	2

Sophomore Year			Credits
AR	212	History of Western An III	3
AR		Art history. upper division	6
AR		Studio introduction	6
L		Foreign language	10
		Behavioral and social sciences	3
		Option	3
		Electives	4

Junior Year			Credits
AR		Art history, upper division	6
PL	318	Aesthetics-Visual Arts	3
		Arts and humanities 1	5
		Behavioral and social sciences	3
		Option 3	9
		Electives	6

Senior Year			Credits
AR	419	Historiography and Methodology of An History	3
AR		Art electives	4
		Natural sciences 1	10
		Option"	9
		Elective	3

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

2. Select one course each from any two of the following sophomore art studio areas: fibers, metalsmithing. painting. photo image making, pottery. printmaking, and sculpture.

3. Select 21 credits in one area other than *art.*

Studio Concentration

With a liberal education plus involvement in the visual arts, students may incorporate art in their life activities. People who are knowledgeable about art may contribute much by supporting community arts activities.

Freshman Year		Credits	
AR	110, 111	History of Western Art I, II	6
AR	135	Introduction to Drawing	3
AR	160	Foundations Painting	3
AR	170	Foundations Sculpture	3
CO	150	College Composition	3
M		Mathematics	3
		Behavioral and social sciences	6
		Logic and critical thinking I, II	3
		Physical education/wellness	2

Sophomore Year			Credits
AR	136	Introduction to Figure Drawing	3
AR	212	History of Western Art III	3
AR		Studio introduction 2	6
L		Foreign language	10
		Behavioral and social sciences	3
		Option 3	6

Junior Year			Credits
AR		Art upper division	4
AR		Art 300-level concentration	8
AR		Art history	3
PL	318	Aesthetics-Visual Arts	3
		Behavioral and social sciences 1	3
		Option 3	9
		Elective 1	3

Senior Year			Credits
AR		Art, upper division	4
AR		Art history	3
		Arts and humanities 1	5
		Natural sciences 1	10
		Option 3	5
		Electives 1	4

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

2. Select one course each from any two of the following sophomore *an* studio areas: fibers. metalsmithing, painting, photo image making. pottery. printmaking. and sculpture.

3. Select 21 credits in one area other than an.

The bachelor of fine arts program includes the following nine concentrations.

Basic Courses for Freshman Year - B.F.A			Credits
AR	110, 111	History of Western Art I, II	6
AR	135	Introduction to Drawing	3
AR	136	Introduction to Figure Drawing	3
AR	160	Foundations Painting	3
AR	170	Foundations Sculpture	3
CO	150	College Composition	3
M		Mathematics	3
		Arts and humanities 1	3
		Behavioral and social sciences 1	3
		Physical education/wellness	2

Basic Courses for Sophomore Year - B.F.A			Credits
AR	212	History of Western Art III	3
AR	235, 335	Drawing Workshop I, II	6
AR		Studio introduction 2	9
		Arts and humanities 1	3
		Behavioral and social sciences 1	3
		Communication and reasoning 1	3
		Natural sciences 1	3
		Elective	2

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

2. Select a minimum of three courses from the following sophomore art studio areas: fibers. graphic design, metalsmithing. painting. photo image making, pottery, printmaking, and sculpture.

Drawing Concentration
This concentration allows the art student to pursue the fine art of drawing as part of a second major, or as an end in itself with other directed electives in printmaking, sculpture, and painting. The support and popularity of drawing as a major medium is growing.

see basic courses for freshman and sophomore years - B .F.A.

Junior Year			**Credits**
AR	336, 435	Drawing Workshop lll. IV	6
AR		Art	7
PL	318	Aesthetics-Visual Arts	3
		Arts and humanities 1	3
		Behavioral and social sciences 1	6
		Communication and reasoning 1	3
		Natural sciences 1	4
		Elective	2

Senior Year			**Credits**
AR	436	Drawing Workshop V	3
AR		Art, upper division	12
AR		Art history, upper division	6
		Natural sciences 1	3
		Electives	6

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Fibers Concentration
Fibers provides a strong foundation in on- and off-loom fabric constructions, and in fabric surface design techniques: screen printing, batik, and tie dye. Emphasis is placed on integrating technique with idea and developing process into a medium of personal expression.

See basic courses for freshman and sophomore years- B.F.A.

Junior Year		**Credits**	
AR	350, 351	Fibers II, III	8
AR		Art	3
PL	318	Aesthetics-Visual Arts	3
		Arts and humanities 1	3
		Behavioral and social sciences 1	6
		Communication and reasoning 1	3
		Natural sciences 1	4
		Elective	2

Senior Year			**Credits**
AR	450, 451	Fibers IV. V	8
AR		Art	9
AR		Art history, upper division	6
		Natural sciences 1	3
		Electives	6

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Graphic Design Concentration
Graphic design students prepare for careers in illustration, advertising design, typography, package design, or related fields. An internship in the Office of University Communications, under direction

of their art director, may be taken during the senior year for practical experience. Field trips are taken to Denver studios and advertising firms.

See basic courses for freshman and sophomore years - B.F.A.

Junior Year		**Credits**	
AR	355	Typography and Advertising Design	4
AR	356	Illustration	4
AR		Art	3
PL	318	Aesthetics-Visual Arts	3
		Arts and humanities 1	3
		Behavioral and social sciences'	6
		Communication and reasoning	3
		Natural sciences 1	4
		Elective	2

Senior Year			**Credits**
AR	455	Packaging and Advanced Advertising Design	4
AR	456	Advanced Illustration	4
AR		Art	9
AR		Art history. upper division	6
		Natural sciences 1	3
		Electives	6

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Metalsmithing Concentration
An understanding of the character and properties of metals is reached through manipulation and experimentation. A strong background essential in all activities related to metalwork prepares students to compete at a high level in the field. Studies in metalwork as ornamentation and complement to the human body are included.

See basic courses for freshman and sophomore years - B .F.A.

Junior Year			**Credits**
AR	345, 346	Metalsmithing and Jewelry II, III	8
AR		Art	3
PL	318	Aesthetics-Visual Arts	3
		Arts and humanities'	3
		Behavioral and social sciences	6
		Communication and reasoning	3
		Natural sciencesTM	4
		Elective	2

Senior Year			**Credits**
AR	445, 446	Metalsmithing and Jewelry IV, V	8
AR		Art	9
AR		Art history upper division	6
		Natural sciences 1	3
		Electives	6

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Painting Concentration
This concentration fosters development in painting as fine art, or as illustration, or both. Active experience is emphasized in learning the skills inherent in oil, acrylic and related aqueous media, and mixed media. Conceptual awareness, integrated with technical proficiency, is stressed. The curriculum is intended for students who desire to learn visual self-expression, and who may

eventually enter careers as teachers/artists in higher education, painters/illustrators, or self-directed painters.

See basic courses for freshman and sophomore years - B .F.A.

Junior Year			**Credits**
AR	360, 361	Painting II, III	8
AR		Art	3
PL	318	Aesthetics-Visual Arts	3
		Arts and humanities:	3
		Behavioral and social sciences 1	6
		Communication and reasoning 1	3
		Natural sciences 1	4
		Elective	2

Senior Year			**Credits**
AR	460, 461	Advanced Painting I, II	8
AR		Art	9
AR		Art history. upper division	6
		Natural sciences 1	3
		Electives	6

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Photo Image Making Concentration
Emphasis in the photography program is on the development of a student's vision and awareness within a fine arts tradition. Skills are emphasized in

silver, non-silver, mixed media, and synthetic color. The curriculum is intended for students who desire to learn visual self-expression. and who may eventually enter careers as teachers/artists or self-directed artists/photographers in a wide spectrum of photographic application.

See basic courses for freshman and sophomore years - B.F.A.

Junior Year		**Credits**	
AR	330, 331	Photo Image Making II, III	8
AR		Art	3
PL	318	Aesthetics-Visual Arts	3
		Arts and humanities 1	3
		Behavioral and social sciences 1	6
		Communication and reasoning'	3
		Natural scicnces 1	4
		Elective	2

Senior Year			**Credits**
AR	430, 431	Advanced Photo Image Making I, II	8
AR		Art	9
AR		Art history upper division	6
		Natural sciences 1	3
		Electives	6

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Pottery Concentration
Pottery students prepare for careers in one of humankind's oldest art forms. Since pottery blends technology and artistic expression, both the ancient and modern technical aspects are presented along with emphasis on aesthetics for the contemporary idiom. All classes are geared to professional standards.

See basic courses for freshman and sophomore years - B.F.A.

Junior Year			**Credits**
AR	340, 341	Pottery II, III	8
AR		Art	3
PL	318	Aesthetics-Visual Arts	3
		Arts and humanities 1	3
		Behavioral and social sciencesTM	6
		Communication and reasoning 1	3
		Natural sciences 1	4
		Elective	2

Senior Year			**Credits**
AR	440, 441	Pottery IV, V	8
AR		Art	9
AR		Art history, upper division	6
		Natural sciences 1	3
		Electives	6

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Printmaking Concentration
A technical and conceptual background necessary for graduate study and involvement in personal creative work is given. The program provides experience in intaglio, relief, lithographic, and serigraphic media and allows students to pursue an individualized direction in the senior year. Junior and senior courses are offered in workshops to encourage personal interaction and professional attitudes.

See basic courses for freshman and sophomore years - B.F.A.

Junior Year			**Credits**
AR	365, 366	Printmaking II, III	8
AR		Art	3
PL	318	Aesthetics-Visual Arts	3
		Arts and humanities 1	3
		Behavioral and social sciences 1	6
		Communication and reasoning 1	3
		Natural sciences 1	4
		Elective	2

Senior Year			**Credits**
AR	465, 466	Printmaking IV, V	8
AR		Art	9
AR		Art history, upper division	6
		Natural sciences 1	3
		Electives	6

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Sculpture Concentration
Experience in various materials and processes is offered to explore concepts of sculpture. The program provides broad technical and aesthetic knowledge in the junior year. Students use this knowledge in a more personal and specialized manner in their senior year.

See basic courses for freshman and sophomore years - B.F.A.

Junior Year			**Credits**
AR	371	Sculpture II	4
AR	372 or 373	Sculpture III or IV	4

AR		Art	3
PL	318	Aesthetics-Visual Arts	3
		Arts and humanities 1	3
		Behavioral and social sciences 1	6
		Communication and reasoning 1	3
		Natural sciences 1	4
		Elective	2

Senior Year			**Credits**
AR	470	Sculpture V (2 semesters)	8
AR		Art	9
AR		Art history, upper division	6
		Natural sciences 1	3
		Electives	6

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Minor in Art History
Art history gives the student a unique visual education in art and humanities. A culture, an age is made

more pertinent and alive through visual images. Reference to visual objects contributes to understandings of the creative process for artists and laymen. A minor in art history has the potential of adding a different dimension and depth to humanistic learning.

Lower Division			**Credits**
AR	100	Introduction to the Visual Arts	3
		or	
AR	110	History of Western Art I	3
AR	111	History of Western Art II	3
AR	212	History of Western Art III	3

Select one course from the following:

AR	135	Introduction to Drawing	3
AR	160	Foundations Painting	3
AR	170	Foundations Sculpture	3

Upper Division		**Credits**
AR	Art history	15

Minor in Studio Art
A minor in studio art provides the student with basic technical skills and aesthetic understanding in at least one of the major studio arts. Students should consult with an an department adviser to plan a course of study in one of the following fields: fibers, metalsmithing and jewelry, painting, photo image making, pottery, printmaking, or sculpture.

Lower Division			**Credits**
AR	100	Introduction to the Visual Aris	3
		or	
AR	110	History of Western Art I	3
AR	111	History of Western Art II	3
AR	212	History of Western Art III	3
AR		200-level studio introduction	3

Select one course from the following:

AR	135	Introduction to Drawing	3
AR	160	Foundations Painting	3
AR	170	Foundations Sculpture	3

Upper Division

A minimum of 12 credits of studio an at the 300-400 level.' After consultation with an *Art* Department advisor.

Graduate Programs in Art
The *Art* Department otters a master of fine arts degree program with specializations in drawing, fibers, graphic design. metalsmithing and jewelry, painting, printmaking. and sculpture. The program requires 60 credits in two full-time academic years.

A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF ECONOMICS

Office in Clark Building, Room C 312
Associate Professor Charles F. Revier, Chair
Economics applies to any study of human endeavor where scarce resources must be allocated among competing uses. Inflation, recession, income and wealth distribution, monopoly power, and environmental decay are topics covered in economics.

Economics majors are expected, upon graduation, to be able to examine the logic and understand the quantitative methods in rational economic decision making; to be knowledgeable in various fields of economics such as international trade, finance and banking, environmental resources, and political economics; and to gain a broad liberal arts education.

Major in Economics
This major, which leads to the bachelor of arts degree, prepares students for public affairs. business positions, and government service. It is a foundation for prelaw students and for graduate study leading to teaching and research positions in universities, governments, and private enterprise.

Students desiring to be certified to teach in junior or senior high schools must complete teaching endorsement requirements in social studies. See the Teacher Certification section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies, College of Applied Human Sciences section of this catalog.

Economics majors must achieve a minimum 2.00 grade point average in all economics (EC) courses taken at Colorado State.

Freshman Year			**Credits**
CO	150	College Composition	3
EC	100	Principles of Macroeconomics	3
EC	102	Principles of Microeconomics	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	141	Calculus in Management Sciences	3
		Behavioral and social sciences 1	6
		Communication and reasoning 1	3
		Natural sciences 1	7
		Physical education/wellness	2

Sophomore Year		**Credits**
	Arts and humanities 1	6
	Behavioral and social sciences 1	9
	Business	3
	Natural sciences 1	3
	Electives	10

Junior Year			**Credits**
EC	304	Intermediate Macroeconomics	3
EC	306	Intermediate Microeconomics	3
EC	335/EA 335	Introduction to Econometrics	3
EC		Economics 2	3

ST	301	Introduction to Statistical Methods	3
		Arts and humanities 1	3
		Behavioral and social sciences 1	3
		Business	3
		Electives	8

Senior Year			**Credits**
EC	370	Comparative Economic Systems	3
		or	
EC	372	History of Economic Institutions and Thought	3
		or	
EC	376	Marxist Economic Thought	3
		or	
EC	379/HY 379	Economic History of the United States	3
		or	
EC	474	Recent Economic Thought	3
EC	495	Independent Study	1
EC		Economics:	12
		Arts and humanities 1	3
		Behavioral and social sciences 1	3
		Electives	10

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

2. EC 300/EA 300 may not be counted as part of the required EC credits.

Minor in Economics
The minor in economics is designed to prepare students for understanding current socioeconomic problems in the areas of resource allocation, inflation, unemployment, income distribution, environmental degradation, and monopoly power. The program can be of help to students interested in careers in business management, teaching, government, banking, public policy, and related areas.

Economics minors must achieve a 2.00 grade point average in all courses taken for the minor.

Lower Division			**Credits**
EC	100	Principles of Macroeconomics	3
EC	102	Principles of Microeconomics	3

Upper Division			**Credits**
EC	304	Intermediate Macroeconomics	3
EC	306	Intermediate Microeconomics	3

*Plus nine credits of economics electives. with prior department approval. numbered EC 301 or higher.

*Additional course work may be required because of prerequisites.

Graduate Programs in Economics
Programs lead to the degrees of master of arts and doctor of philosophy. Three primary fields of specialization are presently emphasized: economic theory and quantitative methods, social and political economics, and international and development economics. Within these areas, further field specialization is available.

A brochure describing the graduate program in economics is available from the department. Also refer to the *Graduate and Professional Bulletin.*

DEPARTMENT OF ENGLISH
Office in Eddy Building, Room 359

Professor Pattie Coweli, Chair

University Requirements in Composition
Requirements are presented in the Undergraduate Degree Requirements section, University Studies Program in this catalog.

Major in English
The undergraduate major in English, which leads to the bachelor of arts degree, develops a student's (1) knowledge of the cultural backgrounds, literary traditions, and great works of English, American, and World literature; (2) ability to analyze texts and apply different critical perspectives to them; and (3) ability to write for both specialized and general audiences.

Offering many elective programs, some of which are interdisciplinary, this major prepares students for careers which require liberally educated people who can think critically, analyze texts effectively, and write well. The English major also qualifies graduates to continue in professional or graduate education or, when combined with the professional education sequence, to teach English in secondary schools. As a minor or second major, English complements most other majors and preprofessional programs (such as business, computer science, prelaw, premedicine, etc.) to create an educated, well-rounded candidate for public and private sector employment.

A student may elect to concentrate in linguistics or creative writing. A variety of scholarships are available. Honors sections are available in Introduction to Humanities and a variety of other courses.

In order for the department to assess how well its 'majors have achieved the goals outlined above, all graduating seniors are required to submit to the department in their last semester a portfolio consisting of at least three papers written in upper-level English classes (see department for further details).

For graduation, an English major must attain a minimum grade point average of 2.00 in upper-division English courses.

Freshman Year		**Credits**	
CO	150	College Composition	3
E	140	Introduction to Literature	3
E	160	Mythical and Biblical Backgrounds	3
HY		History (2 semesters)	6
M		Mathematics	3
PL		Philosophy 1	3
SP	200	Public Speaking and Discussion	3
		or	
SP	231	Oral Reading	3
		Logic and critical thinking	3
		Physical education/wellness	2

Sophomore Year			**Credits**
E	240	Introduction to Poetry	3
E	270	Introduction to American Literature	3
E	275	Introduction to British Literature	3
		Natural sciences	10
		Option	9-10

Junior and Senior Years			**Credits**
CO	301A-C	Intermediate Composition	3
E	320A-D	Introduction to the Study of Language	3
		or	
E	326	Development of the English Language	3
E	341	Principles of Literary Criticism	3
E	342	Shakespeare I	3
		or	
E	343	Shakespeare II	3

E		Major author I	3
E		English. upper division (include one course from each of the following categories: Medieval/Renaissance British; 18th- and 19th-century British and American; 20th-century British and American; and literature in translation)3	18
		Arts and humanities 1	9
		Behavioral and social sciences 1	6
		Option 2, upper-division courses to complete 21-credit requirement	

1. See departmental advising sheet for requirements in these areas.

2. The option requirement can be met by completing the second year of a foreign language. or by completing a 21 -credit. coherent study in any field. Twelve of the 21 credits must be upper division. The option requirement must be approved by the student's adviser. Students opting for a foreign language should begin. or, if they have a language background. continue their foreign language courses during the freshman year. Those not opting for a foreign language should take arts and humanities and behavioral and social sciences electives during their freshman year and begin the option in the sophomore year,

3. Students in the creative writing concentration should count E 412A or B as part of their upper-division English electives.

Teaching Endorsement

Students planning to qualify for a teaching endorsement in English are not held for the option requirement and instead must fulfill the professional education sequence in the School of Occupational and Educational Studies. The following variations in the regular English major are required:

1. E 322, E 323. E 402. E 405. PY 100, SP 200, SP 231.

2. The requirement for English upper-division electives is reduced from 18 credits to 15 credits. selecting one course from each of the following categories: Medieval/Renaissance; 18th- and 19-century British and American; 20th-century British and American: and literature in translation. One course must be a major authors course.

3. Three credits of' behavioral and social sciences are required instead of six as shown above.

CREATIVE WRITING CONCENTRATION

Freshman Year

Courses are the same as the English major freshman year.

Sophomore Year			**Credits**
Courses are the same as the English major sophomore year, and:			
E	210	Beginning Creative Writing	3

Junior Year			**Credits**
Courses are the same as the English major junior year. and:			
E	311 A	Intermediate Creative Writing-Fiction	3
		or	
E	311 B	Intermediate Creative Writing-Poetry	3

Senior Year			**Credits**
Courses are the same as the English major senior year. and:			
E	412A	Creative Writing Workshop-Fiction	3
		or	
E	412B	Creative Writing Workshop-Poetry	3
E		One course approved by the Creative Writing Committee	3

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Language Concentration
Freshman Year
Courses are the same as the English major freshman year. but excluding E 160.

Sophomore Year			**Credits**
E	240	Introduction to Poetry	3
E	270	Introduction to American Literature	3
E	275	Introduction to British Literature	3
		Natural sciences I, II	10
		Option 2	10

Junior and Senior Years			**Credits**
CO	301 A-C	Intermediate Composition	3
E	322, 323	English Language for Teachers I, II	6
E	326	Development of the English Language	3
E	342	Shakespeare I	3
		or	
E	343	Shakespeare II	3
E	360	Chaucer	3
E		English (upper division. at least 9 credits from CO 401. E 31 IA-C. E402. E403. E412A-B. E465. or additional courses approved by adviser)	18
		Arts and humanities	9
		Behavioral and social sciences	6
		Option 2	20

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

2. Students in this concentration must meet the option requirements by completing the second year of one foreign language and the first year of another foreign language. which totals 30 credits for students lacking previous training.

Minor in English
Students may consult with an English Department adviser to plan a course of study.

Students minoring in English must maintain a 2.0 grade point average in all English courses and a 2.0 grade point average in all upper-division English courses.

Minimum of 21 credits in English. at least 12 of which must be upper division. CO 150 may not count toward the minor. CO 301A-C and CO 401 may count toward the minor. A minimum of six credits must be taken at Colorado State.

Graduate Programs in English
The Department of English offers programs of study leading to the master of fine arts degree in creative writing or the master of arts degree in literature, teaching, teaching of English as a foreign language or second language. or communication development. The department shares in a joint master of arts degree in foreign languages and the teaching of English as a second language.

A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF FOREIGN LANGUAGES AND LITERATURES
Office in Eddy Building, Room 16
Associate Professor Tobin H. Jotres, Chair
The study of foreign languages and their related literatures and cultures is an essential part of a broad, liberal education. Gaining insight into a foreign culture through its primary system of thought, its language, generally furthers multicultural understanding and enhances international perspectives in a student's total program of study. Language study not only promotes awareness

of linguistic structures, but also of the function of language as a mental system for logic and critical thinking, everyday communication, and specialized discourse. Foreign language study is key to understanding the literature and thought of a particular culture. Literature study in turn will heighten abilities in discourse analysis necessary in today's world spectra. Advanced proficiency in foreign languages and thorough familiarity with the related cultures are particularly valuable in fields such as social work, international relations and political science, international business or finance, and the natural sciences.

The department offers majors in French, German, and Spanish. Undergraduate minors are offered in French, German, Japanese, Russian, and Spanish. Basic courses may also be taken in Arabic, Chinese, Italian, Japanese. Korean, and Latin. The programs in foreign languages, which lead to the bachelor of arts degree, emphasize oral and written proficiencies in the language of specialization. They also develop knowledge of the culture and the literature, and the critical and analytical skills requisite to an understanding of their relationships. The department encourages study abroad.

The Department of Foreign Languages and Literatures has adopted proficiency guidelines suggested as national standards by the American Council on the Teaching of Foreign Languages. These guidelines establish levels of functional competency in each of the following areas: oral and written uses of the language; practical knowledge of its cultural expressions; and the analytical and critical reasoning skills requisite to understanding and successful communication in representative intellectual and cultural contexts. The department requires all undergraduate majors to take a written and oral Outcomes Assessment Examination in their language during their final academic semester.

Students who wish to be certified to teach in junior or senior high schools must complete teaching endorsement area requirements in foreign language. See the Teacher Certification section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies, College of Applied Human Sciences section of this catalog.

Foreign Language Majors

Freshman Year			**Credits**
CO	150	College Composition	3
HY	100, 101	Western Civilization I, II	6
		or	
HY	170, 171	World Civilizations. Ancient-Present	6
L		Foreign languages, lower division	10
M		Mathematics	3
		Arts and humanities'	3
		Communication and reasoning	3
		Physical education/wellness	2

Sophomore Year		**Credits**
L	Foreign languages, lower and upper division	9
	Arts and humanities'	3
	Behavioral and social sciences	3
	Communication and reasoning'	3
	Natural sciences	6

Junior Year		**Credits**
L	Foreign languages, upper division	15
	Arts and humanities	3
	Behavioral and social sciences	3
	Natural sciences	4

Senior Year		**Credits**
L	Foreign languages, upper division	18
	Arts and humanities	3
	Behavioral and social sciences	3

1. See departmental advising sheet for University Studies and College Core Curriculum requirements in these areas.

Major in French, German, or Spanish
Majors in French. German. or Spanish must complete 36 upper-division credits in course work in the language of specialization. including the following:

			Credits
L	300, 301	Third-Year Language I, II	6
L	310	Introduction to Literary Study	3
L	335	Introduction to Civilization	3
		or *	
L	336	Introduction to Spanish-American Civilization	3
L	350, 351	Survey of Literature I, II	6
L	400	Fourth-Year Language I	3
L	426	Phonetics	3
L	435	Advanced Studies in Civilization	3
L		Language literature	9

1. Select from the following: L 449. L 450. L 452. L 453 (required for majors in Spanish), and L 454.

L 401, Fourth-Year Language II. is strongly recommended for all majors and is required for students seeking teacher certification. Twenty-four semester credits in a second field are required for teacher certification.

It is also recommended that majors in foreign languages complete 15 credits of course work beyond' the 100 level as part of a coherent program of complementary studies. These courses should be selected with the help and approval of the major adviser from offerings in such fields as anthropology, art, English (literature and linguistics). geography, history, philosophy. political science. or the performing arts. This complementary course work may be used to meet College Core Curriculum and University Studies Program requirements or the requirements of a minor or second major.

Minor Programs
A minor in a foreign language offers opportunities for studying the language and culture of other countries and complements many major fields. A student with a broadly based education, including a foreign language. will be better prepared to deal with changing technological, economic, and social conditions on an international scale. A student who minors in a foreign language may expect to develop sufficient competency to speak and write with reasonable accuracy and fluency while pursuing interests in language, literature, and culture.

Minor in French
Minimum of 21 credits in French. at least 15 of which must be upper division, including at least one literature or civilization course and at least one course at the 400 level. Courses in translation may not be used to meet the requirements for the minor.

Minor in German
Minimum of 21 credits in German, at least 15 of which must be upper division. including at least one literature or civilization course and at least one course at the 400 level. Courses in translation may not be used to meet the requirements for the minor.

Minor in Japanese
Minimum of 21 credits in Japanese, a(least 12 of which must be upper-division credits. Courses in translation not allowed.

Minor in Russian
Minimum of 21 credits in Russian. at least 12 of which must be upper-division credits. Courses in translation not allowed.

Minor in Spanish

Minimum of 21 credits in Spanish, at least 15 of which must be upper division, including at least one literature or civilization course and at least one course at the 400 level. Courses in translation may not be used to meet the requirements for the minor.

Graduate Programs in Foreign Languages
Students wishing to pursue advanced studies leading to the M.A. degree in French, German, or Spanish or a joint M.A. degree in foreign languages and the teaching of English as a second language should consult the *Graduate and Professional Bulletin.*

DEPARTMENT OF HISTORY

Office in Clark Building, Room B 357 Professor Mark T. Gilderhus, Chair

Major in History
A major in history leads to the bachelor of arts degree and provides a broad liberal arts education. Through the study of human experience, students acquire an understanding of human affairs, an ability to think critically, and a sense of proportion and perspective. History provides a form of knowledge which cannot be rendered obsolete by a changing technological world. It also provides academic preparation for a wide variety of careers in public service, politics, government, law, business, and teaching. Specialized programs train students in historic preservation and restoration, and in archival and records management.

The history program is designed to enhance the students' knowledge about the past, improve their ability to think logically and critically, and to express themselves in clear and precise language. These goals are evaluated through discussion and written work during and after the sophomore year.

Liberal Arts Concentration
This concentration provides a solid preparation in the major and offers many elective credits for individualized study. It is usually chosen by persons planning further professional study in such areas as law, medicine, ministry, librarianship, archival and record management, or graduate work.

Freshman and Sophomore Years			Credits
CO	150	College Composition	3
HY	200	Prologue	1
HY		History	12
M		Mathematics	3
		Arts and humanities:	6
		Behavioral and social sciences 2	9
		Natural sciences:	10
		Physical education/wellness	2
		Electives	9

Select one of the following options:2

Language Option

L	105, 107	First-Year Language I, II	10

Select one course from the following:

CS	110	Personal Computing I	4
CS	150	Introduction to FORTRAN Programming	*3*
PL	110	Logic and Critical Thinking	3
PL	112	Reasoning and Problem Solving	3
PL	210	Introduction to Formal Logic	3
ST	201	General Statistics	3
ST	301	Introduction to Statistical Methods	3
ST	311	Statistics for Behavioral Sciences I	3

Quantitative Option

CO	301A-C	Intermediate Composition	3
		or	
SP	200	Public Speaking and Discussion	3

CS	110	Personal Computing 1	4
		or	
CS	150	Introduction to FORTRAN Programming	3

Select one course from the following:

ST	301	Introduction to Statistical Methods	3
ST	307/EH 307	Introduction to Biostatistics	3
ST	309	Engineering Statistics	3
ST	311	Statistics for Behavioral Sciences I	3

Select one course from the following:

ST	302	Design of Experiments	3
ST	304	Multiple Regression Analysis	3
ST	305	Sampling Techniques	2
ST	312	Statistics for Behavioral Sciences II	3
ST	375	Nonparametric Statistical Methods	2

Junior and Senior Years			**Credits**
HY	492	Seminar	3
HY		History, upper-division U.S	6
HY		History, upper-division European or non-Western	6
HY		History electives	11
		Arts and humanities	6
		Social sciences 2	3
		Electives	25

1. One lower-division course in each of the following areas: U.S. history. premodern world/European history, modern world/ European history, non-Western history.

2. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Social Studies Teaching Concentration

History majors who wish to teach in junior or senior high schools must complete requirements in the University Studies Program and in professional education. Students must also complete the requirements for the social studies undergraduate teaching endorsement listed in the School of Occupational and Educational Studies, College of Applied Human Sciences section in this catalog. This concentration requires 142 credits.

Freshman and Sophomore Years			**Credits**
CO	150	College Composition	3
ED	255	Introduction to Education	2
HY	200	Prologue	1
M		Mathematics	3
PY	100	General Psychology	3
SP	200	Public Speaking and Discussion	3
		Arts and humanities	12
		Common history and social studies requirements 2	33
		Communication and reasoning	3
		Natural sciences	10
		Physical education/wellness	2

Junior and Senior Years			**Credits**
ED	355	Educational Psychology	3
ED	401A	Teaching Classroom Reading Literacy Skills	2
ED	428	Exceptionality, Diversity, and Human Relations	3
ED	4.50	Methods and Evaluation of Instruction	4
ED	451	Microteaching Laboratory	1
ED	465	Methods and Materials in Social Studies	4

ED	485B	Student Teaching-Secondary	15
ED	486C	Practicum-Exceptionality and Diversity	1
ED	493	Seminar in Professional Relations	1
HY	492	Seminar	3
		Common history and social studies requirements	30

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

2. These requirements for the social studies undergraduate teaching endorsement are listed in the School of Occupational and Educational Studies, College of Applied Human Sciences section in this catalog.

Minor in History
The minor, consisting of 21 total credits, enables students with an interest in history to satisfy their curiosity.

Lower Division
Appropriate courses as determined in consultation with a History Department adviser.

Upper Division
Minimum of 12 credits,

Graduate Programs in History
The department offers graduate programs leading to the master of arts degree. The Ph.D. degree is offered jointly with the Department of History of the University of Colorado, Boulder, A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF MUSIC, THEATRE, AND DANCE

Office in Music Building, Room 102
Associate Professor Robert F. Nisbett, Chair

Program in Music
Program goals encourage, develop, and offer high standards of teaching, scholarship. research, and performance in music; provide a stimulating musical environment for campus and community; and prepare and educate music teachers, music therapists, and performers.

Undergraduate curricula lead to the bachelor of arts degree in music, and the bachelor of music degree in music with concentrations in music education. music therapy, or performance (applied music).

Nonmusic majors with musical skills and aptitudes may participate in a chorus, band, or orchestra. and enroll in selected music classes. Individual lesson time, however, for nonmusic majors is limited. See Courses of Instruction, applied music instruction courses in this catalog.

Music majors are expected to pass comprehensive examinations in music history and theory upon completion of course sequences in those areas. Students are expected to recognize music literature of all periods through aural and score analysis. Performance skills are tested at the end of the sophomore year and in a graduation recital if required by the degree option. Some programs require satisfactory completion of supervised student teaching, an internship, or a senior project. In addition. all students must pass a piano proficiency examination.

PROGRAM REQUIREMENTS

Performance Auditions
An audition is required of all freshmen before admission to the bachelor of music program. While an audition is not a prerequisite for admission to the bachelor of arts degree in music, students in this program must also audition on their major instrument/voice for evaluation of their proficiency. In cases where a personal audition is not feasible. a tape demonstrating performance ability may allow provisional acceptance. All transfer .student applicants must pass an audition regardless of the degree.

Applied Study, Ensembles, and Recitals

Every music major must declare a performing instrument/voice. with faculty determining the proficiency needed; they must register for applied instruction each semester until program requirements (for applied study) are met. In addition. all music majors must register for a minimum of one ensemble every semester until program requirements (for applied study) are met.

A performance exam must be passed during the fourth semester of applied study to receive permission to register for upper-division applied study. All degree programs, except the B.A. degree in music, require at least one semester of upper-division applied study for graduation.

To perform any recital required for a degree. a student must be registered for applied study. Music majors concentrating in performance must present a junior and senior solo recital. Music majors concentrating in music education present a joint solo recital; recitals may not be given during the semester of student teaching.

Piano Proficiency

All music majors must pass a piano proficiency examination. Most music majors develop the skills to meet this requirement with class piano courses. If development is not adequate. study continues until satisfactory. Music majors concentrating in music education must pass the examination prior to the semester of student teaching. Music therapy students must pass the examination before being eligible to enroll in senior music therapy practicum courses.

Concert/Recital Attendance Requirement

All undergraduate music majors must attend 105 performances sponsored by the department in order to graduate. For further information, consult the current Music Student Handbook.

Review of Student Progress

During the freshman and sophomore years, the faculty annually examines each student's progress.

Scholastic Standards

A minimum grade of C is required in all music courses used to satisfy the requirements of the major programs (B.A. and B.M.) in music. Music majors concentrating in music education must also complete all required education courses with a minimum grade of C.

Second Major

While students may complete concurrently the requirements for a second major in any college, they may also wish to consider the combination of any two majors offered within the music program. For example, the combination of both music education and music therapy will better prepare a student to teach handicapped children in the public schools. For general information, see Second Major Requirements in the Graduation Requirements section of this catalog. For specific information, see program advisers in the Department of Music, Theatre, and Dance.

Music Therapy-Music Education Certificate

As a part of the music therapy curriculum, the program in music offers specialized training for music teachers who work with children and youth enrolled in programs which have been mandated by the Education of All Handicapped Children Act (PL 94-142). The curriculum consists of 14 semester credits beyond the bachelor's degree in music education. The program is approved by the National Association for Music Therapy, which awards a certificate upon completion of the following courses: MU 153, MU 241, MU 440, MU 486A-B, and PY 460.

Major in Music (B.M.)

Music Education Concentration

Music education prepares students for teaching vocal, instrumental, and general music in elementary and secondary schools.

A three-track program leads to certification, K- 12, in vocal-general music, instrumental-general music, or vocal-general music and instrumental. This concentration requires 146-150 credits. Both elementary and secondary student teaching will be completed spring semester. See also the

Teacher Certification section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies, College of Applied Human Sciences section of this catalog.

Freshman Year			**Credits**
CO	150	College Composition	3
M		Mathematics	3
MU	117, 118	MusicTheory I, II	8
MU	131	Introduction to Music History and Literature	3
MU	150	Piano Class I	2
MU	204	Marching Band	1
MU	272A-V	Applied Music Instruction (major instrument or voice) (2 semesters)	4
MU		Ensemble (1-2 semesters)	1-2
PY	100	General Psychology	3
		Natural sciences 2	4
		Physical education/wellness	2

Sophomore Year			**Credits**
ED	255	Introduction to Education	2
MU	204	Marching Band	1
MU	217, 218	MusicTheory III, IV	8
MU	252E	Instrumental Techniques-Low Strings	1
MU	252F	Instrumental Techniques-High Strings	1
MU	254	Beginning Conducting	2
MU	272A-V	Applied Music Instruction (major instrument or voice) (2 semesters)	4
MU	286B	Practicum-Music Education	1
MU		Ensemble (1-2 semesters)	1-2
SP	200	Public Speaking and Discussion	3
		Arts and humanities 2	3
		Logic and critical thinking 2	3
		Natural sciences 2	3

Junior Year			**Credits**
ED	355	Educational Psychology	3
ED	401 A	Teaching Classroom Reading/Literacy Skills	2
MU	252A-B	Instrumental Techniques-Brass	2
MU	252G	Instrumental Techniques-Percussion	1
MU	334, 335	Music History I, II	6
MU	355	Choral Conducting and Literature	2
MU	356	Instrumental Conducting and Literature	2
MU	416	Stylistic Analysis	3
MU	472A-V	Applied Music Instruction (major instrument or voice) (2 semesters)	4
MU	486B	Practicum-Music Education	1
MU		Ensemble (2 semesters)	2
		Arts and humanities 2	3
		Behavioral and social sciences 2	3

Senior Year			**Credits**
ED	428	Exceptionality, Diversity, and Human Relations	3
ED	450	Methods and Evaluation of Instruction	4
ED	451	Microteaching Laboratory	1
ED	475	Elementary School Music Methods	4
ED	476	Choral Methods for Secondary Schools	2
ED	477	Instrumental Methods lot Secondary Schools	2
ED	486C	Practicum-Exceptionality and Diversity	1
ED	486H	Practicum-Music Education	1
MU	252C-D	Instrumental Techniques-Woodwinds	2
MU	265A	Diction-German/English	1

MU	411	Orchestration	3
MU	420	Marching Band Techniques	2
MU	472A-V	Applied Music Instruction (major instrument or voice) (2 semesters)	4
MU	496H	Group Study-Pedagogy (voice)4	1
MU		Ensemble (2 semesters)	2

Fifth Year			**Credits**
ED	485A	Student Teaching-Elementary 5	7-8
ED	485B	Student Teaching-Secondary 5	7-8
ED	493	Seminar in Professional Relations	1
MU	469	Instrumental Literature	2
		Arts and humanities 2	6
		Behavioral and social sciences 2	3
		Natural sciences 2	3

1. Required for percussion and wind instrument majors.

2. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

3. Required for voice majors.

4. Required for instrumental majors.

5. Fifteen credits of student teaching (eight credits at one level and seven credits at the other) must be completed.

Music Therapy Concentration

Music therapy is an allied health profession whose members generally work as an interdisciplinary team in the role of learning specialists or providing comprehensive health care. Music therapists are generally sought for employment by community agencies, schools, hospitals, clinics, institutions, and correctional facilities. In addition to music courses, the program requires offerings in psychology, sociology, philosophy, arts and humanities, anatomy, computer science, and a core emphasizing clinical and research aspects of music therapy. Successful completion of all curricular requirements, plus a six-month clinical internship, qualifies the candidate to sit for the National Certification Examination and for eligibility for admission to the National Registry, maintained by the National Association for Music Therapy. Students are not qualified to work as professional music therapists until they have become registered by the National Association for Music Therapy.

A two-year preprofessional curriculum provides the academic background for the two-year professional curriculum normally beginning the junior year and leading to the bachelor's degree. This concentration requires 153 credits.

Preprofessional Music Therapy Curriculum

At least two years (64 semester credits) of acceptable college work are required for admission to the professional curriculum.

Courses in preprofessional music therapy offered at Colorado State must be completed before students can begin the professional course.

Freshman Year			**Credits**
C	103	Chemistry, and Society	3
CO	150	College Composition	3
D	120A	Dance Techniques Modern	2
MU	117, 118	MusicTheory I, II	8
MU	131	Introduction to Music History and Literature	3
MU	155	Guitar Class I	2
MU	241	Introduction to Music Therapy	3
MU	272A-V	Applied Music Instruction (major instrument or voice) (2 semesters)	4

MU		Ensemble (2 semesters)	2
PY	100	General Psychology	3
S	100	General Sociology	3

Sophomore Year			**Credits**
BY	102	Attributes of Living Systems	4
		or	
Z	110	Principles of Animal Biology	4
M		Mathematics	3
MU	217, 218	Music Theory III, IV	8
MU	252A-B	Instrumental Techniques-Brass	2
MU	252C-D	Instrumental Techniques-Woodwinds	2
MU	252G	Instrumental Techniques-Percussion	1
MU	272A-V	Applied Music Instruction (major instrument or voice) (2 semesters)	4
MU	286A	Practicum-Music Therapy	1
MU		Ensemble (2 semesters)	2
OT	215	Medical Terminology	1
PL	110	Logic and Critical Thinking	3
		or	
PL	210	Introduction to Formal Logic	3
		or	
PL	415	Logic and Scientific Method	3
		Arts and humanities	3
		Physical education/wellness	2

Junior Year			**Credits**
AY	300/PS 300	Principles of Human Anatomy and Physiology	4
CS	110	Personal Computing I	4
MU	153	Piano Class IV	2
MU	157	Voice Class I:	2
MU	254	Beginning Conducting	2
MU	335	Music History II	3
MU	342	Psychology of Music	3
MU	440	Music Therapy Methods I	3
MU	443, 444	Music Therapy Methods II, III	6
MU	472A-V	Applied Music Instruction (major instrument or voice) (1 semester)	2
MU	486A	Practicum-Music Therapy	1
MU		Ensemble (1 semester)	1
PY	320	Abnormal Psychology	3

Senior Year			**Credits**
HD	211	Infancy and Childhood	3
		or	
HD	311	Adolescence	3
		or	
HD	322	Adult Development and Aging	3
		or	
PY	260	Child Psychology	3
		or	
PY	465	Adolescent Psychology	3
HD	323	Death, Dying, and Grief	3
MU	343	Research Methods in Music Therapy	3
MU	445	Improvisation Techniques in Music Therapy	2
MU	486A	Practicum-Music Therapy 12 semesters)	5
MU		Music	4
ST	201	General Statistics	3
		or	
ST	301	Introduction to Statistical Methods	3
		or	

ST	311	Statistics for Behavioral Sciences 1	3
		Arts and humanities	6
		Communication and reasoning	3

Fifth Year			**Credits**
AY	445	The Human Brain and Its Disorders	4
MU	411	Orchestration	3
PY	452	Cognitive Psychology	3
		or	
PY	454A	Physiological Psychology	3
		Arts and humanities	3

1. See departmental advising sheet and/or College Core Curriculum for specific requirements in these areas.

2. Voice majors must substitute MU 265A and B.

3. Select from piano improvisation, arranging, conducting. ensemble. or a minor instrument.

Performance Concentration

Students concentrating in performance may elect either an instrumental or vocal option. Students are encouraged to develop their talent potential and demonstrate a high degree of proficiency through frequent public performance. The degree prepares the student for a professional career as a performer or private music teacher.

General Requirements			**Credits**
CO	150	College Composition	3
M		Mathematics	3
MU	117, 118	MusicTheory I, II	8
MU	131	Introduction to Music History and Literature	3
MU	217, 218	Music Theory III, IV	8
MU	254	Beginning Conducting	2
MU	272A-V	Applied Music Instruction (major instrument or voice) (2 semesters)1	4-6
MU	311, 312	Counterpoint I, II	4
MU	334, 335	Music History I, II	6
MU	355	Choral Conducting and Literature	2
		or	
MU	356	Instrumental Conducting and Literature	2
MU	411	Orchestration	3
MU	416	Stylistic Analysis	3
MU	471	Recital (1-2 semesters)5	1-2
MU	472A-V	Applied Music Instruction (major instrument or voice) 14 semesters)	12
MU		Ensemble (6-8 semesters)6	6-8
PY	100	General Psychology:	3
SP	200	Public Speaking and Discussion'	3
		Arts and humanities	3-12
		Behavioral and social sciences	6-12
		Logic and critical thinking	3
		Natural sciences	10
		Physical education/wellness	2

Options			**Credits**
Select one of the following options:			
Composition			
MU	252A-G	Instrumental Techniques	7
MU	272A-V	Applied Music Instruction (major instrument or voice) (2 semesters)	4
MU	272F	Applied Music Instruction Composition (2 semesters)	4

Orchestral Instrument

MU	272A-V	Applied Music Instruction major instrument) (2 semesters)	6
MU	469	Instrumental Literature	2
MU		Music	4

Organ

L		Foreign language	10
MU	272H	Applied Music Instruction-Organ 12 semesters)	6
MU	437	History and Structure of the Organ	2
MU	468	Organ Literature	2
MU		Music	4

Piano

L		Foreign language	10
MU	2721	Applied Music Instruction-Piano (2 semesters)	6
MU	407	Accompanying (2 semesters)	2
MU	465	Keyboard Literature	2
MU		Music	4

Piano Pedagogy

L		Foreign language	10
MU	2721	Applied Music Instruction-Piano (2 semesters)	6
MU	407	Accompanying (2 semesters)	2
MU	465	Keyboard Literature	2
MU	495G	Independent Study-Pedagogy (2 semesters)	6
MU		Music	4
PY	260	Child Psychology	3
		or	
PY	465	Adolescent Psychology	3

String Pedagogy

MU	272K-P	Applied Music Instruction (major instrument) (2 semesters)	4
MU	272K-P	Applied Music Instruction (complementary instrument: violinists take viola and vice versa; cellists take bass and vice versa; guitarists take electric bass) (1 semester)	2
MU	469	Instrumental Literature	2
MU	495E	Independent Study-Music Literature	2
MU	495G	Independent Study-Pedagogy	2
MU		Music	4
PY	260	Child Psychology	3
		or	
PY	465	Adolescent Psychology	3

Voice

L		Foreign language (German)	10
L		Foreign language (French or Italian)	10
MU	265A	Singers' Diction-German/English	1
MU	265B	Singers' Diction-French/Italian	1
MU	2721	Applied Music Instruction-Piano (2 semesters)	4
MU	272Q	Applied Music Instruction-Voice (2 semesters)	6
MU	466	Song Literature	2
MU		Music	2

1. MU 272F is not allowed for the composition option.

2. MU 311 *or* MU 312 required for the piano pedagogy or voice options; MU 312 *only* required for the string pedagogy option.

3. MU 355 required for the organ and voice options; MU 356 required for the orchestral instrument and string pedagogy options; neither MU 355 nor MU 356 required for the piano pedagogy option.

4. Not required for the piano pedagogy or voice options.

5. Only the piano pedagogy and string pedagogy options require one credit.

6. The piano and piano pedagogy options require six credits; all other options require eight credits.

7. Not required for the voice option.

8. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Major in Music (B.A.)
This major permits students to study music within the larger context of a liberal education. In comparison to majors leading to the bachelor of music degree, less emphasis is placed on studies specifically in music.

A major paper, a lecture/recital, or a full recital is required of seniors in this degree program.

The option requirement may be used to enhance opportunities for employment after graduation. Option programs and advisers are established in many fields.

			Credits
Music Studies			**48**
MU	117, 118	MusicTheory I, II	8
MU	131	Introduction to Music History and Literature	3
MU	217, 218	MusicTheory III, IV	8
MU	272A-V	Applied Music Instruction (major instrument or voice) (4 semesters)	8
MU	334-335	Music History I, II	6
MU		Ensemble (4 semesters)	4
MU		Theory (upper division)	2
		Music electives (select from the following: history and literature; theory, composition, or orchestration; applied music-performance; maximum of 4 credits in ensemble)	9

			Credits
General Studies			**49**
Including the following:			
CO	150	College Composition	3
M		Mathematics	3
SP	200	Public Speaking and Discussion	3
		Arts and humanities	6
		Behavioral and social sciences	12
		Logic and critical thinking	3
		Natural sciences	10
		Physical education/wellness	2
		Electives	7

Foreign Language	**10**
	Credits
Option (A coherent field of study outside the field of music, including at least 12 upper-division credits)	21

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Minor in Music

A minor in music enables the student to broaden career opportunities or pursue avocational interests, If a student has a teaching major in another area and wishes to acquire certification in music, he/she should consult with a music adviser 1 or appropriate courses and requirements. The student must complete a minimum of 24 credits of which a minimum of 12 must be upper division. A maximum of four ensemble credits are allowed.

Lower Division			**Credits**
MU	117, 118*	MusicTheory I, II	8
MU*		Music'	4

Upper Division			**Credits**
MU	334, 335	Music History I, II	6
MU*		Music	6

1. These courses may be either lower or upper division.

* Additional course work may be required because of prerequisites.

Minor in Musical Theatre

Students with majors other than dance. theatre. *or* music will take the following courses:

Lower Division			**Credits**
D	121A	Dance Techniques II-Modern	2
D	220A	Dance Techniques Ill-Modern	2
D	226	Dance Choreography I	2
MU	272Q	Applied Music Instruction-Voice	4
TH	141	Introduction to Theatre	3
TH	151	Acting I	3

Upper Division			**Credits**
D	326*	Dance Choreography II	2
MU	472Q	Applied Music Instruction-Voice	4
TH	351	Acting II	3

Select one course from the following:

D	491	Workshop	3
D	495	Independent Study	3
MU	495A-H	Independent Study	3
TH	495	Independent Study	3

Students with majors in dance, theatre. *or* music must earn all twenty-eight credits in the two cognate disciplines outside the major. Music majors will choose the theatre and dance groups; theatre majors will choose the music and dance groups; dance majors will choose the music and theatre groups.

Dance Group-Lower Division			**Credits**
D	121A	Dance Techniques II-Modern	2
D	220A	Dance Techniques III-Modern	2
D	226	Dance Choreography I	2

Dance Group-Upper Division			
D	320A	Dance Techniques V-Modern	2
D	325	Dance Production	3
D	326*	Dance Choreography II	2
D	496	Group Study	2

Music Group-Lower Division			Credits
MU	131	Introduction to Music History and Literature	3
MU	272Q	Applied Music Instruction-Voice	4

Music Group-Upper Division			
MU	401	Opera Theatre	3
MU	472Q	Applied Music Instruction-Voice	4

Theatre Group-Lower Division TM			Credits
TH	151	Acting I	3
TH	255	Directing I	3
		or	
TH	495	Independent Study	3
TH	264	Theatrical Makeup	2

Select one course from the following:

TH	161	Technical Theatre I	3
TH	265	Design I	3
TH	363	Theatrical Costume Design	3

Theatre Group-Upper Division			
TH	351	Acting II	3

1. A minimum of five upper-division credits in theatre must be earned.

*Additional course work may be required because of prerequisites.

Graduate Programs in Music

Programs leading to the degree of master of music are available in composition, conducting (choral or orchestral), music education, music history and literature, performance, and theory. Applicants should have a B.M., B.M.E., or equivalent bachelor's degree. A description of these programs may be found in the *Graduate and Professional Bulletin.* For further information, contact the Department of Music, Theatre. and Dance.

Program in Theatre

Major in Performing Arts Theatre Concentration

The theatre concentration is a four-year program involving classroom and laboratory study as well as practical experience with productions of the experimental and main stages. Consistent with the theatre program's generalist philosophy, students are required to take courses in all of the basic theatrical disciplines. Qualified senior students may elect, upon approval, to enroll in a Special project in the area of their interest. Such projects include directing a full-length play. designing or lighting a main stage production, presenting an acting recital, or writing a major research paper.

The Theatre Program's Accountability Plan has three components: (1) a test on theatre backgrounds and an audition in which all students are expected to perform a brief scene from a selected play; (2) an evaluative session at the end of the sophomore year to determine their training emphasis during the final two years, with special reference to the two areas of acting/directing or technical theatre/design; and (3) a senior final project. which is selected as both the best culmination for the student's academic plan but also as a piece of work which, when properly documented, will help in school and professional applications. Records are to be kept of all three phases. Students will be asked to critique their educations at an exit session.

Students selecting a concentration in theatre should contact the Director of the Program in Theatre, 220 Johnson Hall, for additional information.

			Credits
CO	150	College Composition	3
M		Mathematics	3
SP	200	Public Speaking and Discussion	3

Arts and humanities	15
Behavioral and social sciences	15
Communication and reasoning	3
Natural sciences	10
Physical education/wellness	2
Option	12

With the approval of the adviser. majors will undertake a unified study program in business or in one department of the humanities or social sciences.

			Credits
TH	141	Introduction to Theatre	3
TH	151	Acting I	3
TH	160	Graphic Expression for the Theatre	2
TH	161	Technical Theatre I	3
TH	255	Directing I	3
TH	265	Design I	3
TH	286	Practicum	3-4
TH	341, 342	History of Theatre I, II	6
TH	486	Practicum	3-4
TH		Additional upper-division course	3

Select one course from the following:

AR	100	Introduction to the Visual Arts	3
AR	110	History of Western Art I	3
AR	111	History of Western Art II	3

Select one course from the following:

MU	130	Understanding Music	3
MU		Music appreciation	3

Select three courses from the following:

TH	351	Acting II	3
TH	355	Directing II	3
TH	361	Technical Theatre II	3
TH	365	Design II	3

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

MINORS IN THEATRE

The purpose of the theatre minors is to give students in related majors the opportunity to formalize their interest in theatre with an organized course of study. These minors will give students the opportunity for concentrated study in at least one of the basic theatre crafts as well as a background in general theatre practice and history. Students are encouraged to enroll in additional "cross topic" courses.

Acting/Directing

Lower Division			**Credits**
TH	141	Introduction to Theatre	3
TH'	151	Acting I	3
TH	255	Directing I	3

Upper Division			**Credits**
TH	341, 342	History of Theatre I, II	6
TH	351	Acting II	3
TH	355	Directing II	3

Design/Technical Theatre

Lower Division			**Credits**
TH	141	Introduction to Theatre	3
TH	161	Technical Theatre I	3

TH	265	Design I	3

Upper Division			**Credits**
TH	341, 342	History of Theatre I, II	6
TH	361	Technical Theatre II	3
TH	365	Design II	3.

PROGRAM IN DANCE

Major in Performing Arts Dance Concentration

The Dance Program curriculum is designed to meet the various needs of the student interested in dance. The performing arts major requires 46 credits with a concentration in dance and culminates in the bachelor of arts degree. Many students in dance choose to obtain a second major in business, exercise and sport science. music. occupational therapy. technical journalism. or theatre. The Dance Program also offers a dance minor. Students are placed in the technique level where they may best be challenged toward developing expertise in many forms and styles of dance. Visiting guest artists teach master classes. workshops. and choreograph for the students on a regular basis.

There are many performance opportunities available including the fully staged Winter and Spring Dance Concerts and the informal Studio Night. There are also performing. choreographing. and teaching opportunities with local studios and companies and at elementary..junior high, and senior high schools throughout the state. Dance students are encouraged to audition .tnd participate in departmental productions in which all three areas (music. theatre. and dance) collaborate.

All dance students are encouraged to audition for Creative and Performing Arts (CPA) Awards. These awards range from 5250-$500 per semester credited lo the student's University account. CPA Awards are given primarily to performing arts dance majors and minors who are of the intermediate/advanced levels of technique.

Upon graduation students will have achieved an intermediate/advanced level of proficiency in two of the following dance techniques; modern, ballet, and jazz. Students will have a theoretical foundation complete with practical experience in the area of dance education and a basic working knowledge of anatomy. kinesiology. and various movement theories relating to dance techniques. The graduating senior also will have completed the dance performance and production requirements. a senior project and supporting paper, and a comprehensive senior exam covering a variety of dance topics. Finally. graduating majors in performing arts-dance will have a solid knowledge and appreciation of the history and philosophy of dance from many cultures and time periods. Upon graduation dance students will be prepared for advanced study in dance at the graduate level .tnd for a variety of professional careers in the dance field.

Students selecting a concentration or a minor in dance should contact Jane Slusarski-Harris, Director of the Program in Dance. 120 Ammons Hall. for additional information.

Freshman and Sophomore Years			**Credits**
AP	100	Introductory Cultural Anthropology	3
AR	100	Introduction to the Visual Arts	3
		or	
AR	101	Visual Form	3
C	103, 104	Chemistry and Society. Laboratory	4
CO	150	College Composition	3
D	121A	Dance Techniques II-Modern	2
D	121B	Dance Techniques II-Ballet	2
D	121C	Dance Techniques II-Jazz	2
D	220A	Dance Techniques III-Modern	2
D	220B	Dance Techniques III-Ballet	2
D	220C	Dance Techniques III-Jazz	2
D	221A	Dance Techniques IV-Modern	2
D	221B	Dance Techniques IV-Ballet	2
D	221C	Dance Techniques IV-Jazz	2
D	226	Dance Choreography I	2
M		Mathematics	3

MU	130	Understanding Music	3
PY	100	General Psychology	3
S	100	General Sociology	3
SP	200	Public Speaking and Discussion	3
TH	151	Acting I	3
Z	101	Humans and Other Animals	3
		Arts and humanities	3
		Behavioral and social sciences	3
		Communication and reasoning	3
		Physical education/wellness	2

Junior Year			**Credits**
AY	300/PS 300	Principles of Human Anatomy and Physiology	4
AY	301	Human Gross Anatomy	5
D	320A	Dance Techniques V-Modern	2
		or	
D	320B	Dance Techniques V-Ballet	2
		or	
D	320C	Dance Techniques V-Jazz	2
D	321A	Dance Techniques VI-Modern	2
		or	
D	321B	Dance Techniques VI-Ballet	2
		or	
D	321C	Dance Techniques VI-Jazz	2
D	325	Dance Production	3
D	326	Dance Choreography II	2
D	330	Dance Repertory (2 semesters)	4
D		Dance elective	3

Senior Year			**Credits**
D	420A	Dance Techniques VII-Modern	2
		or	
D	420B	Dance Techniques VII-Ballet	2
		or	
D	420C	Dance Techniques VII-Jazz	2
D	421A	Dance Techniques VIII-Modern	2
		or	
D	421B	Dance Techniques VIII-Ballet	2
		or	
D	421C	Dance Techniques VIII-Jazz	2
D	426	Dance Choreography III	2
D	427	Dance History I	3
		or	
D	428	Dance History II	3
D		Dance electives	7

1. See department advising sheet and/or College Core Curriculum for requirements in these areas.

Minor in Dance

Students in related disciplines may enhance their professional competence by completing this minor.

Lower Division			**Credits**
D	120A	Dance Techniques I-Modem	2
D	120B	Dance Techniques I-Ballet	2
D	120C	Dance Techniques I-Jazz	2
D	121A-C	Dance Techniques II	2
D	220A-C	Dance Techniques III	2
D	221A-C	Dance Techniques IV	2
D	226	Dance Choreography I	2

Upper Division			Credits
D	427	Dance History I	3
		or	
D	428	Dance History II	3

Select 9 credits from the following:

D	320A-C	Dance Techniques VI	2
D	321A-C	Dance Techniques VII	2
D	325	Dance Production	3
D	326	Dance Choreography II	2
D	420A-C	Dance Techniques VII	2
D	421A-C	Dance Techniques VIII	2
D	426	Dance Choreography III	2
D	427	Dance History I	3
D	428	Dance History II	3
D	430	Labanotation	3
D	432*	Dance Therapy	3

1. Select the same subtopic (modern. ballet, or jazz) for each of these courses.

* Additional course work may be required because of prerequisites.

DEPARTMENT OF PHILOSOPHY

Office in Eddy Building, Room 41
Professor Richard F. Kitchener, Chair

Major in Philosophy

The study of philosophy, which leads to the bachelor of arts degree, broadens and intensifies liberal education while enhancing interpretive abilities in many fields. While some students plan for graduate school and teaching careers in philosophy, the broad relevance of philosophy to other fields permits most students to work toward goals such as professional or paraprofessional training in law, medicine, or theology.

Concentrations such as philosophy and bioethics or philosophy and religion prepare the student either for further study of philosophical issues related to these areas or for entering a different program of study. Such concentrations also combine easily with other majors in the University. See Second Major Requirements in the Graduation Requirements section of this catalog for a complete description of the program.

A central goal of the discipline of philosophy is to impart to the philosophy major a fundamental and comprehensive understanding of the major fields of philosophy. To evaluate mastery of this philosophical subject matter there will be a compulsory written examination over a list of basic concepts in the traditional fields of logic, epistemology-metaphysics, ethics, and the history of philosophy. This examination will occur in the semester prior to or during the semester in which the student graduates. A list of these basic concepts is available in the department's office. The examination will be graded by three members of the department and. in addition, detailed written comments will be provided.

General Requirements			Credits
CO	150	College Composition	3
HY	100, 101	Western Civilization I, II	6
M		Mathematics	3
		Communication and reasoning	6
		Physical education/wellness	2

General Philosophy Concentration			Credits
Philosophy			**33**
PL	106	Wisdom of the East-Oriental Philosophy	3
PL	210	Introduction to Formal Logic	3
PL	300, 301	History of Philosophy I, II	6

PL	302	19th-Century Philosophy	3
PL	409	20th-Century Philosophy	3
PL	425	Epistemology	3
PL	435	Metaphysics	3
PL	447	Ethical Theory	3

Select one course from the following:

PL	105	Introduction to Philosophy	3
PL	205	Introduction to Ethics	3
PL	206	Knowledge and Existence-An Introduction	3

Select one course from the following:

PL	462	Seminar	3
PL	463	Seminar in Religious Studies	3
PL	499	Thesis	3

Arts and Humanities	**12**
Behavioral and Social Sciences 1	**12**
Natural Sciences 1	**12**
Electives	**39**

1. See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Philosophy and Bioethics Concentration			**Credits**
Philosophy			**30**
PL	210	Introduction to Formal Logic	3
PL	300, 301	History of Philosophy I, II	6
PL	325	Philosophy of Natural Science	3
PL	415	Logic and Scientific Method	3
PL	447	Ethical Theory	3

Select one course from the following:

PL	105	Introduction to Philosophy	3
PL	205	Introduction to Ethics	3
PL	206	Knowledge and Existence-An Introduction	3

Select one course from the following:

PL	305B	Philosophical Issues in Medical-Life Science	3
PL	305E	Philosophical Issues in Animal Science	3
PL	345	Environmental Ethics	3

Select one course from the following:

PL	375	Science and Religion	3
PL	435	Metaphysics	3
PL	438	Philosophy of Mind	3

Select one course from the following:

PL	462	Seminar	3
PE	463	Seminar in Religious Studies	3
PE	499	Thesis	3

Arts and Humanities	**12**
Behavioral and Social Sciences	**12**
Natural Sciences	**40-43**

Including:

B	120	Principles of Plant Biology	4
		and	

Z	110	Principles of Animal Biology	4
		or	
BY	102	Attributes of Living Systems	4
		and	
BY	103A-B	Biology of Organisms	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
C	341, 343	Organic Chemistry I, II	6
		and	
C	344	Organic Chemistry Laboratory	2
		or	
C	245, 246	Organic and Biological Chemistry, Laboratory	5
		Electives	8-11

1. See departmental advising sheet or College Core Curriculum for requirements in these areas.

Philosophy and Religion Concentration			**Credits**
Philosophy			**42**
PL	170	Understanding Religion	3
PL	171	Religions of the West	3
PL	172	Religions of the East	3
PL	205	Introduction to Ethics	3
PL	210	Introduction to Formal Logic	3
PL	300, 301	History of Philosophy I, II	6
Select one course from the following:			
PL	105	Introduction to Philosophy	3
PL	206	Knowledge and Existence-An Introduction	3
Select one course from the following:			
PL	106	Wisdom of the East-Oriental Philosophy	3
PL	371	Contemporary Eastern Religious Thought	3
PI	379	Mysticism East and West	3
Select two courses from the following:			
PL	272	Meaning and Truth in Religious Belief	3
PL	370	Contemporary Western Religious Thought	3
PL	375	Science and Religion	3
PL	497	Group Study	3
Select two courses from the following:			
PL	302	19th-Century Philosophy	3
PL	355	Philosophy of Religion	3
PI	409	20th-Century Philosophy	3
PL	425	Epistemology	3
PI	435	Metaphysics	3
Select one course from the following:			
PL	463	Seminar in Religious Studies	3
PL	499	Thesis	3
Arts and Humanities			**12**
Select one course from the following:			
AR	411	History of Medieval Art	3
E	160	Mythical and Biblical Backgrounds	3
		Behavioral and Social Sciences	18
Select one course from the following:			
AP	100	Introductory Cultural Anthropology	3
AP	310	Peoples and Cultures of Africa	3
AP	320	Nature of Culture	3

AP	322	Religion in Nonliterate Societies	3
AP	324	Folk Religion	3

Select one course from the following:

HY	215	Revolution and Conflict in the Middle East	3
HY	253	History of Modern Christianity	3
HY	310	The Age of the Reformation	3
HY	347/E 347	Modern Mideast Through Literature	3
HY	360	Colonial .red Provincial America to 1740	3
HY	404	Ancient Israel	3
HY	414	Tudor Stuart England. 1485-1689	3
HY	451	Early Christian Church to 500 A.D	3
HY	452	Medieval Christianity. 500-1500	3

Natural SciencesTM	**12**
Electives	**24**

See departmental advising sheet and/or College Core Curriculum for requirements in these areas.

Minors in Philosophy

A minor in philosophy is intended to broaden students' education and to complement and encourage creative reflection in other courses. Students may choose a minor in general philosophy or in religious studies.

Minor in General Philosophy

Lower Division			**Credits**
PL	105	Introduction to Philosophy	3
		or	
PL	205	Introduction to Ethics	3
		or	
PL	206	Knowledge and Existence-An Introduction	3

*** Lower or Upper Division**			**Credits**
PL	110	Logic and Critical Thinking	3
		or	
PL	210	Introduction to Formal Logic	3
		or	
PL	410*	Formal Logic	3
		or	
PL	415	Logic and Scientific Method	3

Upper Division			**Credits**
PL	301	History of Philosophy I	3
		or	
PL	301	History of Philosophy II	3
PI,	305A-F	Philosophical Issues in the Professions	3
		or	
PL	447	Ethical Theory	3
PL	425	Epistemology	3
		or	
PL	435	Metaphysics	3
PL		Philosophy, upper division	6

Substitutions allowed with prior approval of department chair.

*Additional course work may be required because of prerequisites.

Minor in Religious Studies

Lower Division			Credits
PL	100	Appreciation of Philosophy	3
		or	
PL	105	Introduction to Philosophy	3
		or	
PL	205	Introduction to Ethics	3
		or	
PL	206	Knowledge and Existence-An Introduction	3

Select two courses from the following:

PL	170	Understanding Religion	3
PL	171	Religions of the West	3
PL	172	Religions of the East	3

Lower or Upper Division			Credits
Select three courses from the following:			
PL	272	Meaning and Truth in Religious Belief	3
PL	309	Ideas in Oriental Art and Literature	3
PL	349	Philosophy of Tao and Zen	3
PL	355	Philosophy of Religion	3
PL	360	Topics in Oriental Philosophy	3
PL	370	Contemporary Western Religious Thought	3
PL	371	Contemporary Eastern Religious Thought	3
PI	375	Science and Religion	3
PL	379	Mysticism East and West	3
PL	463	Seminar in Religious Studies	3

Upper Division			Credits
PL	300	History of Philosophy I	3
		or	
PL	301	History of Philosophy II	3

Substitutions allowed with prior approval of department chair.

Graduate Program in Philosophy
The program leads to a master of arts degree with emphasis on practical work in value theory, especially environmental ethics, animal rights, international development, and public policy.

A description of this program may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF POLITICAL SCIENCE
Office in Clark Building, Room C 346
Associate Professor Wayne Peak. Chair

Major in Political Science
This major, which leads to the bachelor of arts degree, provides preparation for a broad liberal arts education, professional careers, and participation in political processes. By studying political behavior, systems, processes, institutions, and problems, students have a basis for understanding the political world. They gain a foundation for political action and for advanced study in political science and social sciences.

The political science major is designed to complement the University's general education goals by developing students' understandings of political life in the United States and in other nations. Students should be able to exhibit valid information about political processes; they should be informed about approaches to and theories of politics, and be able to use these tools to analyze politics. They should be stimulated to clarify their own political perspectives and to express a responsible spirit of public life. The department measures the effectiveness of its instruction in a variety of ways, including the administration of a mandatory set of questions to political science majors as they enter the department and just prior to graduation.

Careers are in public service. law (for those continuing to law school), business, industry, private research firms, international administration, and teaching at either secondary school or college levels. Students desiring to be certified to teach in junior or senior high schools must complete teaching endorsement area requirements in social studies. See the Teacher Certification section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies, College of Applied Human Sciences section of this catalog.

			Credits
Arts and Humanities			**12**
Including:			
E	232, 233	Introduction to Humanities	6
		or	
H	205	Introduction to Ethics	3
		and	
PL	206	Knowledge and Existence-An Introduction	3
Behavioral and Social Sciences			**15**
AP	100	Introductory Cultural Anthropology	3
		or	
PY	111	General Psychology	3
		or	
S	100	General Sociology 2	3
EC	100	Principles of Macroeconomics	3
EC	102	Principles of Microeconomics	3
HY	100, 101	Western Civilization I, II	6
		or	
HY	151	U.S. History to 1876	3
		and	
HY	151	U.S. History Since 1876	3
		or	
HY	273	Asia-The Formative Years	3
		and	
HY	274	Asia-Years of Transformation	3
Communication and Reasoning			**12**
CO	150	College Composition	3
CO	301A-C	Intermediate Composition	3
		or	
E	320A-D	Introduction to the Study of language	3
		or	
SP	200	Public Speaking and Discussion	3
		or	
SP	207	Rhetoric anti Argumentation	3
M		Mathematics	3
Select one course from the following:			
PI	110	Logic and Critical Thinking	3
PI	112	Reasoning and Problem Solving	3
PL	210	Introduction to Formal logic	3
PL	415	Logic and Scientific Method	3
S	310	Quantitative Sociological Analysis	3
ST	201	General Statistics	3
ST	204	Statistics for Business Students	2
ST	311	Statistics for Behavioral Sciences I	3
		Natural Sciences 3	3
		Physical Education/Wellness	2
Political Science 4			**36**
PC	101	American Government and Politics	3

PC	103	State and Local Government and Politics	3
PO	232	International Relations	3
PO	241	Comparative Government anti Politics	3
PO		Political science'	24
	Electives		22-30

Select one of the following three support options:

Foreign Language Option **12-19**

Select four courses for a minimum of 12 credits in one language including at least one upper-division course.

Humanities and Social Sciences Option			**18**
		Arts and humanities 6	
		(six upper-division credits)	9
		Social sciences 7	
		(six upper-division credits)	9

Methods Option			**18**
S	310	Quantitative Sociological Analysis	3
		or	
S	311	Methods of Sociological Inquiry	3
		Arts and humanities. upper division 6	3
		Social sciences. upper division	3

Select nine credits (a minimum of six credits with the same prefix and one PL course) from the following:

CS		Computer science	3-6
PL	110	Logic and Critical Thinking	3
PL	210	Introduction to Formal Logic	3
PL	415	Logic and Scientific Method	3
ST	201	General Statistics	3
ST	311	Statistics for Behavioral Sciences I	3

Courses may not be covered in more than one requirement category.

1. Select six credits from AR, D, E. L (200 or higher), MU, PL, SP, and TII courses. Credits must be taken in at least two departments.

2. Required for students taking the Methods Option.

3. Select at least seven credits from category' 11-A in the University Studies Program: at least one course must have a formal laboratory. Credits must be taken in at least two prefixes.

4. At least one upper-division course must be taken in each of the following areas: American politics, comparative politics, international relations. political theory. public policy and administration, public law. PO 320 must be taken as part of the political science requirements for the Methods Option.

5. Credits earned in PO 486 anti PO 495 may not be used to satisfy this requirement.

6. Credits must be taken from AR. D. E, L. MU. PL, SP, and TH courses.

7. Credits must be taken from AP. EC, GR. HY. JT, PY, and S courses.

Minor in Political Science

This minor provides a sound academic core for students in other social science or in non-social science curricula interested in studying politics. It also may be useful for persons preparing for careers in law, teaching in the social sciences, journalism, and the public services.

Lower Division			**Credits**
PO	101	American Government and Politics	3

Select two courses from the following:

PO	103	State and Local Government and Politics	3
PO	*232*	International Relations	3
PC	241	Comparative Government and Politics	3

Upper Division
Twelve credits in political science courses with at least three credits in political theory and in at least one additional subfield of political science. (Credits earned in PO 486 and PO 495 may not be used to satisfy this upper-division credit requirement.

Graduate Programs in Political Science
The department offers graduate programs in political science leading to the master of arts and doctor of philosophy degrees. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF SOCIOLOGY
Office in Clark Building, Room C 240 Professor David M. Freeman. Chair

Major in Sociology
Sociology is the study of how human beings construct and reconstruct social networks and meaning systems in which they live. People's interaction with each other, their technologies, and environment create patterned social bonds. The manner in which people sustain and change their social patterns is the central focus for sociological inquiry. Subject matter ranges from the family to the hostile mob, from crime to religion, from ethnic and class divisions to shared beliefs of a common culture, from the social organization of work to that of leisure and sport, from the experience of small groups to the affairs of nation-states, and the international community of nations.

Sociological training is useful in combination with majors in such fields as technical journalism, computer science, business management, recreation resources management, agriculture, and engineering, where the human factor is of significant importance. See Second Major Requirements in the Graduation Requirements section of this catalog for a complete description of the program.

A minimum of thirty credits of sociology including courses in theory, research methods, and other substantive areas are required. The major in sociology leads to the bachelor of arts degree.

Student outcomes assessment for sociology majors is achieved within S 403, Capstone Seminar. After completion of the theory requirement (S 301) and the methods requirement (S 310, S 311), the senior sociology major will be expected to synthesize the undergraduate educational experience in theory, methods, and substantive areas of sociology through development of a research project and demonstrated retention of these three types of knowledge. Information sharing, effective communication in written and oral form, and the capacity for critical and synthesizing thought are expected of the mature sociology major.

Freshman Year			**Credits**
CO	150	College Composition	3
M		Mathematics	3
S	100	General Sociology	3
		or	
S	105	Social Problems in Contemporary Society	3
		Arts and humanities 1	6
		Communication and reasoning'	6
		Natural sciences	3
		Physical education/wellness	2
		Social sciences	9

Sophomore Year			**Credits**
S		Sociology 2	6

		Arts and humanities	3
		Behavioral and social sciences'	21
		Natural sciences	3

Junior Year			**Credits**
S	301	Development of Sociological Thought	3
S	310	Quantitative Sociological Analysis	3
S	311	Methods of Sociological Inquiry	3
S		Sociology. upper division:	6
		Arts and humanities'	3
		Natural sciences	4

Senior Year			**Credits**
S	403	Capstone Seminar	3
S		Sociology. upper division	3

1. See departmental advising sheet 10 assure compliance with University. college, and department requirements in these areas.

2. Select courses representing a balanced distribution in the major areas of sociology.

Minor in Sociology
A minor in sociology provides the student with basic technical skills and conceptual framework to study human societies. From an array of courses such as organization, bureaucracy, symbolic interaction, deviance, criminology, social change, and others the student can select the areas of study which enhance the focus of his/her major.

Lower Division			**Credits**
S	100	General Sociology	3
		or	
S	105	Social Problems in Contemporary Society	3

Upper Division			**Credits**
S	301	Development of Sociological Thought	3
S	311	Methods of Sociological inquiry	3
		or Equivalent course work in social research	

Minimum of 12 credits in upper-division sociology courses beyond specific requirements chosen on the basis of relevance to student's program of study.

Graduate Programs in Sociology
Programs leading to M.A. and Ph.D. degrees are described in the *Graduate and Professional Bulletin.* Direct inquiries to the Department of Sociology, C 242 Clark Building.

DEPARTMENT OF SPEECH COMMUNICATION
Office in Eddy Building. Room 302
Associate Professor Ann M. Gill, Chair

Major in Speech Communication
Majors prepare for careers in the radio and television industry, public relations, advertising, government service, or organizational communication; for future graduate work in speech communication and broadcasting; for teaching at various levels; for postgraduate study in law, theology, or a variety of professions; and for a broad, liberal arts education.

The department's goals for undergraduate majors include development of outstanding skill in oral and written communication; knowledge of the history. theory. and criticism of pragmatic human communication in all forms. including mass-mediated communication; commitment to the values and ethical obligations of free speech in a diverse, democratic society; and an understanding of the role of speech communication within the liberal arts.

The speech communication major, which leads to the bachelor of arts degree. encompasses many facets of oral and electronic communication. and constitutes an excellent second major for students in other disciplines. Thus, students in such diverse areas as business, natural sciences. agriculture. human resource sciences, and natural resources may find it advantageous to gain competency in rhetorical and communication theory. public speaking and inter-personal communication. and television-radio production. Students wishing such a second major are urged to contact the Speech Communication Department for proper advising as soon as possible. For general information, see Second Major Requirements in the Graduation Requirements section of this catalog for a complete description of the program.

Concentrations are offered in speech and broadcasting and teacher education. Internships are available for speech communication majors; application procedures and eligibility requirements are available from the Speech Communication Department.

Transfer students must complete a minimum of 12 credits in speech communication courses at Colorado State.

Speech and Broadcasting Concentration
Students selecting this concentration prepare for positions in television-radio-film organizations, public relations, or government; careers in professional, legal, or business communications; teaching; or graduate study and research in communication.

Freshman Year			**Credits**
CO	150	College Composition	3
HY	100, 101	Western Civilization I, II	6
M		Mathematics	3
PL	110	Logic and Critical Thinking	3
PL		PhilosophyTM	3
SP	200	Public Speaking and Discussion	3
SP	201	Rhetoric in Western Thought	3
SP	241	Television and Radio in Society	3
		Physical education/wellness	2
		Elective	3

Sophomore Year			**Credits**
E		English	6
HY	150	U.S. History to 1876	3
HY	151	U.S. History Since 1876	3
PO	101	American Government and Politics	3
SP	207	Rhetoric and Argumentation	3
SP		Speech 3	3-4
		Natural sciences	10

Junior Year			**Credits**
CO	301A-C	Intermediate Composition	3
SP		Speech;	12
		Arts and humanities 2	6
		Behavioral and social sciences CAP, EC. GR. HY, JT, PO, PY. S, and business)	6
		Electives	6

Senior Year			**Credits**
SP	450	Capstone Seminar	2
SP		Speech 2	11-12
		Behavioral and social sciences and business (see above)	9
		Electives	9

1. Select from list of courses in category 111-A in the University Studies Program.

2. See departmental advising sheet and/or College Core Curriculum for requirements in these areas'

3. Select seven credits from list of courses in category 11-A in the University Studies Program. At least one course must have a formal laboratory. Credits must be taken in at least two prefixes. Select three credits from list of courses in category II-A or II-B in the University Studies Program.

Teacher Education Concentration

Students desiring to be certified to teach public speaking, dramatics, or forensics in junior or senior high schools must complete either the speech and broadcasting concentration or the theatre concentration (Department of Music, Theatre, and Dance) and the teacher education concentration, which will require more than the 128-credit minimum for graduation. They also complete the general education requirements and the professional certification requirements (see the Teacher Certification section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies, College of Applied Human Sciences section of this catalog).

			Credits
CO	301A-C	Intermediate Composition	3
E	270	Introduction to American Literature	3
E	275	Introduction to British Literature	3
E	402	Teaching Composition	3
E		English 1	3
SP	201	Rhetoric in Western Thought	3
SP	207	Rhetoric and Argumentation	3
SP	231	Oral Reading	3
SP	241	Television and Radio in Society	3
TH	141	Introduction to Theatre	3

Students must complete either Option I or II:

Option I - General Speech

SP	300	Advanced Public Speaking	3
SP	311	Historical Speeches on American Issues	3
SP	405	Interpersonal Communication	3
SP	409	Studies in Persuasion	3
SP	417	Communication. Language. and Thought	3
SP	450	Capstone Seminar	2
SP		Speech 2	10

Option II - Theatre

TH	151	Acting I	3
TH	161	Technical Theatre I	3
TH	255	Directing I	3
TH	341	History of Theatre I	3
		or	
TH	342	History of Theatre II	3
TH		Theatre	15

1. Select from list of courses in category 111-A in the University Studies Program.

2. Maximum of three credits total from SP 215. SP 315. SP 384. SP 487, and SP 495 counted toward major requirement.

Graduate Programs in Speech Communication

Programs lead to the degree of master of arts emphasizing a theoretical base in rhetoric and communication; a critical base in public address, mass media, film; and an applied base in television and radio. The department also participates in the interdepartmental master of arts program in communication development.

A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF TECHNICAL JOURNALISM

Office in Clark Building, Room C 225
Professor James K. Van Leupen, Chair

The Department of Technical Journalism's outcomes assessment program measures students' proficiency in journalistic writing and production of professional communication materials. Measures include writing tests, portfolio assessments, broadcast tape reviews, and comprehensive internship and alumni evaluations.

Major in Technical Journalism

Technical journalism deals with seeking, interpreting, and transmitting information. In addition to learning applied communication skills, students study how and why people communicate and respond to communication.

Successful communicators require broad knowledge. A flexible program encourages background in the humanities, social and natural sciences, as well as in-depth study in one's interest area.

The department offers four concentrations which lead to the bachelor of arts degree. One course may not fulfill more than one of the stated requirements.

Freshman and Sophomore Years			**Credits**
CO	150	College Composition	3
JT	100	You and Media	3
JT	210	Newswriting	4
M		Mathematics	3
		Arts and humanities 1	12
		Behavioral and social sciencesTM	9
		Communication and reasoning 1	6
		History and/or political science	6
		Natural sciences'	10
		Physical education/wellness	2

Junior and Senior Years **Credits**

By the beginning of the junior year. students must select 21 credits in one or two options of the student's interest outside journalism, with a minimum of three courses in each area undertaken. See concentrations in public relations and technical/specialized journalism for additional option requirements.

JT	415	Communications Law	3
		Option electives	21

Select one course from the following:

JT	311	History of Media	3
JT	411	Media and Society	3
JT	414	Media Effects	3
JT	471	Communication Research Methods	3

1. See departmental advising sheet for departmental, College Core Curriculum, and University Studies Program requirements in these areas.

Electronic Reporting Concentration

Students prepare for electronic media work emphasizing writing and reporting skills.

			Credits
JT	340	Videotape Editing	3
JT	341	Broadcast News	3
IT	345	Electronic Field Production	4
JT	440	Advanced Electronic Reporting	3
JT		Journalism electives	6

News-Editorial Concentration
Students prepare to be newspaper writers, reporters, and editors.

			Credits
JT	235	Photojournalism	3
		or	
JT	361	Writing for Specialized Magazines	3
JT	310	Copy Editing and Production	4
JT	320	Reporting	3
JT	420	Interpretive Reporting	3
JT	460	Publication Management	3
JT		Journalism electives	5

Public Relations Concentration
Students prepare to evaluate and influence opinion and action of various publics through work in private and public organizations.

Option must include at least three courses from the College of Business of which one must be BN 300.

			Credits
JT	310	Copy Editing and Production	4
JT	350	Public Relations	3
JT	351	Public Relations Practices	3
JT	450	Public Relations Campaigns	3
JT		Journalism electives	3-4

Select one course from the following:

JT	320	Reporting	3
JT	341	Broadcast News	3
JT	342	Writing for Specialized Electronic Media	3
JT	361	Writing for Specialized Magazines	3
JT	464	Technical Writing	3

Technical/Specialized Journalism Concentration
Students prepare for staff positions with media aimed at professional. technical, and other specialized audiences, and to be technical writers and editors for industry, government, and educational institutions.

Option shall be selected from courses in the following areas: agriculture, business. economics. engineering. forestry and natural resources, human resource sciences, industrial sciences, natural sciences. veterinary medicine and biomedical sciences.

			Credits
JT	310	Copy Editing and Production	4
JT	361	Writing for Specialized Magazines	3
JT	464	Technical Writing	3
JT	465	Technical/Specialized Editing	3

Select two courses from the following:

JT	235	Photojournalism	3
JT	341	Broadcast News	3
JT	342	Writing for Specialized Electronic Media	3
JT	350	Public Relations	3
JT	460	Publication Management	3
JT	487	Internship	3

Major in Agricultural/Natural Resources Journalism
Agricultural/natural resources journalists serve the informational needs of people in food and fiber production and marketing, natural resources activities, and industries that supply goods and

services to agribusinesses and natural resource organizations. To prepare for careers in agricultural/natural resources communication, students may emphasize print or electronic media or public relations.

In addition to course work in communication, agriculture, natural resources and agricultural/natural resources economics, students gain broad exposure to humanities, and social and natural sciences. The major in agricultural/natural resources journalism leads to the bachelor of arts degree.

Freshman Year			**Credits**
CO	150	College Composition	3
EA	102	Agricultural/Natural Resource Economics	3
JT	100	You and Media	3
M		Mathematics	3
		Physical education/wellness	2

Select two courses from the following:

B	120	Principles of Plant Biology	4
BY	102	Attributes of Living Systems	4
C	107, 108	Fundamental Chemistry, Laboratory	5
ER	140	Physical Geology	4
Z	110	Principles of Animal Biology	4

Select a total of four courses from Option One and Option Two, with a minimum of one course from each option:

Option One			
AG	100	General Crops	4
AN	100	Animal Sciences	4
AN	200	Poultry Science and Production	2
AN	240	Equine Management	3
FT	110	Introduction to Food Science and Technology	3
H	100	Basic Horticulture	4

Option Two			
ER	304	Principles of Watershed Management	3
FW	360	Principles of Wildfire Management	3
NR	120	Environmental Conservation	3
RR	200	Introduction to Recreation Resources	3
RS	300	Principles of Range Management	3

Sophomore Year			**Credits**
JT	210	Newswriting	4
PL	110	Logic and Critical Thinking	3
		or	
PL	345	Environmental Ethics	3
SP	200	Public Speaking and Discussion	3
		Arts and humanities 2	9
		Natural sciences 3	2-3

Select one course from the following:

AP	100	Introductory Cultural Anthropology	3
GR	100	Introduction to Geography	3
PY	100	General Psychology	3
S	100	General Sociology	3
S	320	Population-Natural Resources and Environment	3
S	341	Sociology of Rural Life	3

Select two courses from the following:

PO	101	American Government and Politics	3
PO	301	Political Parties and Interest Groups'	3

PO	304	Legislative Politics	3
PO	351	Public Administration'	3
PO	361	Politics and Natural Resources	3

Select one course from the following:

S	310	Quantitative Sociological Analysis	3
ST	201	General Statistics	3
ST	301	Introduction to Statistical Methods	3
ST	311	Statistics for Behavioral Sciences I	3

Junior and Senior Years			**Credits**
JT	310	Copy Editing and Production	4
JT	415	Communications Law	3
IT		Electives	6-7
		Agribusiness or natural resource electives	12
		Electives	5-8

Select one course from the following:

JT	235	Photojournalism	3
JT	460	Publication Management	3
JT	465	Technical/Specialized Editing	3

Select one course from the following:

JT	311	History of Media	3
JT	411	Media and Society	3
JT	414	Media Effects	3
JT	471	Communication Research Methods	3

Select one course from the following:

JT	320	Reporting	3
JT	341	Broadcast News	3
JT	350	Public Relations	3

Select one course from the following:

JT	361	Writing for Specialized Magazines	3
JT	464	Technical Writing	3

Select a total of twelve credits from Option One and Option Two, with a minimum of three credits from each option:

Option One

EA	228	Agricultural Business Management I	3
EA	305	Farm and Ranch Records and Analysis	3
EA	308	Agricultural Finance	3
EA	310	Agricultural Marketing	3
EA	375	Agricultural Law	3
EA	405	Agricultural Production Management	3
EA	478	Agricultural Policy	3

Option Two

EA	240/EC 240	Issues in Environmental Economics	3
EA	340/EC 340	Introduction to Economics of Natural Resources	3
EA	342	Economic Analysis-Water Resource Development 6	3
EA	344/EC 344	Economics of Energy Resources	3
EA	346/EC 346	Economics of Outdoor Recreation	3
EA	348/EC 348	Economics of Urban and Regional Land Use	3

1. Students selecting FW 360 must also take BY 220.

2. Select three credits from E, L, or SP courses in category III-A in the University Studies Program. and six credits from AR, E, L. MU. PL. or SP courses. Credits must be taken in at least two departments.

3. Select from departmental list.

4. Students selecting PO 301 or PO 304 or PO 351 must also take PO 101.

5. Select courses from AG. AN. BK. BN, ER, F. FN, FK FW, GR. H. NR. RR. RS, and BA 210. Courses selected must include at least two prefixes.

6. Students selecting EA 342 or EA 478 must also take EC 100.

Graduate Program in Technical Communication
The department offers a master of science degree in technical communication for students aspiring to communication management careers in technical and scientific communication, public relations, or public information for business, industry, government, and educational institutions. A description of this program may be found in the *Graduate and Professional Bulletin.*

COLLEGE OF NATURAL RESOURCES

Office in Natural Resources Building, Room 101 Professor A. AI Dyer, Dean
Professor Diana Freckman. Associate Dean/ Director
Associate Professor Donald L. Crews, Assistant Dean

UNDERGRADUATE MAJORS
Fishery Biology
Forestry
Geology
Natural Resources Management
Natural Resources Recreation and Tourism
Range and Forest Management
Range Ecology
Watershed Science
Wildlife Biology

UNDERGRADUATE MINORS
Commercial Recreation and Tourism
Fishery Biology
Forestry
Geography
Geology
Range Ecology
Recreation Resources Management
Resource Interpretation
Watershed Science
Wildfire Biology

The college offers studies and professional training in the management, administration, and scientific investigation of renewable and nonrenewable natural resources. Programs include the study of fish, forests, minerals, range, watershed, wildlife, and outdoor recreation areas - their environments, products, and services.

The Natural Resource Ecology Laboratory, housed in the college, is devoted to research and training in ecosystem biology.

COLLEGE PROGRAMS
Undergraduate Majors
The scope of the college's programs is more broadly based than most forestry or natural resources schools. There are nine undergraduate curficula, some with specialized concentrations or designated areas of

further study. Undergraduate majors in all five departments lead to the bachelor of science degree. The bachelor of science degree requires a minimum of 128 credits, except for the land rehabilitation concentration in the major in range ecology, and the major in range and forest management which require 129 credits. A minimum of 45 credits in upper-division courses is required for all majors.

Freshman Open Option
Office in Natural Resources Building, Room 101

Students who have a strong interest and aptitude in the broad area of natural resources, but who have not decided on a specific major, may enroll in the Natural Resources Open Option. This option extends through the two semesters of the freshman year. Selection of a major must be made prior to the beginning of the sophomore year.

Field Training Programs

Most undergraduate majors require the completion of a four-week summer field training program *before* their junior year. Summer field instruction is given at the Pingree Park campus, 55 miles west of Fort Collins. Permanent quarters and meals are provided. Information concerning the summer program is available in February from the Dean's-Office of the College of Natural Resources.

Summer Field Training Program (4 weeks)

Pingree Park Campus

Required Course			**Credits**
NR	220	Natural Resources Ecology and Measurements	5

During interim or summer periods, certain majors devote several weeks to advanced field training programs off campus. Students taking advanced ROTC should arrange their schedules with their advisers beginning their junior year to avoid conflicts during' senior spring semester. It is recommended for all majors and required for some, that students have a minimum of one summer of field experience before graduation.

Western Undergraduate Exchange

Colorado State is a participant in the Western Undergraduate Exchange (WUE) program through the Western Interstate Commission for Higher Education. Nonresident students from designated western states may enroll in certain majors in the college and pay one and one-half times the resident tuition rate. For specific information on the designated states and majors, interested students should contact the Office of Admissions.

International Education

International resources management is an increasingly important concern of the College of Natural Resources. It is desirable that students in the college have opportunities to study abroad, just as students from abroad are encouraged to study here. The college has agreements covering study abroad opportunities at the University of Edinburgh and the University of Aberdeen in Scotland, the University of New South Wales and the University of Queens-land in Australia, Lincoln College in New Zealand, and the University of Stellenbosch in South Africa. Students may complete one or two semesters of resources management education abroad. Students interested in study abroad should contact the Office of International Education and Training, 315 Aylesworth Hall.

Graduate Programs

Master of science and doctor of philosophy degree programs are offered in each department. Programs leading to the professional degree, master of forestry, are offered in the Department of Forest Sciences. A description of these programs may be found in the *Graduate and Professional Bulletin.*

ADMISSION INFORMATION

For High School Graduates

See the Undergraduate Admissions Policy and Procedures section in this catalog for specific admission requirements.

High school students are advised to take all the English, science, and mathematics courses possible to prepare for college-level work in natural resources.

Physical Limitations

The college does not discourage or restrict enrollment of physically handicapped students. However, students with physical handicaps who contemplate entering federal service should confer with the U.S. Office of Personnel Management. This agency will determine their fitness for federal employment.

Limitation on Transfer of Credits

Students planning initially to attend another college or junior college should follow closely Colorado State's freshman program for their chosen major and

should transfer to Colorado State no later than their junior year in order to complete degree requirements in four years. Students whose majors include the summer field training program should transfer for the summer session prior to their junior year. Credits which transfer but are not equivalent to specific curriculum requirements may be used as elective credits.

Curriculum Guide for Transfer Students
Students are required to choose a major when enrolling. Transfer students, therefore, should follow the departmental curriculum closely. Certain subject areas are common to all curricula as follows:

Area	Minimum Credit Requirements
Biology	Eight credits, including plant biology Most majors include ecology; geology majors require paleontology
Chemistry	At least one course in inorganic chemistry. Most majors also require a course in organic chemistry
Economics	Three or four credits
English composition	Three credits
Mathematics	Most majors require one semester of calculus
Natural resources	Three credits
Physical education	Two credits (one or two semesters)
Speech	Three credits

Check the individual major and concentration for specific courses.

The college has transfer agreements with Fort Lewis College, Mesa College, the University of Southern Colorado, and New Mexico Highlands University in Las Vegas, New Mexico. Students at these institutions who complete the first two years of the approved pre-natural resources program may transfer to the College of Natural Resources at Colorado State with full junior standing. Students who are attending Fort Lewis College, Mesa College, the University of Southern Colorado, and New Mexico Highlands University should consult the forestry adviser for a list of courses approved for transfer.

DEPARTMENT OF EARTH RESOURCES

Office in Room 322, Natural Resources Building
Professor Donald O. Doehring, Head
Two majors are offered for careers in geology and watershed science. Curricula provide in-depth training for employment with federal, state, and local governments, industry, and consulting firms responsible for the investigation, development, and management of earth resources. Minors in geography, geology, and watershed science are also offered.

Students are expected to have a thorough knowledge of their discipline and will get rigorous training in other basic sciences and mathematics as well as acquire skills in both oral and written communication. Exposure to other disciplines within the liberal arts will give the student historical and social perspective. The student will be able to integrate field, laboratory, and classroom knowledge and skills. Outcomes assessment will include (1) an evaluation of the records of the student at the beginning and end of each academic year, (2) a record kept of student products from a capstone course that integrates theoretical and practical aspects of the discipline, (3) an in-depth exit interview of the student, and (4) career tracking after the student graduates.

Major in Geology
The geology and environmental geology curricula provide students with strong programs in geology and the related sciences while offering a balanced education in the arts, humanities, and

behavioral and social sciences. Colorado State is ideally situated so students can combine on-campus academic activities with field work in the nearby Rocky Mountains. Completion of the geology major prepares students for employment with private industry and government agencies or for graduate training in specialized areas of geology. Technical electives permit specialization in areas of interest. Students wishing to teach geology should consult the Teacher Certification section in the College of Applied Human Sciences in this catalog.

Transfer students should have completed course work comparable to the following curriculum for a given entry level to avoid prolonging completion of degree requirements. Courses equivalent to ER 140 and ER 154 must be taken.

M 120 and M 121 are considered review courses; credits may not be used toward a degree in geology.

The following core curriculum is required for all geology majors. Students must select one of the concentrations offered within the major.

Core Curriculum

Freshman Year			**Credits**
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
ER	140	Physical Geology	4
		or	
ER	150	Physical Geology for Scientists and Engineers	4
ER	154	Historical and Analytical Geology	4
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
		Physical education/wellness	2

Sophomore Year			**Credits**
ER	232	Crystallography and Mineralogy	4
ER	234	Mineralogy and Mineral Equilibrium	4
M	155, 255	Calculus for Biological Scientists I, II	8
PH	141	Physics for Scientists and Engineers I	5
PH	142	Physics for Scientists and Engineers II	5
		or	
AG	470	Soil Physics	3
		Arts and humanities 2	3

Junior Year			**Credits**
B	120	Principles of Plant Biology	4
		or	
BY	102	Attributes of Living Systems	4
		or	
Z	110	Principles of Animal Biology	4
ER	344	Stratigraphy and Sedimentation	4
ER	364	Petrology	4
ER	372	Structural Geology	4
ER	376	Geologic Field Methods	3
ST	301	Introduction to Statistical Methods	3
		Arts and humanities 2	3

Summer Session			**Credits**
ER	436	Geology Summer Field Course	6

Senior Year		**Credits**	
ER	454	Geomorphology	4
		Behavioral and social sciences 3	6

1. Students planning later specialization in geophysics and geotechnical fields should substitute M 160, M 161. and M 261 for M 155, M 255.

2. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

3. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

Environmental Geology Concentration
The environmental geology concentration prepares students to address the environmental implications of geologic processes and human effects on the earth. This curriculum provides the background for careers in consulting firms and governmental agencies.

Freshman Year			**Credits**
CS	151	Introduction to Pascal Programming	4
		or	
NR	260	Introduction to Natural Resource Analysis	3

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4

Junior Year		**Credits**	
CO	301B	Intermediate Composition-Expository Writing in the Sciences	3
		or	
JT	300	Technical Communication	3
		or	
SP	200	Public Speaking and Discussion	3
ER	446	Environmental Geology	3

Senior Year			**Credits**
Select six credits from the following:			
AG	442	Forest and Range Soils	3
BY	220	Ecology	3
C	245	Organic and Biological Chemistry	4
C	261	Basic Inorganic Chemistry	3
CE	413	Environmental River Mechanics	3
CE	422	Basic Hydrology	3
ER	304	Principles of Watershed Management	3
ER	400	Quaternary Geology	3
ER	416	LandUseHydrology	3
ER	417	Watershed Measurements	2
ER	452	Hydrogeology	3

Select six credits from the following:			
AC	462	Environmental Law	3
AG	440	Soil Genesis and Survey	3
CE	440	Environmental Health Engineering	2
CE	450	Introduction to Geotechnical Engineering	4
EH	220	Environmental Health	3
PL	345	Environmental Ethics	3

GEOLOGY CONCENTRATION
The geology concentration covers general geology
using a practical, field-oriented approach suited to future employment opportunities in the petroleum and mining industries as well as other traditional geologic fields.

Freshman Year	**Credits**

NR	260	Introduction to Natural Resource Analysis	3

Sophomore Year			**Credits**
CO	301B	Intermediate Composition-Expository Writing in the Sciences	3
		or	
JT	300	Technical Communication	3
SP	200	Public Speaking and Discussion	3

Junior Year			**Credits**
CS	151	Introduction to Pascal Programming	4

Senior Year			**Credits**
ER	342	Paleontology	3
ER	460	Advanced Geochemistry and Petrology	4
		Technical elective, 300-400 level	3

Major in Watershed Science

Watershed science is the study of the interactions among land, land uses, and water. As a science it is based on an understanding of the physical and chemical processes operating on watersheds, but a primary objective is the sound and sustainable management of land and water resources. Employment opportunities include consulting firms; governmental bodies at the local, regional, and national level; international development and resource management agencies; and private industry.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
C	111, 113	General Chemistry I, II	7
C	112	General Chemistry Laboratory I	1
CO	150	College Composition	3
ER	140	Physical Geology	4
		or	
ER	150	Physical Geology for Scientists and Engineers	4
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
M	155	Calculus for Biological Scientists I	4
		or	
M	160	Calculus for Physical Scientists I	4
SP	200	Public Speaking and Discussion	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
BY	220	Ecology	3
		or	
NR	220	Natural Resources Ecology and Measurements	5
CS	110	Personal Computing I	4
		or	
NR	260	Introduction to Natural Resource Analysis	3
EA	102	Agricultural/Natural Resource Economics	3
		or	
EC	102	Principles of Microeconomics	3
M	161	Calculus for Physical Scientists II	4
		or	
M	255	Calculus for Biological Scientists II	4
NR	322	Introduction to Geographic Information Systems	3
		or	
NR	323	Remote Sensing of Natural Resources	3
PH	141	Physics for Scientists and Engineers I	5

PH	142	Physics for Scientists and Engineers II	5
		or	
AG	470	Soil Physics	3
ST	301	Introduction to Statistical Analysis	3

Junior Year			**Credits**
AT	440	Meteorology	2
CE	413	Environmental River Mechanics	3
		or	
ER	365	Eolian and Fluvial Transport Processes	4
CE	422	Basic Hydrology	3
CO	301B	Intermediate Composition-Expository Writing in the Sciences	3
		or	
IT	300	Technical Communication	3
EH	220	Environmental Health	3
		or	
F	311	Forest Ecology	3
		or	
RS	300	Principles of Range Management	3
ER	416	Land Use Hydrology	3
ER	417	Watershed Measurements	2
ER	454	Geomorphology	3
ST	304	Multiple Regression Analysis	3
		Arts and humanities	3
		Behavioral and social sciences:	3

Senior Year			**Credits**
AC	462	Environmental Law	3
		or	
EA	240/EC 240	Issues in Environmental Economics	3
		or	
EA	340/EC 340	Introduction to Economics of Natural Resources	3
		or	
EA	342	Economic Analysis-Water Resource Development	3
AG	440	Soil Genesis and Survey	3
		or	
AG	442	Forest and Range Soils	3
CE	423	Groundwater Engineering	3
ER	418	Land Use and Water Quality	3
ER	419	Water Quality Laboratory for Wildland Managers	2
ER	440	Watershed Problem Analysis	3
		Arts and humanities 1	3

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

Minor in Geography

Geography examines the interaction between individuals and societies and the environment, especially as they are arranged and distributed over the surface of the earth. Systematic courses consider the surface of the earth as the home of humans, either in its various components (e.g., climate. landforms), or as it relates to human occupancy and resource use (cultural, economic). Regional courses extend the concepts of spatial and regional analysis to specific geographical areas. Both are supported by geographic methods that include interpretation of remotely sensed and cartographic information, and statistical analyses.

Although a major in geography is not currently offered, a student may elect a concentration of credits in geography within the Department of Earth Resources. Students are encouraged to

combine courses from earth resources and cognate fields in the natural, physical, and social sciences.

Lower Division			Credits
GR	100	Introduction to Geography	3
GR	210	Physical Geography	3

Upper Division	Credits
Geography electives, to be approved by adviser and not to include more than two regional courses	15

Minor in Geology

The minor in geology provides an opportunity to obtain a valuable background in geology to enhance other majors. While it is flexibly designed to be applicable to a variety of disciplines, the minor is especially tailored to the physical science major in

the College of Natural Sciences. The geology minor adviser can provide advice on the selection of minor electives.

Lower Division			Credits
ER	140	Physical Geology	4
ER	154	Historical and Analytical Geology	4

Select a minimum of 13 credits; 12 credits must be in the upper-division (300-400) level. Alternative courses may be approved by the geology minor adviser.

			Credits
ER	272	Oceanography I	3
ER	274	Oceanography II	3
ER	342	Paleontology	3
ER	344*	Stratigraphy and Sedimentation	4
ER	372*	Structural Geology	4
ER	376*	Geologic Field Methods	3
ER	434	Geology of National Parks and Monuments	3
ER	450	Marine Geology	3
ER	454	Geomorphology	4

*Additional course work may be required because of prerequisites.

Minor in Watershed Science

The minor in watershed science provides an opportunity to obtain a background in watershed science to complement other majors. While it has sufficient flexibility to be applied to a variety of subject areas, the minor is especially tailored to those majors within the College of Natural Resources. Advice on the selection of minor electives is available in the department.

Lower Division			Credits
ER	140	Physical Geology	4

Upper Division			Credits
ER	416*	Land Use Hydrology	3
ER	417	Watershed Measurements	2
ER	418'	Land Use and Water Quality	3
ER	454	Geomorphology	4

Select at least six credits from the following:

AG	440*	Soil Genesis and Survey	3
CE	423	Groundwater Engineering	3
EA	342*	Economic Analysis-Water Resource Development	3
ER	365*	Eolian and Fluvial Transport Processes	4
ER	406	Seasonal Snow Environments	3
ER	419	Water Quality Laboratory for	

*Additional course work may be required because of prerequisites.

Graduate Programs in Earth Resources
The Department of Earth Resources offers graduate programs leading to the master of science and doctor of philosophy degrees. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF FISHERY AND WILDLIFE BIOLOGY
Office in Wagar Building, Room 135
Professor Alan P. Covich, Head
Two majors are offered for careers in fish or wildlife management, administration, or research. Wildfire is interpreted broadly to include both game animals and nongame animals. Emphasis is given to fish and wildfire in integrated resource management, to computer applications, and to socioeconomic considerations.

Employers usually are state departments of conservation, natural resources, or fish and game;or federal agencies, such as the U.S. Fish and Wildfire Service, U.S. Forest Service, National Marine Fisheries Service, Environmental Protection Agency, U.S. Bureau of Land Management, National Park Service, and U.S. Soil Conservation Service. Some graduates find jobs with private enterprise, such as fish culture, citizens' organizations, resource development companies, or environmental consulting firms. Most students complete an internship or temporary employment with a natural resource agency.

An annual outcomes assessment will be made for undergraduates in the Department of Fishery and Wildlife Biology. The assessment will include: (1) an annual survey of all fishery and wildlife biology majors to ascertain their level of satisfaction with selected key courses, (2) survey of recent alumni on satisfaction of meeting their educational objectives, (3) the evaluation of the performance record of students in a capstone course that integrates theory and application of natural resource management, and (4) annual survey of professional employers who supervise the students in their junior or senior year while doing internships, cooperative education work, temporary jobs, and/or special studies projects. Each graduate is expected to have a thorough grasp of the discipline and its application in resource management.

C 101, M 120, and M 121 are considered review courses by the Department of Fishery and Wildlife Biology. Credits in these courses, either by examination or completion, may not be used toward a degree in this department.

Prospective students may write the department to request brochures and further information about programs and professional opportunities.

Major in Fishery Biology
Professor Stephen A. Flickinger, in charge
This major prepares students for careers as fishery scientists. The curriculum allows students to use approximately 30 credits of approved electives in one of four options listed below. Alternatively, students may work closely with their faculty advisers to plan personalized programs preparing them for graduate school or other career options. Curriculum guidelines are available for:
Aquaculture - This option prepares students for careers in propagation of fish for sport, bait, food, or ornamental purposes. Upper-division electives emphasize fish culture and nutrition; water quality; food science and technology; and business.

Aquatic Ecology/Environmental Assessment - This option prepares students for graduate school or work in consulting firms and government agencies that assess impacts on aquatic environments. Upper-division electives emphasize a broad background in aquatic ecology, chemistry, statistics, water quality, natural resources law, and public relations in natural resources.

Fisheries Management- This option prepares students for careers in management of fishery resources. Upper-division electives emphasize management of fish and fish habitat, and a broad background in aquatic ecology, public relations in natural resources, natural resources law, computer programming, and logic.

Fisheries Research - This option prepares students for further education toward a career in research on fish and fisheries. Upper-division electives are flexible and provide a broad background in statistics, physics, chemistry. geology. and biology, with specific electives in fisheries and zoology.

All students are required to attend the four-week summer camp at Pingree Park campus with a total cost of approximately $995, and to complete at least one summer in fishery-related employment.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
		and	
Z	110	Principles of Animal Biology	4
		or	
BY	102	Attributes of Living Systems	4
		and	
BY	103A-B	Biology of Organisms	4
C	111, 113	General Chemistry I, II	7
C	112	General Chemistry Laboratory I	1
CO	150	College Composition	3
FW	100	Wildfire Biology	3
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
M	155	Calculus for Biological Scientists I	4
SP	200	Public Speaking and Discussion	3
		Physical education/wellness	2

Sophomore Year			**Credits**
BY	220	Ecology	3
BY	310	Cell Biology	4
C	245, 246	Organic and Biological Chemistry, Laboratory	5
FW	204	Introduction to Fishery Biology	2
PH	110	Descriptive Physics	3
		Arts and humanities 1	6
		Behavioral and social sciences 2	3

Summer Field Training Program			**Credits**
NR	220	Natural Resources Ecology and Measurements	4

Junior Year		**Credits**	
BY	311	Developmental Biology	5
FW	300	Ichthyology	3
FW	360	Principles of Wildlife Management	3
NR	260	Introduction to Natural Resource Analysis	3
ST	301	Introduction to Statistical Methods	3
		Behavioral and social sciences 2	3
		Biology or chemistry	6

Senior Year		**Credits**	
FW	370	Design of Wildlife Projects	2
FW	400	Fish Ecology	3
		or	
FW	402	Fish Culture	4
FW	401	Fishery Science	3
NR	320	Natural Resources Policy and Administration	3
		or	
NR	400	Public Relations in Natural Resources	3
		or	
NR	420	Integrated Resource Management	4

Biology	3-4
Electives	15-17

1. Select from list of courses in category 11I-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

Minor in Fishery Biology
Students majoring in wildlife biology, watershed science, forestry, range ecology, zoology, and others may find that a minor in fishery biology will increase employment opportunities. The requirements for this minor provide a solid base for aquatic work.

Lower Division			**Credits**
BY	102	Attributes of Living Systems	4
		and	
BY	103A	Biology of Organisms-Animal	2
		or	
Z	110	Principles of Animal Biology	4
BY	220	Ecology	3

Upper Division			**Credits**
FW	300	Ichthyology	3

Select two courses from the following:

FW	400	Fish Ecology	3
FW	401*	Fishery Science	3
FW	402	Fish Culture	4

Select three to five additional credits in adviser-approved aquatic courses for a total of 21 credits.

*Additional course work may be required because of prerequisites.

Major in Wildlife Biology
Professor Dale Hein, in charge
The core curriculum is required of all students; electives may be used to develop special competency. Specializations include conservation biology, management of game or nongame wildlife, biometrics, ecology, nutrition, international wildlife, public relations, administration, and problem wildlife. Electives may also be used to introduce related natural resources, namely fisheries, forests, rangelands, water, and recreation. Electives in additional basic sciences may prepare wildlife students for graduate school or veterinary school.

Honors option courses and individualized programs of study for graduation as a University Honors Scholar are available to highly qualified students.

Two weeks are spent between the junior and senior years touring important wildlife areas. A fee of approximately $200 is required for transportation.

Each student pays a similar amount for food and lodging. This field study normally is required in late May following junior spring semester.

All students, including transfer students, are required to attend the four-week summer camp at Pingree Park campus no later than the summer following sophomore year. Total cost is approximately $995.

A minimum grade of C is required in BY 220, FW 100, and FW 360 for students majoring in wildlife biology.

Freshman Year			**Credits**
BY	102	Attributes of Living Systems	4

BY	103A-B	Biology of Organisms	4
BY	220	Ecology	3
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
FW	100	Wildfire Biology	3
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
		Arts and/or humanities	6
		Physical education/wellness	2

Sophomore Year			**Credits**
B	223	Plant Identification	3
C	245	Organic and Biological Chemistry	4
FW	360	Principles of Wildlife Management	3
M	155	Calculus for Biological Scientists I	4
NR	260	Introduction to Natural Resources Analysis	3
SP	200	Public Speaking and Discussion	3
ST	301	Introduction to Statistical Methods	3
Z	335	Ornithology	3
		Behavioral and social sciences 2	3
		Economics 1	3

Summer Field Training Program,

Pingree Park Campus			**Credits**
NR 2	20	Natural Resources Ecology and Measurements	5

Junior Year		**Credits**	
AG	240	Introductory Soil Science	4
CO	301 B	Intermediate Composition-Expository Writing in the Sciences	3
		or	
JT	300	Technical Communication	3
FW	300	Ichthyology	3
FW	370	Design of Wildlife Projects	2
FW	371	Wildlife Management Techniques	4
FW	375	Field Wildlife Studies	2
NR	320	Natural Resources Policy and Administration	3
Z	330	Mammalogy	3
		Botany or plant science 4	3
		Wildlife, zoology. or biology 4	5

Senior Year			**Credits**
FW	474	Wildlife Ecology	3
FW	492	Seminar-Wildlife Biology	1
FW	495B	Independent Study-Wildlife Biology	1
NR	400	Public Relations in Natural Resources	3
NR	420	Integrated Resource Management	4
		Electives	14

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

3. Select from list of courses in category IV-A in the University Studies Program.

4. Select from departmental list.

Minor in Wildlife Biology

A minor in wildlife biology is especially appropriate for students majoring in other natural resources disciplines or in natural sciences. NR 220 is required for all wildlife minors and is offered only during summer at the Pingree Park campus. A wildfire minor can greatly increase employment qualifications with natural resources management agencies.

Lower Division			**Credits**
BY	220*	Ecology	3
NR	220*	Natural Resources Ecology and Measurements	5

Upper Division			**Credits**
FW	360	Principles of Wildfire Management	3
FW	474*	Wildfire Ecology	3
NR	400	Public Relations in Natural Resources	3

Select at least two courses from the following:

FW	312*	Diseases of Wildfire	3
FW	371*	Wildfire Management Techniques	4
FW	377	Habitat for Wildfire	3
FW	468	Wild Bird Management	3
FW	469*	Big Game Management	3

* Additional course work may be required because of prerequisites.

Graduate Programs in Fishery and Wildlife Biology
Associate Professor Richard L. Knight, in charge
Graduate programs lead to the master of science and doctor of philosophy degrees. A description of these programs may be found in the *Graduate and Professional Bulletin.*

Students should indicate their interest when writing for further information about graduate programs and research. Contact the department for application instructions.

DEPARTMENT OF FOREST SCIENCES
Office in Forestry Building. Room 131
Professor Charles C. Grier, Head
Two majors are offered to prepare students for a variety of career opportunities. The forestry major and the natural resources management major emphasize multiple-use management of forested ecosystems. Both qualify graduates for employment with organizations such as private forest land owners, forestry consultants, wood harvesting and processing firms, state forestry services, the U.S. Forest Service, the Bureau of Land Management, the Bureau of Indian Affairs, and the Soil Conservation Service. The forestry major provides unique concentrations for students interested in emphasizing forest biology, forest fire science, forest management, forestry-business, or wood science and technology.

Through the advising process, students majoring in natural resources management have the opportunity to achieve additional educational objectives such as a minor in another field. However, if students intend to pursue a career with organizations which specialize in management of forests for production of wood products, it is recommended that they elect the forestry major.

The forestry major qualifies persons as professional foresters and is accredited by the Society of American Foresters.

As a result of their educational experience, students will obtain comprehensive knowledge of subject areas relevant to their major field of study. They will be able to apply this knowledge in solving problems. Students will learn to communicate their knowledge of forestry and natural resources in verbal and written English. Students are expected to be conversant about subject areas outside their major study focus, including. but not restricted to, appreciation for creativity and interpersonal group dynamics.

All students in the department are required to complete one summer of acceptable field experience. There are opportunities for students to obtain jobs which fulfill this requirement.

With the exception of the natural resources management major, M 120, M 121, M 124, M 125, and M 126 are considered review courses, and may not be used toward a degree in the forestry major.

Major in Forestry

Professor David R. Betters, in charge This curriculum emphasizes professional training in multiple-use forestry. It also provides a broad education in the basic sciences as well as an introduction to the behavioral and social sciences, and arts and humanities. All graduates from this major qualify as professional foresters. They are also qualified for employment in public or private forestry organizations.

All students in the major must choose one of five concentrations that best suits their career objectives. In addition, programs emphasizing other fields of forestry, such as forest entomology, forest pathology, forest influences, or forest engineering or surveying may be arranged on an individual basis.

Students must elect one of two field course options. The first is NR 220, a four-week course offered during the summer at the Pingfee Park Campus in the mountains west of Fort Collins, The second is a nine-week session offered during the fall semester at Pingree Park. This session is devoted to field ecology and forest field operations. Students selecting the fall semester option take a common curriculum.

Forest Biology Concentration

Professor Frederick W. Smith, in charge

This curriculum provides ideal preparation for graduate study in forest biological. sciences and eventual careers in college teaching or research. Forest biology encompasses such sciences as forest ecology,

forest fire ecology, forest entomology, forest genetics and tree improvement, forest pathology, forest soil biology, tree physiology, and silviculture.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
C	107, 108	Fundamental Chemistry Laboratory	5
CO	150	College Composition	3
F	I CO	Fundamentals of Forestry	3
M	155	Calculus for Biological Scientists I	4
SP	200	Public Speaking and Discussion	3
		Arts and humanitiesTM	3
		Behavioral and social sciences	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
BY	220	Ecology	3
C	245	Organic and Biological Chemistry	4
EC	102	Principles of Microeconomics	3
F	201	Forest Mapping	2
F	207	Forest Field Ecology	2
F	210	Dendrology	3
F	215	Forestry Field Operations 3	4
F	224	Wildland Fire Measurements 3	1
F	230	Forest Mensuration	3
NR	260	Introduction to Natural Resource Analysis	3
PH	121	General Physics I	5
		Arts and humanities 1	3

Junior Year			**Credits**
B	440	Plant Physiology	3
F	311	Forest Ecology	3
F	321	Forest Biometry	3
F	322	Forest Economics	3

F	325	Silviculture	3
ST	301	introduction to Statistical Methods	3
		Electives	6

Senior Year			**Credits**
CO	301B	Intermediate Composition-Expository Writing in the Sciences	3
F	493C	Seminar-Forest Biology	1
NR	420	Integrated Resource Management	4
PD	365/EN 365	Integrated Forest Pest Management	4
		Electives	7

Select 12 additional credits in the junior or senior year from approved departmental list.

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

3. NR 220 may be substituted for these courses.

Forest Fire Science Concentration

Professor Philip N. Omi, in charge

The Department of Forest Sciences has the largest fire science program in the United States. Graduates perform fire management activities in the nation's public and private forests. This concentration also serves as a foundation for graduate study in a firerelated discipline. Students generally find rewarding summer employment while progressing toward the B.S. degree, especially during those years of high fire suppression need.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
BY	220	Ecology	3
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
F	100	Fundamentals of Forestry	3
F	210	Dendrology	3
M	125	Numerical Trigonometry	1
M	141	Calculus in Management Sciences	3
SP	200	Public Speaking and Discussion	3
ST	201	General Statistics	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
EC	102	Principles of Microeconomics	3
F	201	Forest Mapping 1	2
F	207	Forest Field Ecology 1	2
F	215	Forestry/Field Operations 1	4
F	224	Wildland Fire Measurements 1	1
F	230	Forest Mensuration	3
F	331	Wood Anatomy and Properties	3
NR	260	Introduction to Natural Resource Analysis	3
PH	110	Descriptive Physics	3
		or	
PH	121	General Physics I	5

Junior Year			**Credits**
AT	350	Introduction to Weather and Climate	2
CO	301B	Intermediate Composition-Expository Writing in the Sciences	3

F	311	Forest Ecology	3
F	321	Forest Biometry	3
F	322	Forest Economics	3
F	325	Silviculture	3
F	330	Timber Harvesting and the Environment	3
NR	320	Natural Resources Policy and Administration	3
PD	365/EN 365	Integrated Forest Pest Management	4

Senior Year			**Credits**
F	421	Timber Management	3
F	422	Quantitative Methods in Forest Management	3
F	423	Decision Making in Forest Resource Management	3
F	424	Forest Fire Management	3
NR	420	Integrated Resource Management	4
NR	425	Sustainability of Renewable Resources	3

Junior or Senior Year			**Credits**
F	425	Forest Fire Behavior	2
		Arts and humanities 2	6
		Behavioral and social sciences	3

1. NR 220 may be substituted for these courses.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

3. Select from list of courses in category IV-A in a University Studies Program. excluding EA and EC courses.

Forest Management Concentration

Professor David R. Betters, in charge

This concentration is the "traditional" forestry program and leads to an understanding of the basic principles of forestry. Many graduates from this concentration continue their education by enrolling in graduate studies in forestry or related natural resource areas.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
BY	220	Ecology	3
C	107, 108	Fundamental Chemistry. Laboratory	5
CO	150	College Composition	3
F	100	Fundamentals of Forestry	3
F	210	Dendrology	3
M	125	Numerical Trigonometry	1
M	141	Calculus in Management Sciences	3
SP	200	Public Speaking and Discussion	3
ST	201	General Statistics	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
EC	102	Principles of Microeconomics	3
F	201	Forest Mapping 1	2
F	207	Forest Field Ecology 1	2
F	215	Forestry Field Operations'	4
F	224	Wildland Fire Measurements 1	1
F	230	Forest Mensuration	3
F	321	Forest Biometry	3
NR	260	Introduction to Natural Resource Analysis	3
		Biological sciences	3

Junior Year			Credits
F	311	Forest Ecology	3
F	322	Forest Economics	3
F	325	Silviculture	3
F	330	Timber Harvesting and the Environment	3
F	331	Wood Anatomy and Properties	3
JT	300	Technical Communication	3
NR	320	Natural Resources Policy and Administration	3
NR	323	Remote Sensing of Natural Resources	3
PD	365/EN 365	Integrated Forest Pest Management	4
		Arts and humanities 2	6
		Behavioral and social sciences 3	3

Senior Year			Credits
F	421	Timber Management	3
F	422	Quantitative Methods in Forest Management	3
F	424	Forest Fire Management	3
F	493A	Seminar-Forest Management Science	1
NR	420	Integrated Resource Management	4
NR	425	Sustainability of Renewable Resources	3
		Biological sciences 4	3

1. NR 220 may be substituted for these courses.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

3. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

4. Select from list of courses in category 11-B in the University Studies Program.

Forestry-Business Concentration

Professor Douglas B. Rideout, in charge

The forestry-business concentration is for those who wish to study forestry with an emphasis in business. This concentration prepares students for careers in either public or private enterprise. The business courses supporting the forestry program give graduates an understanding of business principles often used in small business, industrial forestry, and public agencies. Qualified graduates are eligible for admission to most M.B.A. programs and for graduate studies in forestry without taking remedial courses normally required.

Freshman Year			Credits
B	120	Principles of Plant Biology	4
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
CS	150	Introduction to FORTRAN Programming	3
F	100	Fundamentals of Forestry	3
F	210	Dendrology	3
M	141	Calculus in Management Sciences	3
SP	200	Public Speaking and Discussion	3
		Physical education/wellness	2

Sophomore Year			Credits
AG	240	Introductory Soil Science	4
BY	220	Ecology	3
EC	102	Principles of Microeconomics	3
NR	260	Introduction to Natural Resource Analysis	3
ST	204	Statistics for Business Students	2
		Arts and humanities 1	6

		Behavioral and social sciences 2	3

Junior Year			**Credits**
BA	210	Financial Accounting	3
BK	300	Marketing	3
F	311	Forest Ecology	3
F	321	Forest Biometry	3
F	322	Forest Economics	3
F	325	Silviculture	3
F	330	Timber Harvesting and the Environment	3
F	331	Wood Anatomy and Properties	3
NR	320	Natural Resources Policy and Administration	3

Senior Year			**Credits**
BF	300	Principles of Finance	3
BG	260	Legal Environment of Business	3
BL	300	Production Fundamentals	3
BN	300	Management Fundamentals	3
F	421	Timber Management	3
F	422	Quantitative Methods in Forest Management	3
F	424	Forest Fire Management	3
F	493A	Seminar-Forest Management Science	1
NR	420	Integrated Resource Management	4
NR	425	Sustainability of Renewable Resources	3
PD	365/EN 365	Integrated Forest Pest Management	4

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program. excluding EA and EC courses,

Wood Science and Technology Concentration

Associate Professor Craig E. Shuler, in charge

This curriculum is designed to provide a thorough understanding of wood characteristics and properties. Its processing and use as a major construction material, in paper and chemicals, and for numerous other products are included. The material science of wood is emphasized; and graduates are prepared for professional positions where wood is a primary raw material and/or of principal interest. These positions include business, marketing, computer applications, personnel and corporate management, technical services, production, product development, and quality control. Employers are primarily in private industry, but opportunities also exist in government agencies.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
EC	102	Principles of Microeconomics	3
F	100	Fundamentals of Forestry	3
F	210	Dendrology	3
M	160	Calculus for Physical Scientists I	4
		Arts and humanities 1	6
		Physical education/wellness	2

Sophomore Year			**Credits**
C	245, 246	Organic and Biological Chemistry, Laboratory	5
CE	256	Statics for Nonengineers	3
F	201	Forest Mapping 2	2
F	207	Forest Field Ecology 2	2
F	215	Forestry Field Operations 2	4
F	224	Wildland Fire Measurements 2	1

F	230	Forest Mensuration	3
F	331	Wood Anatomy and Properties	3
M	229	Matrices and Linear Equations	1
NR	260	Introduction to Natural Resource Analysis	3
PH	141	Physics for Scientists and Engineers I	5

Junior Year			**Credits**
CE	358	Mechanics of Materials for Nonengineers	3
F	321	Forest Biometry	3
F	322	Forest Economics	3
F	330	Timber Harvesting and the Environment	3
F	334	Wood Chemistry	4
F	335	Pulping Processes	3
F	341	Wood Protection	4
PD	365/EN 365	Integrated Forest Pest Management	4
SP	200	Public Speaking and Discussion	3
ST	301	Introduction to Statistical Methods	3
		Behavioral and social sciences 3	3

Senior Year		**Credits**	
F	431 B	Mechanics of Wood and Wood Composites	4
F	432	Design of Wood Structures	3
F	435	Mechanical Processing of Wood Products	4
F	441	Wood Bonding and Finishing	3
F	493B	Seminar-Wood Science	1
F	495B	Independent Study-Wood Science	3
ME	412	Quality Control	2

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. NR 220 may be substituted for these courses.

3. Select from list of courses in category IV-A in the University Studies Program. excluding EA and EC courses.

Major in Natural Resources Management

Professor Dennis L. Lynch, in charge

This curriculum is designed to provide the broadest possible exposure to natural resources. Opportunities exist for individualized advising to meet specific student objectives. Graduates can gain employment in a wide variety of forestry positions and natural resource fields such as land use planners, environmental consultants, realty specialists, conservation directors with youth organizations, and resource inventory and analysis specialists. Students interested in a broad natural resource program leading to graduate study in law, business, or journalism will find this curriculum ideal. This major has an unusually large number of elective courses which allows students to pursue the varied educational and career objectives outlined above. For example, students must choose a minor from subject areas throughout the University or select the Conservation Biology Interdisciplinary Studies Program. International natural resource management interests can also be accommodated. This major requires close communication between advisers and students.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
C	107, 108	Fundamental Chemistry, Laboratory	5
F	100	Fundamentals of Forestry	3
M	120, 121	College Algebra I, II	2
M	125	Numerical Trigonometry	1
M	141	Calculus in Management Sciences	3
SP	200	Public Speaking and Discussion	3
Z	110	Principles of Animal Biology	4
		Arts and humanities 1	3

		Physical education/wellness	2

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
BY	220	Ecology	3
CO	150	College Composition	3
EC	102	Principles of Microeconomics	3
ER	140	Physical Geology	4
F	210	Dendrology	3
NR	260	Introduction to Natural Resource Analysis	3
ST	201	General Statistics	3
		Arts and humanities	3
		Behavioral and social sciences 2	3

Summer Field Training Program,

Pingree Park Campus			Credits
NR	220	Natural Resources Ecology and Measurements	5

Junior Year		**Credits**
CO	301B	Intermediate Composition-Expository Writing in the Sciences 3
F	311	Forest Ecology 3
F	322	Forest Economics 3
F	325	Silviculture 3
NR	320	Natural Resources Policy and Administration 3.

Senior Year			**Credits**
NR	400	Public Relations in Natural Resources	3
NR	420	Integrated Resource Management	4
NR	421	Natural Resources Sampling	3

Junior and Senior Year			**Credits**
Select three courses from the following:			
ER	304	Principles of Watershed Management	3
FW	360	Principles of Wildlife Management	3
RR	200	Introduction to Recreation Resources	3
RS	300	Principles of Range Management	3

Students must select a minor (with a minimum of 21 credits) or the Interdisciplinary Studies Program in Conservation Biology.

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

Minor in Forestry

Professor David R. Betters, in charge

The minor in forestry provides students with the opportunity to obtain exposure to forest sciences. It provides insight into the management of forested lands and is particularly appropriate for students majoring in other natural resource disciplines or natural sciences.

Lower Division			**Credits**
F	210*	Dendrology	3

Upper Division			**Credits**
F	311*	Forest Ecology	3
F	321*	Forest Biometry	3
F	325	Silviculture	3
F	330	Timber Harvesting and the Environment	3

F	421*	Timber Management	3
F	424*	Forest Fire Management	3
		or	
PD	365/EN 365	Integrated Forest Pest Management	4
NR	323	Remote Sensing of Natural Resources	3

*Additional course work may be required because of prerequisites.

Graduate Programs in Forest Sciences
The department offers graduate programs leading to master of forestry, master of science, and doctor of philosophy degrees. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF RANGELAND ECOSYSTEM SCIENCE

Office in Natural Resources Building, Room 239
Professor Harold Goetz, Head
Two undergraduate majors, range and forest management, and range ecology, are offered. These programs differ slightly in the freshman and sophomore years, then diverge into distinct majors the junior and senior years.

Two concentrations (land rehabilitation and range ecology) can be selected with the range ecology major. Students desiring a concentration should consult their advisers at the beginning of the sophomore year to schedule courses so a bachelor's degree may be obtained within four years. All formal course work toward the degree in range science should be taken for a letter grade. The bachelor of science curricula are accredited by the Society for Range Management.

An outcomes assessment will be made of all graduating seniors in the Rangeland Ecosystem Science Department. They will be evaluated on knowledge and skills acquired during their tenure at Colorado State. Upon graduation students will: (1) have developed an in-depth understanding of basic plant and animal biology and physical sciences as they relate to the field of range science, (2) understand the important concepts of ecology and range management, (3) understand economics and how to use it to evaluate alternatives, (4) be skilled in problem solving and decision making, and (5) have developed communication, political, and interpersonal skills to make their education effective.

M 120 and M 121 are considered review courses; credits in these courses may not be used toward the degrees in range ecology and range and forest management.

Major in Range and Forest Management
This major, which requires 129 credits, prepares students to manage and administer range- and forest-land resources under multiple-use principles. Graduates are qualified lot employment with the U.S. Forest Service, U.S. Bureau of Land Management, U.S. Soil Conservation Service, U.S. Bureau of Indian Affairs, and private range and forest industries. With proper courses, students can qualify for U.S. Civil Service range conservationist, soil conservationist, and forester examinations. Students are encouraged to work closely with their advisers to discuss curriculum requirements and options available.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
B	223	Plant Identification	3
BY	220	Ecology	3
C	107, 108	Fundamental Chemistry, Laboratory	5
CO	150	College Composition	3
F	100	Fundamentals of Forestry	3
M	141	Calculus in Management Sciences	3
SP	200	Public Speaking and Discussion	3
ST	201	General Statistics	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4

AN	100	Animal Sciences	4
EA	102	Agricultural/Natural Resource Economics	3
F	201	Forest Mapping	2
F	207	Forest Field Ecology	2
F	210	Dendrology	3
F	215	Forestry Field Operations	4
F	224	Wildland Fire Measurements	1
F	230	Forest Mensuration	3
F	321	Forest Biometry	3
NR	260	Introduction to Natural Resource Analysis	3
RS	300	Principles of Range Management	3

Junior Year			**Credits**
AN	220	Feeds and Feeding	2
AN	221	Feed Formulation	1
B	421	Grass Systematics	3
B	440	Plant Physiology	3
C	245	Organic and Biological Chemistry	4
ER	304	Principles of Watershed Management	3
F	322	Forest Economics	3
FW	360	Principles of Wildlife Management	3
RS	331	Range Ecogeography	2
RS	332	Range Measurements	2
RS	351	Range Plant Production and Decomposition	3
RS	352	Range Animal-Habitat Interactions	3

Senior Year			**Credits**
AG	440	Soil Genesis and Survey	3
AN	372	Sheep Production	3
		or	
AN	478	Beef Production and Management	3
F	311	Forest Ecology	3
NR	420	Integrated Resource Management	4
RS	400	Rangeland Improvements	2
RS	470	Range Economics and Analysis	2
RS	472	Range Ecosystem Planning	4
		Arts and humanities 1	6
		Behavioral and social sciences 2	3

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program. excluding EA and EC courses.

Major in Range Ecology

This curriculum prepares students to manage the vegetation and soil resources on rangelands for land management agencies or related industries. It also gives students an excellent background for pursuing an advanced degree.

The curriculum meets U.S. Civil Service requirements for a range conservationist and soil conservationist. It is possible, with a few additional courses, to meet U.S. Civil Service requirements for soil scientist and ecologist. Students with such training are generally employed by the U.S. Bureau of Land Management, U.S. Bureau of Indian Affairs, U.S. Soil Conservation Service, U.S. Forest Service, or private industry (e.g., conservation groups, reclamation firms, private consulting companies, etc.).

Students are encouraged to work closely with their advisers to discuss curriculum requirements and options available. The land rehabilitation concentration requires 129 credits.

Land Rehabilitation Concentration

Freshman Year			**Credits**
AN	100	Animal Sciences	4
BY	102	Attributes of Living Systems	4
BY	103A-B	Biology of Organisms	4
BY	220	Ecology	3
C	107	Fundamental Chemistry	4
C	245	Organic and Biological Chemistry	4
CO	150	College Composition	3
M	141	Calculus in Management Sciences	3
M	229	Matrices and Linear Equations	1
		Physical education/wellness	2

Summer Field Training Program, Pingree Park Campus			**Credits**
NR	220	Natural Resources Ecology and Measurements	5

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
B	223	Plant Identification	3
EA	102	Agricultural/Natural Resource Economics	3
ER	140	Physical Geology	4
NR	260	Introduction to Natural Resource Analysis	3
PH	110	Descriptive Physics	3
RS	300	Principles of Range Management	3
RS	331	Range Ecogeography	2
SP	200	Public Speaking and Discussion	3
ST	301	Introduction to Statistical Methods	3

Junior Year			**Credits**
AG	350	Soil Fertility Management	3
AN	220	Feeds and Feeding	2
AN	221	Feed Formulation	1
B	421	Grass Systematics	3
B	440	Plant Physiology	3
EA	340/EC 340	introduction to Economics of Natural Resources	3
ER	304	Principles of Watershed Management	3
RS	332	Range Measurements	2
RS	351	Range Plant Production and Decomposition	3
RS	352	Range Animal-Habitat Interactions	3

Senior Year			**Credits**
AG	440	Soil Genesis and Survey	3
AG	455	Soil Microbiology	3
FW	360	Principles of Wildfire Management	3
RS	400	Rangeland Improvements	2
RS	470	Range Economics and Analysis	2
RS	472	Range Ecosystem Planning	4
RS	478	Restoration Ecology	3
		Arts and humanities 1	6
		Behavioral and social sciences"	3

Select two courses from the following:

AG	414	Agricultural Experimental Design	3
AG	470	Soil Physics	3
ER	416	Land Use Hydrology	3
ER	418	Land Use and Water Quality	3

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.'

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

Seed Science Option
The commercial seed industry has demand for persons knowledgeable in seed science for range re-seeding projects and disturbed lands reclamation. Persons interested in careers with the seed industry should enter the seed science option within the range ecology concentration.

Range Ecology Concentration

Freshman Year			**Credits**
AN	100	Animal Sciences	4
BY	102	Attributes of Living Systems	4
BY	103A-B	Biology of Organisms	4
BY	220	Ecology	3
C	107	Fundamental Chemistry	4
C	108	Fundamental Chemistry Laboratory 1	1
		or	
C	112	General Chemistry Laboratory	1
C	245	Organic and Biological Chemistry	4
CO	150	College Composition	3
M	141	Calculus in Management Sciences	3
M	229	Matrices and Linear Equations	1
		Physical education/wellness	2

Summer Field Training Program, Pingree Park Campus			**Credits**
NR	220	Natural Resources Ecology and Measurements	5

Sophomore Year			**Credits**
AG	240	Introductory Soil Science	4
B	223	Plant Identification	3
C	246	Organic and Biological Chemistry Laboratory 1	1
EA	102	Agricultural/Natural Resource Economics	3
ER	140	Physical Geology	4
NR	260	Introduction to Natural Resource Analysis	3
PH	110	Descriptive Physics	3
RS	300	Principles of Range Management	3
RS	331	Range Ecogeography	2
SP	200	Public Speaking and Discussion	3
ST	301	Introduction to Statistical Methods	3

Junior Year			**Credits**
AG	304	Seed Production, Conditioning, and Marketing	2
AG	330	Principles of Genetics	3
AN	220	Feeds and Feeding	2
AN	221	Feed Formulation	1
AN	320	Principles of Animal Nutrition	3
B	421	Grass Systematics	3
B	440	Planl Physiology	3
EA	340/EC 340	Introduction to Economics of Natural Resources	3
ER	304	Principles of Watershed Management	3
RS	332	Range Measurements	2
RS	351	Range Plant Production and Decomposition	3
RS	352	Range Animal-Habitat Interactions	3

Senior Year			**Credits**
AG	440	Soil Genesis and Survey	3
AG	455	Soil Microbiology	3
AG	460/H 460	Plant Breeding 1	3
AN	372	Sheep Production	3

		or	
AN	478	Beef Production and Management	3
B	446	Physiology of Seeds 1	2
FW	360	Principles of Wildfire Management	3
PD	424	Seed Technology 1	2
RS	400	Rangeland Improvements	2
RS	470	Range Economics and Analysis	2
RS	472	Range Ecosystem Planning	4
		Arts and humanities 2	6
		Behavioral and social sciences 3	3

1. Required for students in seed science option.

2. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

3. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

Other Elective Groupings

Students interested in other private industry (ranching, land appraisal, etc.) should develop electives in business, economics, and animal science, Students and their advisers may develop electives in any desired area, such as wildfire, watershed, recreation, soils, forage crops, resource economics, or computer programming.

Minor in Range Ecology

The minor in range ecology provides an academic background for students interested in wildlife habitat, integrated land management, ranch management, applied ecology, and international development of arid lands. The minor provides additional flexibility for students who have a liberal arts or international education goal, but would like to increase their employment potential in an applied area.

A minimum of 12 credits in the minor must be from RS courses.

Lower Division			**Credits**
Select a minimum of nine credits from the following:			
AG	240*	Introductory Soil Science	4
B	223*	Plant Identification	3
BY	220*	Ecology	3
F	210*	Dendrology	3
NR	220*	Natural Resources Ecology and Measurements	5

Upper Division			**Credits**
RS	300*	Principles of Range Management	3
		or	
RS	320/AG 320	Forage and Range Management	4
RS	331	Range Ecogeography	2
RS	332*	Range Measurements	2
Select a minimum of five credits from the following:			
RS	351	Range Plant Production and Decomposition	3
RS	352*	Range Animal-Habitat Interactions	3
RS	400	Rangeland Improvements	2
RS	470*	Range Economics and Analysis	2
RS	472	Range Ecosystem Planning	4
RS	478	Restoration Ecology	3

1. AG 240. and one of B 223. F 210. or NR 220 are recommended.

*Additional course work may be required because of prerequisites.

Graduate Programs in Rangeland Ecosystem Science
Programs lead to the master of science and doctor of philosophy degrees. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF RECREATION RESOURCES

Office in Forestry Building, Room 233
Professor Glenn E. Haas, Chairman
The Department of Recreation Resources complements the college's focus on the. physical and biological aspects of natural resource management by focusing on people and human dimension aspects. Specifically, the focus is on the systematic planning, interpretation, and management of natural settings such as parks and wilderness and their urban interface, private recreation and tourism enterprises, and the recreationists and tourists visiting these areas.

The department offers a major in natural resources recreation and tourism. Curricula provide for a wide variety of professional careers in private, public, and nongovernmental sectors, as well as for opportunities of international employment.

Upon successful completion of the bachelor degree program, students will graduate from a high-quality program nationally accredited by the National Recreation and Parks Association. Students will be provided professional technical skills along with skills

in problem solving, systems approach to planning, integrated team decision making, quantitative analysis. oral and verbal communication, and computer operations. Each student will be familiar with the historic evolution of environmental conservation and develop their own appreciation for how their discipline contributes to environmental stewardship.

Major in Natural Resources Recreation and Tourism
This major prepares students for professional employment in interpretation, recreation resource administration, and tourism and commercial recreation.

Employment opportunities are primarily with public agencies and private firms - in administration, management, planning, and research. Graduates work for national, state, and local park and recreation departments, natural resource management agencies administering recreation areas, private recreation industries, school systems, and youth organizations.

All concentrations require a professional internship.

Interpretation Concentration
This concentration develops expertise in developing or managing public education programs related to natural environments. It is oriented to public agencies as well as private commercial recreation and tourism enterprises that wish to increase public awareness and education on environmental/natural resource management issues, and to enhance the quality of people's recreation experiences. This concentration prepares students for public and private sector jobs such as interpreters/naturalists, environmental educators, resource communication specialists, and public affairs specialists.

Recently the headquarters of the National Association of Interpretation has been housed with the Department of Recreation Resources at Colorado State, thus providing a unique opportunity for interaction with national leaders.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
CO	150	College Composition	3
EC	102	Principles of Microeconomics	3
ER	130	Geologic Environment and Society	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
NR	120	Environmental Conservation	3
NR	260	Introduction to Natural Resource Analysis	3
PL	105	Introduction to Philosophy	3
PY	100	General Psychology	3

SP	200	Public Speaking and Discussion	3
		Physical education/wellness	1

Summer Field Training Program, Pingree Park Campus			**Credits**
NR	220	Natural Resources Ecology and Measurements	5

Sophomore Year			**Credits**
AP	100	Introductory Cultural Anthropology	3
BY	220	Ecology	3
F	210	Dendrology	3
RR	200	Introduction to Recreation Resources	3
RR	330	Social Aspects of Natural Resource Management	3
S	310	Quantitative Sociological Analysis	3
		Physical education/wellness	1
		Electives	5

Junior Year			**Credits**
AP	330	Human Ecology	3
BK	300	Marketing	3
EA	346/EC 346	Economics of Outdoor Recreation	3
F*'	360	Principles of Wildfire Management	3
NR	320	Natural Resources Policy and Administration	3
NR	387	Internship I	1
RR	361	Environmental Interpretation	3
RR	363	Tourism and Recreation Management	3
RR	370	Tourism and Commercial Recreation	3
RR	375	Budgeting and Revenue Resources	3
RR	377	Recreation Resources Administration	2
SP	303	Business and Professional Speaking	3

Summer Session		**Credits**
NR	487C	Internship II-Recreation Resources	8

Senior Year		**Credits**
E	403	Nature Writing	3
NR	400	Public Relations in Natural Resources	3
NR	401	Techniques in Public Relations	2
RR	431	Park and Protected Area Management	3
RR	442	Tourism Planning	3
RR	461	Interpretation Techniques	3
		Arts and humanitiesTM	3
		Electives	6

1. Select from list of courses in category III-A in the University Studies Program, excluding PL courses.

RECREATION RESOURCE ADMINISTRATION

Concentration

This concentration develops expertise in managing public recreation resources and in providing quality recreation experiences to their visitors. It is oriented to public or governmental agencies charged with providing outdoor or natural resource-based recreation opportunities such as municipalities, counties, states, and federal agencies. The faculty are actively involved in the National Society for Park Resources and have a close working relationship with numerous urban, state, and federal agencies such as the U.S. Forest Service, National Park Service, U.S. Bureau of Land Management, Corps of Engineers, and Bureau of Reclamation.

This program of study can quality students for both the federal professional forester and outdoor recreation planner job series, and is highly recommended for a career with state forest service

agencies or the U.S. Forest Service. Students taking this concentration can also qualify for nonprofit agency administration.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
CO	150	College Composition	3
EC	102	Principles of Microeconomics	3
ER	130	Geologic Environment and Society	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
NR	120	Environmental Conservation	3
NR	260	Introduction to Natural Resource Analysis	3
PD	105	Introduction to Philosophy	3
PY	100	General Psychology	3
SP	200	Public Speaking and Discussion	3
		Physical education/wellness	1

Summer Field Training Program, Pingree Park Campus			**Credits**
NR	220	Natural Resources Ecology and Measurements	5

Sophomore Year		**Credits**
BY	220	Ecology 3
CO	301B	Intermediate Composition-Expository Writing in the Sciences 3
		or
CO	301C	Intermediate Composition-Expository Writing in the Social Sciences 3
		or
JT	301	Business Communication 3
ER	304	Principles of Watershed Management 3
F	210	Dendrology 3
RR	200	Introduction to Recreation Resources 3
RR	330	Social Aspects of Natural Resource Management 3
S	310	Quantitative Sociological Analysis 3
		Physical education/wellness 1
		Elective 1

Junior Year			**Credits**
BK	300	Marketing	3
EA	346/EC 346	Economics of Outdoor Recreation	3
FW	360	Principles of Wildlife Management	3
IS	306	Landscape Construction Principles	2
NR	320	Natural Resources Policy and Administration	3
NR	360	Methods of Landscape Analysis	3
NR	387	Internship I	1
RR	361	Environmental Interpretation	3
RR	363	Tourism and Recreation Management	3
RR	375	Budgeting and Revenue Resources	3
RR	377	Recreation Resources Administration	2
SP	303	Business and Professional Speaking	3

Summer Session			**Credits**
NR	487C	Internship II-Recreation Resources	8

Senior Year			**Credits**
NR	400	Public Relations in Natural Resources	3
NR	420	Integrated Resource Management	4
NR	440	Land Use Planning	3
NR/RR		Electives	6
RR	431	Park and Protected Area Management	3

RR	442	Tourism Planning	3
		Arts and humanities 1	3
		Electives	3

1. Select from list of courses in category III-A in the University Studies Program, excluding PL courses.

Tourism and Commercial Recreation
Concentration This concentration develops expertise in operating private commercial recreation and tourism enterprises and in providing quality recreation experiences to their customers. It is oriented to private enterprises which incorporate surrounding natural resources into theft marketing and program strategies. such as destination resorts, campground and park concessionaires, adventure/guide service operators, regional tourism development councils, and Chambers of Commerce. The faculty are active members of the Resort and Commercial Recreation Association.

This is an exciting career area with recreation and tourism projected to be the largest industry (6.4 billion dollars) in Colorado in 1992, and the largest industry world-wide by the year 2000.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
CO	150	College Composition	3
EC	102	Principles of Microeconomics	3
ER	130	Geologic Environment and Society	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
NR	120	Environmental Conservation	3
NR	260	Introduction to Natural Resource Analysis	3
PL	105	Introduction to Philosophy	3
PY	100	General Psychology	3
SP	200	Public Speaking and Discussion	3
		Physical education/wellness	1

Sophomore Year		**Credits**	
BA	210	Financial Accounting	3
BG	260	Legal Environment of Business	3
BY	220	Ecology	3
CO	301B	Intermediate Composition-Expository Writing in the Sciences	3
		or	
CO	301C	Intermediate Composition-Expository Writing in the Social Sciences	3
		or	
JT	301	Business Communication	3
EC	100	Principles of Macroeconomics	3
RR	200	Introduction to Recreation Resources	3
RR	330	Social Aspects of Natural Resource Management	3
ST	204	Statistics for Business Students	2
		Physical education/wellness	1

Junior Year			**Credits**
BK	300	Marketing	3
BN	300	Management Fundamentals	3
EA	300/EC 300	Managerial Economics	3
EA	346/EC 346	Economics of Outdoor Recreation	3
NR	387	Internship I	1
RR	320	International Tourism and Recreation	3
RR	361	Environmental Interpretation	3
RR	363	Tourism and Recreation Management	3
RR	370	Tourism and Commercial Recreation	3
RR	375	Budgeting and Revenue Resources	3

SP	303	Business and Professional Speaking	3
		Arts and humanities	3

Summer Session		**Credits**	
NR	487C	Internship II-Recreation Resources	8

Senior Year			**Credits**
BG	425	Starting and Managing Your Own Business	3
NR	400	Public Relations in Natural Resources	3
NR	440	Land Use Planning	3
RR	470	Tourism Impacts	3
RR	472	Resort and Concessions Management	3
		Electives	15

1. Select from list of courses in category IH-A in the University Studies Program. excluding PL courses.

Minor in Commercial Recreation and Tourism
The minor has been designed for students who wish careers in commercial recreation and tourism enterprises ranging from national park concessionaires to the management of a private recreation business.

Lower Division			**Credits**
RR	200	Introduction to Recreation Resources	3

Upper Division			**Credits**
RR	320	International Tourism and Recreation	3
RR	330*	Social Aspects of Natural Resource Management	3
RR	363	Tourism and Recreation Management	3
RR	370	Tourism and Commercial Recreation	3
RR	470	Tourism Impacts	3
RR	472*	Resort and Concessions Management	3

*Additional course work may be required because of prerequisites.

Minor in Recreation Resources Management
The minor in recreation resources management has been designed primarily for the benefit of students whose majors prepare them for jobs in state and federal natural resource management agencies and private sector enterprises.

Lower Division		**Credits**	
RR	200	Introduction to Recreation Resources	3

Upper Division			**Credits**
RR	330*	Social Aspects of Natural Resource Management	3
RR	361 *	Environmental Interpretation	3
RR	375	Budgeting and Revenue Resources	3
RR	377	Recreation Resources Administration	2
RR	431	Park and Protected Area Management	3
RR	442*	Tourism Planning	3
RR	495B	Independent Study-Management	1

* Additional course work may be required because of prerequisites.

Minor in Wilderness Management
The wilderness management minor is relevant for students interested in pursuing a career in local, state, and federal land-management agencies, or with environmental organizations working to preserve natural ecosystems.

Upper Division			**Credits**

NR	487C*	Internship II-Recreation Resources	3
RR	450	Wilderness Philosophy and Ethic Development	3
RR	451	National Wilderness Preservation System	3
RR	452	Management of the Wilderness Resource	4
RR	453	Management of Recreation Resources	3
RR	454	Wilderness Management Planning	3
RR	455	Wilderness Management Skills and Projections	3

*Additional course work may be required because of prerequisites.

Graduate Programs in Recreation Resources
Programs lead to the master of science and doctor of philosophy degrees. A description of these programs may be found in the *Graduate and Professional Bulletin.*

COLLEGE OF NATURAL SCIENCES

Office in University Services Center, Room 408
Professor John C. Raich, Dean
Professor B. George Barisas, Associate Dean
Professor Thomas A. Goreli. Associate Dean
Professor Jacob E. Hautaluoma, Associate Dean
Dr. John C. McGrew, Assistant Dean and Chief Pre-Health Professions Adviser

UNDERGRADUATE MAJORS
Biochemistry
Biological Science
Botany
Chemistry
Computer Science
Mathematics
Physical Science
Physics
Psychology
Statistics
Zoology

UNDERGRADUATE MINORS
Biochemistry
Botany
Chemistry
Computer Science
Mathematics
Physics
Statistics
Zoology

In addition to degree programs, the College of Natural Sciences provides fundamental courses in the biological, mathematical, behavioral, and physical sciences for Colorado State's seven other colleges. In this role the college serves Colorado State's broad liberal and general education objectives.

COLLEGE PROGRAMS
Undergraduate Majors
The college's 8 departments offer 11 undergraduate majors, all leading to a bachelor of science degree which requires a minimum of 128 credits with a minimum of 45 in upper-division courses.

Students may consider simultaneously completing the requirements for a second major or minor. See Second Major Requirements and Minor Program

Requirements in the Graduation Requirements section of this catalog for a complete description of these programs.

Preparation for the Health Professions
Special advisers assist students in planning for entrance into accredited colleges of dentistry and dental hygiene, human medicine and osteopathy, nursing, optometry, pharmacy, physical therapy, physician assistant, podiatry, chiropractic, and other health professions. Since the advisers are acquainted with University courses and the requirements of the professional schools, they can help students fulfill requirements, plan for alternate but related careers, and make the most of their total undergraduate experience.

Students planning to enter a health field may make initial inquiry at the Dean's Office in the College of Natural Sciences.

Students entering a health preprofessional program must declare a formal academic major and be assigned an appropriate adviser. No preprofessional program is a major in itself. The major may be in any college and should be chosen with the student's educational and alternative vocational objectives in mind.

Freshman Open Option
Office in University Services Center, Room 408
Students who have not decided on a major but whose interests. aptitudes, and high school academic preparation in mathematics and the natural sciences clearly point to a major in this college may enroll as Freshman Open Option in the College of Natural Sciences. This option extends through the two semesters of the freshman year. Students may declare a departmental or interdepartmental major anytime during their flesh-man year and are required to do so at the beginning of their sophomore year.

Courses which should be taken by Freshman Open Option students in the College of Natural Sciences are mathematics, one or two basic science courses (chemistry, biology, physics). arts and humanities and behavioral and social sciences courses, and CO ' 150. If biology is chosen as one of the science courses, it is strongly recommended that general chemistry also be taken.

Students who are interested in psychology as a major, but were not accepted into 'the major upon admission to Colorado State, can gain entry into psychology after certain criteria are met. Contact the Dean's Office in the College of Natural Sciences or the Department of Psychology for details.

Graduate Programs
The master of science and doctor of philosophy degrees are offered by all departments. For detailed information, see the *Graduate and Professional Bulletin.* and consult the appropriate department.

INTERDEPARTMENTAL MAJOR
Major in Physical Science
Office in University Services Center, Room 408
This flexible curriculum provides a broad background in the basic physical sciences and an intensive program in two fields of physical science of the student's choosing. Properly designed programs can qualify graduates for admission to professional studies in legal and health-related fields or graduate studies in the basic or applied sciences.

Students who wish to combine this major with secondary teacher certification should see the Teacher Certification section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies, College of Applied Human Sciences section of this catalog.

Students majoring in physical science must complete the required core courses and the requirements for two minors from the fields of biochemistry, chemistry, computer science. geology. mathematics, physics, and statistics. These minors must be officially declared. (See Minor Program Requirements in the Graduation Requirements section in this catalog.) Required credits in the humanities, social sciences. and biology enrich the total program.

			Credits	
Arts and Humanities			**6**	
Basic Mathematics				**5**
M	120, 121	College Algebra I, II	2	
M	124	Logarithmic and Exponential Function	1	
M	125	Numerical Trigonometry	1	
M	126	Analytic Trigonometry	1	

			Credits
Behavioral and Social Sciences2			**6**
Biological Science			**3**
Communication Skills			**9**
CO	150	College Composition	3

SP	200	Public Speaking and Discussion	3
		Logic and critical thinking 3	3

			Credits
Physical Education/Wellness			**2**
Physical Sciences, Mathematics			**27**
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
M	155, 255	Calculus for Biological Scientists I, II	8
		or	
M	160, 161	Calculus for Physical Scientists I, II	8
PH	141, 142	Physics for Scientists and Engineers I, II	10

Complete minors in two of the following fields: biochemistry. chemistry, computer science. geology. mathematics, physics. statistics.

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments 'from prefixes AR, D, E.I, MU. PL. SP. and TH.

2. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments from prefixes AP, EC. GR, HY. PO. PY. and S.

3. Select from list of courses in category I-C in the University Studies Program.

DEPARTMENT OF BIOCHEMISTRY AND MOLECULAR BIOLOGY

Office in Molecular and Radiological Biosciences Building. Room 316
Professor Norman P. Curthoys, Chairman
Biochemistry is fundamental and essential to the life sciences, especially the health professions, and is one of the frontier areas for the physical sciences and engineering. The department offers an undergraduate major and a minor in biochemistry.

Major in Biochemistry

The major provides students with a strong and well balanced background in the biological, physical, and mathematical sciences. It is ideally suited for undergraduates who wish to pursue advanced degrees in biochemistry, molecular biology, or related life sciences; for preprofessional students seeking a career in health-related professions; and for students wishing to obtain technical employment following completion of a bachelor's degree.

The faculty expects that a student completing a major in biochemistry will have mastered fundamental concepts in key areas of the discipline. acquired basic laboratory skills and techniques. and developed university-level skills in written and oral communication. The degree to which these expectations are met will be assessed by (1) academic performance in specific biochemistry didactic and laboratory courses. and (2) quality of student oral presentations and written reports in junior/senior seminars.

Programs for individual research experiences and internships are available to undergraduate students. Those wishing to participate in undergraduate research projects and/or internships should contact the department early in their academic program in order to integrate these programs with their other course work.

M 120, M 121. M 124, M 125. and M 126 are considered review courses; credit in these courses, either by examination or completion, may not be used toward a degree in biochemistry.

Freshman Year			**Credits**
BC	193	Introductory Seminar	1
BY	102	Attributes of Living Systems	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
M	155, 255	Calculus for Biological Scientists I, II	8

		or	
M	160, 161	Calculus *for* Physical Scientists I, II	8
NS	201	Molecular Biosciences 1	4
PH	121	General Physics I	5
		or	
PH	141	Physics for Scientists and Engineers 1	5

Sophomore Year			**Credits**
BC	293	Seminar	1
C	341, 343	Organic Chemistry I, II	6
C	344	Organic Chemistry Laboratory	2
NS	202	Molecular Biosciences II	4
PH	122	General Physics II	5
		or	
PH	142	Physics for Scientists and Engineers II	5
		Arts. humanities. behavioral, social sciences elective	3
		Biology elective 2	4
		Communication elective 3	3
		Physical education/wellness 4	2

Select one course from the following:

CS	110	Personal Computing I	4
CS	150	Introduction to FORTRAN Programming	3
ST	301	Introduction to Statistical Methods	3
ST	307/EH 307	Introduction to Biostatistics	3

Junior Year			**Credits**
BC	401, 403	Comprehensive Biochemistry I, II	5-6
BC	404	Comprehensive Biochemistry Laboratory	2
BC	493	Seminar	1
		Arts, humanities. behavioral. social sciences electives	6
		Biology elective 2	4
		Electives	12

Senior Year			**Credits**
BC	461A-E	Special Topics in Biochemistry 5	3
BC	463	Molecular Genetics 5	4
BC	493	Seminar	1
C	471	Physical Chemistry-Biological orientation I	3
C	473	Physical Chemistry-Biological Orientation II	3
		or	
C	331. 334	Quantitative Analysis, Laboratory	4
		Arts, humanities, behavioral, social sciences electives	6
		Electives	8-10

1. Select a minimum of 15 credits from categories 111-A and IV-A in the University Studies Program with a minimum of 6 credits in each category. Credits in each category must be taken in at least two departments. Foreign language cannot count toward more than one-half of these credits.

2. Select in consultation with student's adviser from departmental list.

3. Select from list of courses in category I-D in the University Studies Program.

4. Select from list of courses in category V in the University Studies Program.

5. A minimum overall grade point average of 2.00 must be earned for all required biochemistry lecture and laboratory courses. This minimum average includes the original grade for any repeated course.

6. These are free electives selected in consultation with the student's adviser.

Minor in Biochemistry
The minor is valuable to students majoring in any biological or physical science or in engineering. The minor requires a sound chemistry background, provides a fundamental course in biochemistry. and augments the latter with more specialized courses at the senior level.

Upper Division			**Credits**
BC	401, 403*	Comprehensive Biochemistry I, II	6
BC	404*	Comprehensive Biochemistry Laboratory	2
BC	461A-E	Special Topics in Biochemistry	3
		or	
BC	463	Molecular Genetics	4
BC	493	Seminar	1
BY	310*	Cell Biology	4
C	331*	Quantitative Analysis	3
		or	
C	471*	Physical Chemistry-Biological Orientation I	3
C	341, 343*	Organic Chemistry I, II	6
C	344*	Organic Chemistry Laboratory	2

* Additional course work may be required because of prerequisites.

Graduate Programs in Biochemistry
Master of science and doctor of philosophy degrees are offered. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF BIOLOGY
Office in Anatomy-Zoology Building, Room E 106
Professor Joan Herbers, Chair

Major in Biological Science
This curriculum provides a broad background in the basic biological sciences, and permits students to select courses in areas of particular interest. The major requires a minimum of 40 credits of biology courses and is especially useful in meeting the preprofessional requirements in the biosciences. Students desiring this preparation should also check the appropriate preprofessional requirements. The major is also useful for meeting the broad teaching endorsement requirements for secondary teachers of biological science. Students desiring to be certified to teach in junior or senior high schools must complete teaching endorsement requirements in biology. See the Teacher Certification section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies, College of Applied Human Sciences section of this catalog.

Course work in this major may prepare students for graduate work in areas of basic biology or in one of several areas of applied biological sciences.

Students must complete the courses listed below. In addition, the student selects a minimum of 12 credits in one of the following fields: anatomy/physiology, botany, microbiology, molecular/cellular/genetics, zoology. The additional requirement of one course in two other fields assures the broad base of study.

Students are required to complete an Outcomes Assessment Evaluation form during the final semester before graduation.

	Credits
Arts and Humanities*	**6**
Behavioral and Social Sciences	**6**

Core Courses-Biological Sciences			**Credits**
AG	330	Principles of Genetics	3
		or	

B	350/Z 350	Molecular and General Genetics	3
		or	
Z	346	Evolution and Heredity	3
		or	
Z	455	Human Heredity and Birth Defects	3
B	120	Principles of Plant Biology	4
		and	
Z	110	Principles of Animal Biology	4
		or	
BY	102	Attributes of Living Systems	4
		and	
BY	103A-B	Biology of Organisms	4
B	450	Plant Ecology 3	4
		or	
BY	220	Ecology	3
		or	
Z	475	Animal Ecology	4
BY	310	Cell Biology	4
BY	311	Developmental Biology	4

In addition, students must select twelve credits in one of the following five fields and a minimum of one course in each of two additional fields: anatomy/physiology. botany, microbiology. molecular/cellular/genetics, zoology.

Communication Skills			**Credits**
CO	150	College Composition	3
SP	200	Public Speaking and Discussion	3

Mathematics and Statistics			**Credits**
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	155	Calculus for Biological Scientists I	4
ST	301	Introduction to Statistical Methods	3

	Credits
Physical Education/Wellness	**2**

Physical Sciences			**Credits**
BC	351, 352	Principles of Biochemistry, Laboratory	5
C	111, 113	General Chemistry I, II	7
C	112. 114	General Chemistry Laboratory I, II	2
C	245, 246	Organic and Biological Chemistry, Laboratory	5
		or	
C	341, 343	Organic Chemistry I. II	6
		and	
C	344	Organic Chemistry Laboratory	2
PH	121	General Physics I	5

1. Select from list of courses in category III-A in the University Studies Program. including only prefixes AR, D, E. L, MU, PL. SP. and TH. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program. including only prefixes AP, EC. GR, HY. PO. PY, and S. Credits must be taken in at least two departments.

3. Students selecting B 450 in this sequence must also take B 223 or B 325.

Major in Botany

This curriculum serves both those students who are stopping with a bachelor of science degree and those going on to advanced studies. A general introduction to plant life is followed by an emphasis in terrestrial, vascular plant studies. Other emphases are recognized, so students are

encouraged to propose course patterns different from the listed program. Students with a broad interest in biology and a liberal education should consider this major for departmental affiliation.

Students are prepared for positions with government agencies, industry, and business. Students desiring to be certified to teach in junior and senior high schools must complete teaching endorsement requirements in biology. See the Teacher Certification. section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies, College of Applied Human Sciences section of this catalog.

Students are required to complete an Outcomes Assessment Evaluation form during the final semester before graduation.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
		and	
Z	110	Principles of Animal Biology	4
		or	
BY	102	Attributes of Living Systems	4
		and	
BY	103A-B	Biology of Organisms	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
		Physical education/wellness	2

Sophomore Year			**Credits**
AG	330	Principles of Genetics	3
		or	
B	350/Z 350	Molecular and General Genetics	3
B	325	Plant Systematics	3
C	245, 246	Organic and Biological Chemistry, Laboratory	5
		or	
C	341, 343	Organic Chemistry I, II	6
		and	
C	344	Organic Chemistry, Laboratory	2
SP	200	Public Speaking and Discussion	3
ST	301	Introduction to Statistical Methods	3
		Arts and humanities 1	6
		Behavioral and social sciences'	6

Junior and Senior Years			**Credits**
B	331	Plant Anatomy	4
B	440, 441	Plant Physiology, Laboratory	5
B	450	Plant Ecology	4
BC	301	Survey of Biochemistry	3
		or	
BC	351	Principles of Biochemistry	4

Select two courses from the following:

B	332	Introductory Phycology	4
B	333	Introductory Mycology	4
B	338	Comparative Morphology of Vascular Plants	4

Select two courses from the following:

AG	240	Introductory Soil Science	4
AT	350	Introduction to Weather and Climate	2

		or	
BY	220	Ecology	3
		and	
ER	424	Bioclimatology	3
ER	130	Geologic Environment and Society	3
GR	210	Physical Geography	3
PH	110	Descriptive Physics	3

Humanities, social sciences, business 10

Select at least three areas from the following including three credits each in humanities and social sciences: anthropology, art, business (maximum of six credits), economics. English, geography, history. journalism, languages, music, philosophy, political science, psychology, sociology. or speech.

1. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

Minor in Botany
The Department of Biology offers a minor in botany to provide interested students with maximum breadth and depth in botanical science utilizing a limited number of requirements. The program also serves to broaden the academic background of students seeking employment in the interdisciplinary job market associated with the plant sciences.

Lower Division		**Credits**	
B	120	Principles of Plant Biology	4
		or	
BY	102	Attributes of Living Systems	4
BY	103B	Biology of Organisms-Plant	2

Upper Division
Minimum of 10 credits from B prefix courses specified for the botany major. A minimum of 7 additional credits from B prefix courses or other courses approved by the department.

Graduate Programs in Botany
The master of science and doctor of philosophy degree programs are offered.in most areas of botany. A description of these programs may be found in the *Graduate and Professional Bulletin.*

Major in Zoology
This curriculum provides a general education and develops competence in the biological sciences. Students prepare to work in various areas of animal biology or to begin graduate or professional studies. It is an appropriate major for students planning to attend medical or veterinary school. Considerable program flexibility is allowed to accommodate individual goals.

The major provides a core program with either general training in animal biology or an option in one of the following areas: animal behavior, aquatic biology, ecology, genetics and evolution, invertebrate organisms, cellular/molecular biology and physiology, systematics and morphology, or vertebrate organisms. A complete listing of appropriate Z prefix and related courses in these options is available in the department office.

Students desiring to be certified to teach in junior and senior high schools must complete teaching endorsement requirements in biology. See the Teacher Certification section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies, College of Applied Human Sciences section of this catalog.

To be qualified for graduation, students in the zoology major must have a minimum grade point average of 2.00 for the aggregate of their zoological, biological, physical science, and mathematical courses used to meet requirements for the major. This applies to courses taken as

substitutions for meeting these requirements. Appropriate waivers of departmental requirements are made upon recommendation of the student's adviser and concurrence of the department chairman.

Students are required to complete an Outcomes Assessment Evaluation form during the final semester before graduation.

Freshman Year			**Credits**
BY	102	Attributes of Living Systems	4
BY	103A-B	Biology of Organisms	4
C	111, 113	General Chemistry I, II	7
C	112	General Chemistry Laboratory I	1
CO	150	College Composition	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	155	Calculus for Biological Scientists I	4
		Physical education/wellness	2
		Electives	4

Sophomore Year			**Credits**
C	245, 246	Organic and Biological Chemistry. Laboratory	5
PH		Physics	10
Z	212	Animal Biology-Invertebrates	4
Z	214	Animal Biology-Vertebrates	4
		Arts and humanities:	3
		Behavioral and social sciences 3	3
		Communication	3

Junior Year			**Credits**
BC	301	Survey of Biochemistry	3
BC	352	Principles of Biochemistry Laboratory I	
ST	301	Introduction to Statistical Methods	3
		Arts and humanities 2	3
		Behavioral and social sciences	3
		Electives	19

Senior Year	**Credits**
Electives	**32**

1. Electives must include 16 credits of upper-division Z prefix courses.

2. Select from list of courses in category III-A in the University Studies Program. Cred its must be taken in at least two departments.

3. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

4. Select from list of courses in category I-D in the University Studies Program.

Minor in Zoology

The minor in zoology is a useful complement to a major in animal science, biological science, botany, fishery biology, geology, range science, natural resources recreation and tourism, or wildlife biology.

Lower Division			**Credits**
BY	102	Attnbutes of Living Systems	4
BY	103A	Biology of Organisms-Animal	2
Z	212	Animal Biology-Invertebrates	4
Z	214	Animal Biology-Vertebrates	4

Upper Division
Select a minimum of 12 credits in Z prefix courses from four of the seven following areas*: animal behavior; aquatic biology;cell biology and physiology; ecology; genetics, evolution, and systematics; invertebrate organisms; vertebrate organisms.

1. A list of Z prefix courses in each area (specialties in zoology) is available from the departmental office.

Graduate Programs in Zoology
The department offers graduate programs leading to a master of science degree and a doctor of philosophy degree in zoology. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF CHEMISTRY

Office in Chemistry Building, Room B 101
Professor Oren P. Anderson, Chairman

Major in Chemistry
The major in chemistry is for students who desire to pursue a professional career in chemistry (industrial or academic) or who need an intensive background in chemistry preparatory to entering professional schools, graduate schools, or secondary school teaching. Chemistry majors receive a broad education through the University Studies Program and a suitable choice of electives. *Students are encouraged to work closely with their advisers on matters such as course scheduling and career planning.*

Most majors will take the prescribed courses for the freshman and sophomore years. M 120, M 121. M 124, M 125, and M 126 are considered review courses for chemistry majors. Credits in these courses may not be used toward a degree in chemistry, Chemistry majors must achieve a minimum grade of C in all of the chemistry courses which are required for graduation.

Students may arrange their programs to receive professional certification by the American Chemical Society. Students desiring certification by the American Chemical Society must take C 431. C 461, C 475. and C 477. These courses are highly recommended for students who desire to pursue an advanced degree in chemistry or seek employment as a chemist. The courses listed as advanced science electives allow students to follow their interests in subjects where chemistry is central to the understanding of the area. These electives are recommended for students desiring a degree in chemistry. but who plan to enter medical or veterinary medical professional schools. graduate schools other than in chemistry. or the teaching profession. The student is urged to see the proper adviser for other courses which may be required for admittance to these schools.

Students desiring to be certified to teach in junior or senior high schools must complete the teaching endorsement requirements in chemistry. See the Teacher Certification section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies. College of Applied Human Sciences section of this catalog.

Upon graduation. most chemistry majors will have taken the necessary course work to earn a degree that is certified by the American Chemical Society. All majors will be able to demonstrate a sound background in each of the four areas of chemistry: analytical. inorganic. organic. and physical chemistry. In addition. chemistry majors will be able to communicate the results of their work both verbally and in writing.

There are many opportunities for undergraduates to pursue independent research projects in chemistry. Students are encouraged to begin a research program under faculty supervision as early in their education as possible.

Freshman Year			**Credits**
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
M	160, 161	Calculus for Physical Scientists I, II	8

		Biological science	3
		Communication 2	3
		Logic and critical thinking 3	3
		Physical education/wellness	2

Sophomore Year			**Credits**
C	261	Basic Inorganic Chemistry	3
C	341, 343	Organic Chemistry I, II	6
C	344	Organic Chemistry Laboratory	2
M	261	Calculus for Physical Scientists III	3
PH	141, 142	Physics for Scientists and Engineers I, II	10
		Arts and humanities 4	6
		Mathematics, computer science, statistics 5	3

Junior Year			**Credits**
C	331, 332	Quantitative Analysis. Laboratory	5
C	440	Advanced Organic Laboratory	2
C	471, 473	Physical Chemistry-Biological Orientation I, II	6
		or	
C	475, 477	Physical Chemistry I, II	6
C	478	Physical Chemistry Laboratory	2
		Behavioral and social sciences 6	6
		Electives	10

Senior Year			**Credits**
C	431	Instrumental Analysis	4
C	461	Inorganic Chemistry	3
C	493	Seminar (2 semesters)	2
C		Advanced chemistry elective 7	1
		Advanced chemistry or science electives 7	8
		Arts and humanities. behavioral and social sciences. and natural sciencess	5
		Electives	10

1. Select from list of courses in category 11-A in the University Studies Program.

2. Select from list of courses in category I-D in the University Studies Program.

3. Select from list of courses in category I-C in the University Studies Program.

4. Select from list of courses in category 111-A in the University Studies Program. Credits must be taken in at least two departments.

5. Any upper-division mathematics course. or any computer science course numbered CS 150 or higher. or any upper-division statistics course.

6. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

7. Select from departmental advising list.

8. Select three credits from list of biological sciences courses in category II-A and two credits from list of courses in categories II.III. or IV in the University Studies Program.

Minor in Chemistry

The Chemistry Department offers a minor in chemistry to interested students from other disciplines. This program serves to broaden the academic background of students seeking employment in the bio-sciences and related fields. A minimum grade of C is required in all of the chemistry courses required for the minor in chemistry.

Lower Division	**Credits**

C	111, 113'	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2

Upper Division			**Credits**
C	331	Quantitative Analysis	3
C	332	Quantitative Analysis Laboratory	2
		or	
C	334	Quantitative Analysis Laboratory	1
C	341, 343	Organic Chemistry I, II	6
C	344	Organic Chemistry Laboratory	2
C	471*	Physical Chemistry-Biological Orientation I	3
		or	
C	475*	Physical Chemistry I	3

* Additional course work may be required because of prerequisites.

Graduate Programs in Chemistry
Master of science and doctor of philosophy degree programs are offered in analytical, inorganic, organic, and physical chemistry. A description of these programs may be found in the *Graduate and Professional Bulletin.* A graduate program brochure is available from the department.

DEPARTMENT OF COMPUTER SCIENCE
Office in University Services Center, Room 111
Professor Rodney R. Oldehoeft, Chairman
Computer science is the study of the structure, function, and application of computers and is central to the rapidly expanding use of information technology. Computers have traditionally been used in business. engineering, and scientific applications, and now with lower prices for hardware and better software, applications are found in almost all human activities from art to zoology. Presently, employment opportunities are excellent for those broadly trained in computer science.

University computer facilities available to computer science majors include IBM RS/6000 multi-user systems. Departmental equipment includes DEC, HP, and SUN multi-user systems along with numerous workstations from HP, IBM, and ATT, X terminals, and laser printers, all fully networked. Many PCs and Macs are available for student use.

Major in Computer Science
The undergraduate curriculum provides students with a background in the basic sciences, and the theory, architecture, and application of computers within the context of a liberal education. This program allows maximum flexibility so that the student may prepare for a career in industrial computer science; entering professional schools such as law, medicine, or accounting; or preparation for graduate school in computer science or in areas where computer science is helpful such as mathematics, physics, or linguistics.

This list is suggestive and not exhaustive since new applications for computers occur frequently.

There is much leeway for students in their junior and senior years in computer science to choose a course of study tailored to their interests. Opportunities exist to pursue independent research projects under faculty supervision. Students are encouraged to begin such research early in their upper-division studies.

A minimum grade of C is required in CO 150, and in all mathematics, statistics, computer science, and departmental Group II courses which are required for graduation. M 120, M 121, M 124, M 125, and M 126 are considered review courses; credits in these courses may not be used toward a degree in the computer science major.

Students may be expected to learn new programming languages independently, especially in courses numbered above 300.

The Department of Computer Science is committed to ensuring its graduates have attained mastery of the fundamentals of computer science. In particular, the department strives to impart an understanding of computer organization, computer architecture, and data structures to its students.

Students graduating in computer science also will have demonstrated a working knowledge of basic systems software, and a grounding in a major area of specialization within computer science (e.g., software engineering, graphics theory, etc.).

Freshman Year			**Credits**
CO	150	College Composition	3
CS	151	Introduction to Pascal Programming	4
CS	155	Computer Organization	4
M	160, 161	Calculus for Physical Scientists I, II	8
M	229	Matrices and Linear Equations	1
		Arts and humanities	3
		Behavioral and social sciences	3
		Natural sciences 3	4
		Physical education/wellness	2

Sophomore Year			**Credits**
CS	200	Algorithms and Data Structures	4
CS	201/M 201	Discrete Structures	4
CS	253	Computer Programming Languages	4
		Behavioral and social sciences"	3
		Communications	3
		Natural sciences	8
		Electives	6

Junior Year			**Credits**
CS	301	Foundations of Computer Science	4
CS	314	Software Development Methods	4
CS	370	System Architecture and Software	4
PL	305F	Philosophical Issues in information Science	3
ST	301	Introduction to Statistical Methods	3
		or	
ST	309	Engineering Statistics	3
		Group II courses	3
		Electives	11

Senior Year		**Credits**
	Group I courses 5	16
	Group II courses	6
	Electives	10

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

3. Select a minimum of twelve credits in at least two departments from *departmental list* to meet University Studies Program requirements in category II-A. At least one course must have a laboratory.

4. Select from list of courses in category I-D in the University Studies Program.

5. A list of Group I and Group 11 courses may be obtained in the department office.

Minor in Computer Science

The minor in computer science offers the students a core of courses in computer hardware and software to support their major field of study. A minimum grade of C is required in all of the courses required for the minor.

Lower Division			**Credits**
CS	151	Introduction to Pascal Programming	4

CS	155	Computer Organization	4
CS	200	Algorithms and Data Structures	4

Upper Division			**Credits**
CS	370	System Architecture and Software	4
		Any Group I course (CS 410 or above)*	4
		Any other Group I course (CS 410 or above)*	4

*Additional course work may be required because of prerequisites.

Graduate Programs in Computer Science
Master of science and doctor of philosophy degree programs in computer science are offered emphasizing either theoretical or practical aspects of computer science. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF MATHEMATICS
Office in Engineering Building, Room 12 1 Professor Robert E. Gaines, Head

Major in Mathematics
The undergraduate degree programs in mathematics aim to provide a liberal and practical education 'in which education and employment are complementary ends, neither subservient to the other. The liberal component of the program requires students to acquire a broad background in communication skills, humanities, social sciences, and natural sciences. The disciplinary component focuses on developing students' knowledge, understanding, and appreciation of the mathematical sciences, their problem-solving skills, and their ability to combine their knowledge of mathematics and problem-solving skills in productive ways. There are four concentrations within the mathematics major: actuarial science, applied mathematics, general mathematics, and mathematics education. Early in their program of study, students are expected to make an informed selection of a concentration within the major.

A minimum grade of C is required in all mathematics, statistics, and computer science courses which are required for graduation. M 120. M 121. M 124, M 125, and M 126 are considered review courses by the Department of Mathematics. Credits in these courses may not be used toward a degree in mathematics.

Transfer students must complete a minimum of nine upper-division credits in mathematics at Colorado State, excluding M 325, M 340. and mathematics courses ending in -80 to -99.

Actuarial Science Concentration
Actuaries use mathematics, statistics, business, and economics to analyze and plan for future situations involving financial uncertainties and risks. This concentration is designed to qualify students to begin careers as professional actuaries assisting with the design of financially sound insurance and benefits/ pension programs. Courses required in the concentration prepare students to take the first three examinations administered by the Society of Actuaries and lay the foundation for the remaining examinations.

Freshman and Sophomore Years			**Credits**
CO	150	College Composition	3
CO	301A-C	Intermediate Composition	3
		or	
JT	200	Professional Writing	3
		or	
JT	300	Technical Communication	3
		or	
SP	200	Public Speaking and Discussion	3
EC	100	Principles of Macroeconomics	3
EC	102	Principles of Microeconomics	3
EC	335/EA 335	Introduction to Econometrics	3
M	160, 161	Calculus for Physical Scientists I, II	8

M	229	Matrices and Linear Equations	11
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
ST	301	Introduction to Statistical Methods	3
		Arts and humanities	9
		Behavioral and social sciences 2	3
		Natural sciences 3	9
		Physical education/wellness	2

Select seven credits from the following:

CS	150	Introduction to FORTRAN Programming	3
CS	151	Introduction to Pascal Programming	4
CS	200	Algorithms and Data Structures	4
CS	253	Computer Programming Languages	4

Junior and Senior Years			**Credits**
BA	210	Financial Accounting	3
BF	300	Principles of Finance	3
BF	311	Investments-Fixed Income Securities	3
BF	342	Risk Management and Insurance	3
BG	260	Legal Environment of Business	3
M	317	Advanced Calculus of One Variable	4
M	350, 351	Introduction to Numerical Analysis I, II	8
M	369	Linear Algebra	3
M	495A	Independent Study-Analysis	1
ST	220	Elementary Probabilistic Modeling	2
ST	420, 430	Probability and Mathematical Statistics I, II	6
		Electives	25

1. Select at least six credits from list of courses in category 11I-A in the University Studies Program. Credits must include at least three upper-division credits or a two-semester sequence in a foreign language and must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program, excluding EA and EC courses.

3. Select at least seven credits from list of courses in category II-A in the University Studies Program. At least one course must have a formal laboratory and credits must be taken in at least two departments.

4. Credit allowed for only one of CS 150 and CS 253.

Applied Mathematics Concentration

The goal of this professionally oriented program is to prepare graduates to begin careers as applied mathematicians in such industries as aerospace, communications, and electronics. Course requirements emphasize mathematical foundations, applicable mathematics, and application of mathematics to other areas.

Freshman and Sophomore Years			**Credits**
CO	150	College Composition	3
CO	301A-C	Intermediate Composition	3
		or	
JT	200	Professional Writing	3
		or	
JT	300	Technical Communication	3
		or	
SP	200	Public Speaking and Discussion	3
M	160, 161	Calculus for Physical Scientists I, II	8
M	229	Matrices and Linear Equations	1
M	261	Calculus for Physical Scientists III	3

M	340	Introduction to Ordinary Differential Equations	4
PH	141, 142	Physics for Scientists and Engineers I, II	10
ST	220	Elementary Probabilistic Modeling	2
		or	
ST	302	Design of Experiments	3
		or	
ST	304	Multiple Regression Analysis	3
ST	301	Introduction to Statistical Methods	3
		Arts and humanitiesTM	9
		Behavioral and social sciences 2	9
		Physical education/wellness	2

Select seven credits from the following:3

CS	150	Introduction to FORTRAN Programming	3
CS	151	Introduction to Pascal Programming	4
CS	152	FORTRAN Programming Module	2
CS	200	Algorithms and Data Structures	4
CS	253	Computer Programming Languages	4

Junior and Senior Years			**Credits**
M	301	Introduction to Combinatorial Theory	3
M	317	Advanced Calculus of One Variable	4
M	318	Advanced Multivariable Calculus	3
		and	
M	332	Methods in Applied Mathematics II	3
		or	
M	364	Number Theory	3
		and	
M	366	Groups, Rings and Fields	3
		and	
M	460	Applied Algebra	3
M	335	Project in Applied Mathematics	3
M	350, 351	Introduction to Numerical Analysis I, II	8
M	369	Linear Algebra	3
		Mathematical sciences electives 4	6
		Option 5	12
		Electives	15-19

1. Select at least six credits from list of courses in category III-A in the University Studies Program. Credits must include at least three upper-division credits or a two-semester sequence in a foreign language and must be taken in at least two departments.

2. Select at least six credits from list of courses in category IV-A in the University Studies Program. Credits must include at least three upper-division credits and must be taken in at least two departments.

3. Credit allowed for only one of CS 150 and CS 253.

4. An additional six credits from upper-division computer science. mathematics. or statistics courses except M 315 and those ending in -80 to -99.

5. A coherent set of courses outside the Mathematics Department in which mathematics is applied; to be approved by the department. At least one course must be selected from category II in the University Studies Program, excluding PH courses.

General Mathematics Concentration

This is a liberal arts program designed to provide a solid foundation in mathematics with the flexibility to explore and develop expertise in other academic areas. Because it is flexible, this concentration is well suited for students who plan a career in business, law, or other area outside mathematics, and those preparing for graduate study in mathematics.

Freshman and Sophomore Years			Credits
CO	150	College Composition	3
CO	301A-C	Intermediate Composition	3
		or	
JT	200	Professional Writing	3
		or	
JT	300	Technical Communication	3
		or	
JT	301	Business Communication	3
		or	
SP	200	Public Speaking and Discussion	3
CS	150	Introduction to FORTRAN Programming	3
		or	
CS	151	Introduction to Pascal Programming	4
M	160, 161	Calculus for Physical Scientists I, II	8
M	229	Matrices and Linear Equations	1
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
		Arts and humanities	13
		Behavioral and social sciences	9
		Natural sciences	15
		Physical education/wellness	2

Junior and Senior Years			Credits
M	317	Advanced Calculus of One Variable	4
M	366	Groups, Rings and Fields	3
M	369	Linear Algebra	3
ST	301	Introduction to Statistical Methods	3
		or	
ST	420	Probability and Mathematical Statistics I	3
		Mathematical sciences electives	15
		Select six credits from a) and nine additional credits from a) or b):	
		a) Upper-division mathematics courses except M 315 and those ending in -80 to -99.	
		b) Upper-division computer science or statistics courses except those ending in -80 to -99.	
		Electives	35-36

1. Select at least six credits from list of courses in category III-A in the University Studies Program. Credits must include at least six upper-division credits or a two-semester sequence in a foreign language and must be taken in at least two departments.

2. Select at least six credits from list of courses in category IV-A in the University Studies Program. Credits must include at least three upper-division credits and must be taken in at least two departments.

3. Select at least seven credits from list of courses in category II-A in the University Studies Program..Credits must include at least six upper-division credits or PH 141, PH 142; at least one formal laboratory course; and must be taken in at least two departments.

Mathematics Education Concentration

This professionally oriented program is designed to prepare graduates to be effective secondary mathematics teachers and leaders in the development of instructional strategies and curricula. This concentration is especially suited to those who have a sincere interest in both people and mathematics.

Students who wish to be certified to teach in junior or senior high schools must complete the following requirements which include the general education requirements and the professional education sequence. See also the Teacher Certification section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies. College of Applied Human Sciences section of this catalog,

Freshman and Sophomore Years			Credits
C	111, 113	General Chemistry I, II	7
		and	
C	112, 114	General Chemistry Laboratory I, II	2
		or	
PH	121, 122	General Physics I, II	10
		or	
PH	141, 142	Physics for Scientists and Engineers I, II	10
CO	150	College Composition	3
CO	301A-C	Intermediate Composition	3
		or	
JT	200	Professional Writing	3
		or	
JT	300	Technical Communication	3
CS	110	Personal Computing I	4
		or	
CS	210	Personal Computing II	4
CS	151	Introduction to Pascal Programming	4
ED	255	Introduction to Education	2
M	160, 161	Calculus for Physical Scientists I, II	8
M	229	Matrices and Linear Equations	1
M	260	Elementary Linear Algebra	2
		or	
M	369	Linear Algebra	3
PY	100	General Psychology	3
SP	200	Public Speaking and Discussion	3
		Arts and humanities	9
		Behavioral and social sciences	3
		Natural sciences	3-4
		Physical education/wellness	2

Junior and Senior Years			**Credits**
BF	250	Personal Investments	3
		or	
HC	320	Finance-Personal and Family	3
		or	
M	133	Consumer Mathematics	2
ED	355	Educational Psychology	3
ED	386	Practicum	1
ED	401A	Teaching Classroom Reading/Literacy Skills	2
ED	428	Exceptionality. Diversity. and Human Relations	3
ED	450	Methods and Evaluation of Instruction	4
ED	451	Microteaching Laboratory	1
ED	464	Methods and Materials in Teaching Mathematics	4
ED	485B	Student Teaching-Secondary	15
ED	493	Seminar in Professional Relations	1
M	317	Advanced Calculus of One Variable	4
M	366	Groups. Rings and Fields	3
M	425	History of Mathematics	3
M	470	Euclidean and Non-Euclidean Geometry	3
ST	301	introduction to Statistical Methods	3
		Mathematical sciences electives	9
		Select from CS 155. CS 270.	
		CS 410. M 261. M 301. M 318.	
		M 335. M 340. M 350. M 351.	

M 364. M 460. ST 220. ST 302.
ST 304. ST 305, ST 420. ST 430.

1. Select at least six credits from list of courses in category 111-A in the University Studies Program. Credits must include at least three upper-division credits or a two-semester sequence in a foreign language and must be taken in at least two departments.

2. Select at least three credits from list of courses in category IV-A in the University Studies Program. excluding PY courses.

3. Select from list of courses in category 11 in the University Studies Program. excluding C or PH courses.

Minor in Mathematics
The Mathematics Department offers a minor in mathematics for those students who wish to acquire a more extensive knowledge of mathematical sciences in pursuit of their personal interests or in support of their major area of study.

A minor in mathematics shall consist of 21 credits distributed as follows:

			Credits
M	155, 255*	Calculus tot Biological Scientists I, II	8
		or	
M	160, 161*	Calculus for Physical Scientists I, II	8
		Upper-division mathematics*	9
		Upper-division computer science. mathematics, or statistics*	3
		Electives in computer science. mathematics. or statistics*	Var.

M 315 and courses ending in -80 to -99 cannot be used 10 satisfy upper-division requirements. A minimum grade of C is required in all mathematics. statistics. and computer science courses required for the minor in mathematics.

*Additional course work may be required because of prerequisites.

Graduate Programs in Mathematics
The department offers the master of science and doctor of philosophy degrees with programs in pure and applied mathematics. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF PHYSICS
Office in Engineering Building, Room AR 206
Professor James R. Sites, Chair
The department offers courses and research in physics and applied physics. The emphasis is on fundamental principles and applying physics to other scientific and technical fields.

The department also offers courses for nonscience majors that address the basic understanding of the methods, results, and limitations of science and technology.

Brochures describing undergraduate and graduate programs are available from the department upon request.

Major in Physics
The undergraduate major, with concentrations in physics and applied physics. offers a flexible program leading to industrial employment or graduate work.

An early emphasis on fundamentals in the basic sciences and mathematics provides students with a broad foundation. Subsequent course work is designed to develop analytical and experimental abilities that allow the student to solve problems involving the technical applications of physics. In addition, arts and humanities and behavioral and social science courses are included as part of a liberal arts education.

Students planning to major in physics should take as many of the high school science and mathematics courses as possible. A high school course in physics or physical science is desirable but not essential.

Most students take the courses described below in their freshman and sophomore years; those with deficiencies start with other introductory courses. All entering freshmen should take the mathematics placement examination prior to fall registration. As a result, some students may take mathematics review courses before entering M 160 and PH 141. while others may be exempted from some or all of the review courses. M 120, M 121, M 124, M 125, and M 126 are considered review courses by the Department of Physics. Credits in these courses, either by examination or completion, may not be used toward a degree in physics.

Majors must achieve a minimum grade of C in all specific courses listed in the Core Program for Freshman and Sophomore Years. in JT 300, in all Colorado State physics, mathematics, and biological science courses, and in all technical elective courses which are used to meet requirements for the degree. Majors are expected to master the basic concepts of mechanics. electricity and magnetism. and quantum mechanics. They are also expected to set up, perform, and communicate the results of laboratory experiments.

Courses in the first two years cover the fundamentals of chemistry, composition, computer science, mathematics, and physics. Beginning in the junior year. students select a concentration depending upon their professional goals. Every effort is made to accept prepared transfers from two-year colleges without credit loss. Substitutions for required courses need the approval of the key adviser. Waivers can be made only by the department chair. Undergraduates are encouraged to participate in any of the departmental research and teaching activities and may receive credit for PH 298, PH 384, PH 495, and PH 498.

Students desiring to be certified to teach in junior or senior high schools must complete the endorsement requirements for teaching in physics. See the Teacher Certification section and the Teaching Endorsement Area Requirements in the School of Occupational and Educational Studies, College of Applied Human Sciences section of this catalog.

Core Program for Freshman and Sophomore Years

			Credits
C	109, 110	General Chemistry for Engineers, Laboratory	5
		or	
C	111, 112	General Chemistry. Laboratory I	5
CO	150	College Composition	3
CS	150	Introduction to FORTRAN Programming	3
		or	
CS	151	Introduction to Pascal Programming	4
M	160, 161	Calculus for Physical Scientists I, II	8
M	229	Matrices and Linear Equations	1
M	261	Calculus for Physical Scientists III	3
M	340	Introduction to Ordinary Differential Equations	4
PH	141, 142	Physics for Scientists and Engineers I, II	10
PH	245	Introduction to Electronics	4
PH	314	Introduction to Modern Physics	4
PH	315	Modern Physics Laboratory	2
		Arts and humanities 1	6
		Behavioral and social sciences 2	6
		Physical education/wellness	2

1. Select from list of courses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

Applied Physics Concentration

This concentration combines fundamental course work in physics with a selection of courses designed to allow the student to apply this knowledge to a related interdisciplinary field. This concentration consists of five separate options, and the 24 credits of technical electives must include at least 12 credits in the same option.

The option in *electronics, semiconductors, and optics* is designed to educate students to work in areas in which the technology is changing rapidly, or in areas which overlap the boundaries of several of the traditional engineering disciplines. The option aims to develop sufficient depth in both engineering skills and science to produce students who are able to relate basic knowledge to practical problems in engineering.

The option in *geophysics* allows students to develop expertise in areas related to geological exploration and modeling of geological phenomena. Experimental techniques used by the geophysicist include very careful seismic, mechanical, gravitational, electrical, magnetic, and thermal measurements. The interpretation of the data involves extensive analysis of raw data, and modeling of complex processes. The role of the geophysicist becomes more important as demands on the earth's oil and mineral resources grow.

The option in *medical physics* provides an opportunity to prepare for employment or further graduate study in the area of health physics. There has been a growing demand for scientists and technicians trained to apply recent advances in the physical sciences and engineering to medical research and practice.

The option in *chemical physics* provides students an opportunity to obtain a thorough knowledge of both chemistry and physics. Such a background is particularly useful in such interdisciplinary areas as materials science, surface science, and studies of molecular systems.

The option in *computers* is relevant for students interested in the applications of modern computer technology to problems in physics. Such technology has revolutionized many areas of physics and will undoubtedly continue to do so in the future. With careful planning, it is possible to complete the requirements for a second major in computer science with a total of 130 credits.

Junior and Senior Years			**Credits**
JT	300	Technical Communication	3
PH	325	Advanced Physics Laboratory	2
PH	341	Mechanics	4
PH	351	Electricity and Magnetism	4
PH	353	Optics and Waves	4
PH	361	Physical Thermodynamics	3
PH	451	Introductory Quantum Mechanics 1	3
PH	497	Seminar	1
		Arts and humanities or behavioral and social sciences	3
		Biological sciences:	3
		Technical electives	24

1. Select from list of courses in category 11 I-A or category I V-A in the University Studies Program.

2. Select from list of courses in category II-A (biological sciences) in the University Studies Program.

3. Select from departmental list. Within the 24 credits, at least 6 credits. in addition to the courses listed above. must be selected from categories 1-3, and at least 12 credits must be selected from the same. category within categories 4-8.

Physics Concentration

The undergraduate concentration in physics provides a broad background in science which serves as a base for later specialization either in graduate school or on the job. Students with a physics degree have the education necessary for a career in industry, government, or for advanced study at the graduate level.

For this concentration, the 24 credits of technical electives must include PH 452, PH 462, and two courses in mathematics or statistics.

Junior and Senior Years			Credits
JT	300	Technical Communication	3
PH	325	Advanced Physics Laboratory	2
PH	341	Mechanics	4
PH	351	Electricity and Magnetism	4
PH	353	Optics and Waves	4
PH	361	Physical Thermodynamics	3
PH	451, 452	Introductory Quantum Mechanics I. II	6
PH	462	Statistical Physics	3
PH	492	Seminar	1
		Arts and humanities or behavioral and social sciences	3
		Biological sciences:	3
		Technical electives 3	18

1. Select from list of courses in category 11I-A or category IV-A in the University Studies Program.

2. Select from list of courses in category II-A (biological sciences) in the University Studies Program.

3. Select from departmental list; two courses must be from category 3 (4-8 credits).

Minor in Physics
Most technical fields require some background in physics. A minor in physics could provide students with a stronger theoretical foundation for their chosen major. For students majoring in the mathematical sciences, such as computer science, statistics, and mathematics, a minor in physics will provide experience in more practical problems. A minimum grade of C is required in all physics courses required for the minor in physics.

Lower Division			Credits
PH	141, 142*	Physics for Scientists and Engineers I, II	10

Upper Division			Credits
PH	314*	Introduction to Modern Physics	4

In addition, select a minimum of eight upper-division credits from the following courses (may include only one AA course):

AA	301 *	Astrophysics 1	5
AA	302*	Astrophysics II	5
AA	303*	Astrophysics III	5
PH	315	Modern Physics Laboratory	2
PH	325*	Advanced Physics Laboratory	2
PH	341 *	Mechanics	4
PH	351 *	Electricity and Magnetism	4
PH	353	Optics and Waves	4
PH	451 *	Introductory Quantum Mechanics I	3
PH	452*	Introductory Quantum Mechanics II	3

Any substitutions need approval of the key adviser.

* Additional course work may be required because of prerequisites.

Graduate Programs in Physics
Graduate programs in physics and applied physics lead to master of science and doctor of philosophy degrees. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF PSYCHOLOGY

Office in Clark Building, Room C 71
Professor Scott B. Hamilton, Interim Head
Undergraduate courses acquaint students with the basic theories, principles, and laws of human and animal behavior, as well as with research in psychology as a basic and applied science. Undergraduate work provides a preprofessional education in a liberal arts tradition with studies in natural sciences, mathematics, behavioral and social sciences, and arts and humanities. Graduate programs offer general training followed by a specialization. Advanced degrees are a prerequisite for professional careers in psychology.

Psychology majors are expected, upon receiving the bachelor's degree, to be able to demonstrate knowledge of psychological principles and concepts across several basic content areas; to demonstrate an ability to engage in analytical and critical thinking in the various content areas of the field; to demonstrate a knowledge of and appreciation of the scientific methods used in psychological research; and to have gained a broad set of educational experiences consistent with the liberal arts tradition.

Major in Psychology
Psychology is a controlled and limited enrollment major. Students not accepted directly into the major upon admission to Colorado State can subsequently gain entry into the psychology major after certain criteria are met. Contact the College of Natural Sciences or the Department of Psychology for details.

The freshman-sophomore program explores several areas of psychology while requiring a flexible general education. The requirements accommodate students definitely committed to a career in the field, students exploring it as a potential major while keeping other options open, and students who view the field as a possible background for other careers in related areas or whose only goal is to acquire a general liberal arts education with an emphasis in psychology.

It is recommended that after completing the fresh-man-sophomore program, students reexamine their choice of major and career plans in consultation with an adviser.

Completion of the junior-senior requirements, including an individualized choice of electives, allows a student to orient toward one or a combination of three goals:

(1) Graduation as a major, without continuing in psychology, either with or without specific career or advanced education plans. Such a degree could provide background for careers outside of psychology or for advanced study in other areas.

(2) Graduation with a set of experiences which might qualify for semiprofessional jobs in psychological settings or closely related fields. With a bachelor's degree. however, job opportunities are limited. The department. in cooperation with other agencies, provides a limited number of qualified students with some training and work experiences which might help secure these types of positions.

(3) Graduation with qualifications for entry into graduate study in psychology. While there is some variation across the various fields, the job market remains generally good for the holder of a master's or doctoral degree. Entry into graduate study is extremely competitive. however.

Additional information is available from the department through printed materials and advisory services.

			Credits
General Requirements			**8**
CO	150	College Composition	3
SP	200	Public Speaking and Discussion	3
		Physical education/wellness	2
Arts and Humanities			**12**
Including:			
E		Literature	3
		or	

L		Foreign language	3-5
PL	100	Appreciation of Philosophy	3
		or	
PL	105	Introduction to Philosophy	3
		or	
PL	120	History and Philosophy of Scientific Thought	3
Behavioral and Social Sciences2			**12**
Including:			
AP	100	Introductory Cultural Anthropology	3
		or	
S	100	General Sociology	3.
Natural Sciences and Mathematics			**24**
Including:			
C	103, 104	Chemistry and Society, Laboratory	4
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
ST	201	General Statistics	3
Z	101	Humans and Other Animals	3
Psychology			**39-40**
PY	100	General Psychology	3
PY	250A	Experimental Psychology	4
PY	370, 371	Psychological Measurement and Testing. Laboratory	4
PY	401	History and Systems in Psychology	3
Select three courses with laboratories:			
PY	352, 353	Psychology of Learning. Laboratory	5
PY	452, 453	Cognitive Psychology. Laboratory	5
PY	454A or B	Physiological Psychology	3
		and	
PY	455A or B	Physiological Psychology Laboratory	2
PY	456, 457	Sensation and Perception. Laboratory	5
Select two courses from the following:			
PY	228	Psychology of Human Sexuality	3
PY	260	Child Psychology	3
PY	320	Abnormal Psychology	3
PY	325	Psychology of Personality	3
PY	327	Psychological Perspectives on Female Experience	3
PY	460	Child Exceptionality and Psychopathology	3
PY	465	Adolescent Psychology	3
Select one course with laboratory from the following:			
PY	315	Social Psychology	3
		and	
PY	317	Social and Environmental Laboratory	2
		or	
PY	316	Environmental Psychology	3
		and	
PY	317	Social and Environmental Laboratory	2
		or	
PY 340, 341		Organizational Psychology. Laboratory	4
		or	
PY 440, 441		Industrial Psychology. Laboratory	4
Electives			**33-36**

1. For acceptable and recommended electives in arts and humanities consult with adviser or department.

2. For acceptable electives in behavioral and social sciences. select from category IV-A or B in the University Studies Program using prefixes AP. EA or EC. GR. HY. IE, PO, S. Credits must be taken in at least two departments.

3. M 130 may be substituted for M 120. M 121. M 124. M 13 3 is not acceptable. BY 102 or Z I 10 may be substituted for Z I 01. C 107. C 108 or C I 11. C 112 may be substituted for C 103. C 104. For acceptable and recommended science and mathematics electives consult with adviser or department.

Graduate Programs in Psychology
The master of science and doctor of philosophy degrees are offered. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF STATISTICS

Office in Statistics Building, Room 101
Professor Richard L. Tweedie. Chairman

Major in Statistics
Students should take basic mathematics. either college algebra or calculus. and ST 192 their first year. Other required statistics courses normally start spring of the sophomore year.

A minimum grade of C must be achieved in all mathematics. statisfies. and computer science courses which are required for graduation.

Students graduating with a bachelor's degree in statistics are expected to be able to function as professional statisticians or continue towards a graduate degree in statistics. All graduating statistics majors will be personally interviewed to ascertain the graduate's educational experience in statistics. As part of ST 486. Practicum. each major will write an essay and make an oral presentation on some topic in statistics. Also, the department will cover the expense of each major taking one or both of the first two nationally normed actuarial examinations.

			Credits
CO	150	College Composition	3
CS		Computer programming language	3-4
CS		Computer science	4
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
M	160, 161	Calculus for Physical Scientists I, II	8
M	229	Matrices and Linear Equations	1
M	260	Elementary Linear Algebra	2
M	261	Calculus for Physical Scientists III	3
M	317	Advanced Calculus of One Variable	4
		and	
M	318	Advanced Multivariable Calculus	3
		or	
M	331, 332	Methods of Applied Mathematics I, II	6
		or	
M	350, 351	Introduction to Numerical Analysis I, II	8
		or	
M	369	Linear Algebra	3
		and	
M	460	Applied Algebra	3
M	340	Introduction to Ordinary Differential Equations	4
ST	192	Introductory Seminar	1
ST	220	Elementary Probabilistic Modeling	2

ST	301	Introduction to Statistical Methods	3
ST	302	Design of Experiments	3
ST	304	Multiple Regression Analysis	3
ST	305	Sampling Techniques	2
ST	375	Nonparametric Statistical Methods	2
ST	420, 430	Probability and Mathematical Statistics I, II	6
ST	460	Applied Multivariate Analysis	3
ST	486	Practicum (1 semester)	2
		Arts and humanities	6
		Arts and humanities, behavioral and social sciences, or natural sciences 2	3
		Behavioral and social sciences	6
		Communication 4	3
		Natural sciences 5	9
		Physical education/wellness	2
		Option	24

Satisfaction of requirements for a minor (or second major) in another department 6; or in departments not offering minors, a 24-credit sequence meeting minimal University requirements for a minor and having the approval of the Statis- tics Department Chairperson or undergraduate adviser.

1. Select from list of cnurses in category III-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in categories II, 11I, or IV A or B in the University Studies Program.

3. Select from list of courses in category IV-A in the University Studies Program. Credits must be taken in at least two departments.

4. Select from list of courses in category I-D in the University Studies Program, excluding L courses.

5. Select from list of courses in category 11-A in the University Studies Program. Credits must be taken in at least two prefixes.

6. A second major is required if the elected department is mathematics.

Minor in Statistics
Students must select at least 21 credits from the list of required courses below and elective courses from a list provided in the Statistics Department. A minimum grade of C must be achieved in all statistics courses required for the minor. At least 12 credits must be in courses offered by the Statistics Department and at least 12 credits must be upper division. Any deviations must be proposed in writing by the student and approved by the undergraduate adviser in statistics or the Statistics Department Chairman.

Students in the biological and social sciences who are interested in applications of statistical methods should take ST 220 and ST 301 (or ST 307/EH 307 or ST 311). Students in the physical sciences who are interested in applications of statistical methods should take ST 220 and ST 309. Students interested in statistical theory and methods should take ST 420 and ST 430.

			Credits
ST	220*	Elementary Probabilistic Modeling	2
		or	
ST	420*	Probability and Mathematical Statistics I	3
ST	301*	Introduction to Statistical Methods	3
		or	
ST	307/EH 307*	Introduction to Biostatistics	3
		or	
ST	309*	Engineering Statistics	3
		or	

ST	311 *	Statistics for Behavioral Sciences I	3
ST	302	Design of Experiments	3
ST	304*	Multiple Regression Analysis	3
ST	305	Sampling Techniques	2
		or	
ST	375	Nonparametric Statistical Methods	2
		or	
ST	430	Probability and Mathematical Statistics II	3
		or	
ST	460	Applied Multivariate Analysis	3

* Additional course work may be required because of prerequisites.

Graduate Programs in Statistics
The master of science and doctor of philosophy degrees are offered. A description of these programs may be found in the *Graduate and Professional Bulletin.*

COLLEGE OF VETERINARY MEDICINE AND BIOMEDICAL SCIENCES

Office in Anatomy-Zoology Building, Room W 102
Professor James L. Voss, Dean
Professor Gordon D. Niswender, Associate Dean
Professor Robert L. Jones. Assistant Dean for Professional Veterinary Medical Curriculum
Assistant Professor Sherry McConnell, Assistant Dean for Admissions and Advising
Professor Alan Tucker. Assistant Dean for Undergraduate and Graduate Programs

UNDERGRADUATE MAJORS
Environmental Health Microbiology

UNDERGRADUATE MINORS
Anatomy and Neurobiology Microbiology

COLLEGE PROGRAMS
Biomedical Sciences Open Option
Doctor of Veterinary Medicine
Preprofessional Program in Veterinary Medicine
A concern for health and the diseases of animals and humans provides the unifying theme for the undergraduate, professional, and graduate programs of the College of Veterinary Medicine and Biomedical Sciences. The college combines teaching, research, and public service activities in basic biomedical disciplines such as anatomy, neurobiology, physiology, microbiology, pathology, and radiological health sciences. with applied disciplines such as clinical veterinary medicine and surgery, radiology, clinical laboratory sciences, epidemiology, and environmental health sciences. Graduates of the college in either the veterinary sciences or the biomedical sciences serve society in the broadest sense - they represent the concept that there is but "one medicine" with human and animal health intimately interrelated.

Major Courses of Study

The College of Veterinary Medicine and Biomedical Sciences offers undergraduate. professional, and graduate courses of study. There are two undergraduate programs leading to the bachelor of science degree With majors in environmental health and

microbiology. The bachelor of science degree requires a minimum of 128 credits with a minimum of 45 in upper-division courses. The four-year professional veterinary medical program leads to the doctor of veterinary medicine degree. Graduate studies in each of the seven departments of the college lead to master of science and doctor of philosophy degrees. The college also offers a nondegree preveterinary medical program.

Biomedical Sciences Open Option

Biomedical Sciences Open Option is a program offered by the College of Veterinary Medicine and Biomedical Sciences for students who are in their first two years of undergraduate work at Colorado State. The program is especially designed for students who have an interest in a career or advanced studies in any of a number of fields which require training in biomedical sciences and who have not made a specific choice of major for the bachelor's degree. Open Option allows students to explore programs and majors in the college by fulfilling course work requirements common to environmental health and microbiology degree programs as well as the preveterinary medicine curriculum. (Refer to the freshman/sophomore years in these programs for an example of a typical course of study that students would follow.) During the two-year program, students also fulfill requirements for the University Studies Program.

After completion of the Open Option curriculum, 'or at any time during the course of study, students will select a major leading to the bachelor's degree. Those who select the environmental health or micro-biology majors can complete degree requirements in two additional years, as described by the departments. The program also prepares students for most other majors in biological sciences. Upon completion of one of the college's baccalaureate degree programs,

students are prepared to enter a career directly or to continue graduate studies in biological sciences or professional studies in veterinary medical, medical or dental schools. Students who intend to apply to veterinary school may complete the Colorado State preveterinary requirements in one year beyond the Open Option program.

Continuing Education

The College of Veterinary Medicine and Biomedical Sciences supports the veterinary profession by offering continuing education courses which enable practicing veterinarians to obtain new medical information and meet the Colorado Veterinary Practice Act's continuing education requirements for relicensing. The college shares responsibility for continuing education and maintains close liaison with the American Veterinary Medical Association (AVMA), the Colorado Veterinary Medical Association (CVMA), the Colorado Board of Veterinary Medical Examiners, and the Western Interstate Commission for Higher Education (WICHE).

Graduate Programs

Programs leading to the master of science and doctor of philosophy degrees are offered in all departments of the college.

Students with bachelor of science or doctor of veterinary medicine degrees or well-qualified students who are currently pursuing veterinary medicine degrees, are eligible to study for advanced degrees offered in the Departments of Anatomy and Neuro-biology, Environmental Health, Microbiology, Pathology, Physiology, and Radiological Health Sciences. Only students with a D.V.M. degree or its equivalent are eligible to study for advanced degrees in the Department of Clinical Sciences.

For detailed information about graduate programs, refer to the individual departments or write to the department concerned. See also the *Graduate and Professional Bulletin.*

INTERDEPARTMENTAL PROGRAM

Doctor of Veterinary Medicine

A four-year professional program in veterinary medicine is offered to approximately 124 selected students. Because the number of applicants exceeds the number of students who can be admitted to any class, the Admissions Committee for the College of Veterinary Medicine and Biomedical Sciences carefully evaluates each applicant to recommend those best qualified. Information concerning the academic program which leads to the doctor of veterinary medicine (D.V.M.) degree may be found in the *Graduate and Professional Bulletin.* The full course of study requires a minimum of six years: at least two years in a preprofessional program, and, after acceptance, four years in the professional program.

Preprofessional Curriculum

Students may take their preprofessional training at any accredited institution;however. courses must be substantially equivalent in subject content and level to those required at Colorado State. Specific inquiries regarding equivalent or substitute courses be directed to the Office of the Dean or Preveterinary Advising Office.

While Colorado State students will take a number of credits, the minimum course re ments for admission to the professional pro exclusive of electives, are:
Arts, Humanities, Behavioral and Social Sciences - at least 12 semester credits. (Agricultural or buisiness courses and the required credits for English composition do not fulfill these requirements.)

Biological Sciences - at least three semester in genetics and a laboratory associated with logical science course.

Chemistry - at least three semester credits chemistry and a laboratory associated with a Chemistry course.

English Composition - at least three semesterss.

Physics - at least four semester credits with labatory.

Statistics - at least three semester credits.

Additional courses which are not required, but recommended are cell biology, developmental, microbiology, nutrition, and computer These courses will enhance the student's preparation for the professional program.

The preveterinary requirement is a minimum of 68 semester credits. Most students may find it be to extend the requirements over a period years. Exceptional, highly motivated student may be able to complete all requirements within two years.

Specific courses offered at Colorado State currently fulfill these requirements are lists following sample curriculum:

Freshman Year			
BY	102	Attributes of Living Systems.	4
		and	
BY	103A-B	Biology of Organisms	4
		or	
B	120	Principles of Plant Biology.	4
		and	
Z	110	Principles of Animal Biology	4
C	111, 113	General Chemistry I, II.	7
C	112, 114	General Chemistry Laboratory I, II.	2
CO	150	College Composition.	3
M	120, 121	College Algebra I, II.	2
M	124	Logarithmic and Exponential Function.	1
		Arts and humanities or behavioral social sciences 1.	6
		Communication 2	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AG	330	Principles of Genetics	3
		or	
B	350/Z 350	Molecular and General Genetics	3
		or	
MB	450	Microbial Genetics	3
		or	
Z	346	Evolution and Heredity	3
		or	
Z	455	Human Heredity and Birth Defects	3
C	245	Organic and Biological Chemistry	4
		or	
C	341, 343	Organic Chemistry I, II	6
		and	
C	344	Organic Chemistry Laboratory	2
EH	307/ST 307	Introduction to Biostatistics	3
		or	
ST	301	Introduction to Statistical Methods	3
		Arts and humanities, and behavioral and social sciencesTM	6
		Electives 3	14

Junior Year			**Credits**
BC	351	Principles of Biochemistry	4
PH	121, 122	General Physics	10
		or	
PH	141, 142	Physics for Scientists and Engineers I, II	10
		Electives'	8

1. Select from list of courses in categories III-A and IV-A in the University Studies Program. Credits must be taken in at least two departments.

2. Select from list of courses in category I-D in the University Studies Program.

3. It is highly recommended that 12 credits of electives include courses in biological sciences such as cell biology, developmental biology. and microbiology.

DEPARTMENT OF ANATOMY AND NEUROBIOLOGY

Office in Anatomy-Zoology Building, Room W 103
Professor F. Edward Dudek, Chairman
The department offers undergraduate instruction in the neurosciences, anatomy of the human body, microscopic anatomy. cell structure, and anatomy and physiology of farm animals. The department offers an undergraduate minor but no undergraduate major is offered.

Minor in Anatomy and Neurobiology

The minor in anatomy and neurobiology provides students with a core curriculum representing a useful complement to majors in biological science, zoology, occupational therapy, exercise and sport science, animal science, and other biomedical sciences. The program offers a variety of courses which serve to broaden the background of students who desire to pursue professional careers in the veterinary and biomedical sciences as well as in a variety of health related disciplines. Candidates begin the program with a combined course in either human or farm animal anatomy and physiology. The remainder of the required 21 credits are selected to complement the student's educational goals and interests.

Required Courses			**Credits**
AY	230/PS 230*	Animal Anatomy and Physiology	5
		or	
AY	300/PS 300*	Principles of Human Anatomy and Physiology	4
AY	301	Human Gross Anatomy	5
		or	
AY	400*	Microscopy of Animal Ceils and Tissues	4
AY	345	Functional Neuroanatomy	3
		or	
AY	365	Nerve and Muscle-Toxins, Trauma, and Disease	3

Elective Courses			**Credits**
AY	345	Functional Neuroanatomy	3
AY	365	Nerve and Muscle-Toxins, Trauma. and Disease	3
AY	384	Supervised College Teaching	1-3
AY	445*	The Human Brain and Its Disorders	4
AY	475	Human Anatomy Dissection	4
AY	495	Independent Study	1-3
BY	310*	Cell Biology	4
BY	311	Developmental Biology	4

*Additional course work may be required because of prerequisites.

Graduate Programs in Anatomy

Graduate programs lead to the master of science and doctor of philosophy degrees in anatomy. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF CLINICAL SCIENCES

Office in Veterinary Teaching Hospital,
300 West Drake Road, Room A 201
Professor Anthony P. Knight, Head
The Department of Clinical Sciences is primarily involved with teaching veterinary students in the professional veterinary medicine program the diagnosis, medical and surgical treatment, and prevention and management of domestic and exotic animal diseases. Through field service clinical experience, students receive on-the-farm training in livestock herd health management and

production medicine. Elective courses provide students the opportunity to select areas such as large animal reproduction, zoological medicine, and a variety of other veterinary specialties.

No undergraduate major is offered.

Graduate Programs in Clinical Sciences
Graduate programs in medicine or surgery lead to a master of science or a doctor of philosophy degree.

The department also offers a three-year combined master's degree and residency program in large and small animal surgery, internal medicine, neurology, oncology, ophthalmology, and emergency and critical care medicine which partially fulfills requirements for board certification. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF ENVIRONMENTAL HEALTH

Office in Microbiology Building, Room B 120 Professor Raymond S.H. Yang, Head

Major in Environmental Health
Environmental health professionals serve society by protecting people from the many health hazards of a complex environment; by working to effect positive environmental changes; and by balancing ecological and environmental needs with social and political imperatives through a process of problem solving using technical and person-based skills.

Students learn control principles of public health hazards including: air, water, and soil pollutants; communicable diseases; injuries; environmental chemicals; ionizing and nonionizing radiation; and' food-borne diseases. They are trained to execute and eventually direct programs in such areas as health planning, waste management, toxicology, disease prevention, occupational health and industrial hygiene, insect and rodent control, general environmental sanitation. noise abatement, risk management, hazardous wastes, vector-borne diseases, water quality. chronic disease control, and epidemiology.

In addition to required courses, environmental health majors complete a 10- to 15-week internship off campus either in an environmental health agency, research organization, or in industry. Upon successful completion of curricular requirements, students receive a bachelor of science degree with a major in environmental health, and may be employed by environmental agencies, health departments, other government entities, academic institutions, or private industry. A variety of specialty skills may be incorporated into the major by judicious use of free and major-related electives. Students may elect a specialty or choose specific courses to meet personal or professional goals.

M 120, M 121, and M 124 are considered review courses in the major in environmental health. Credits in these courses may not be used toward the major but may be used to meet University Studies Program requirements. The major in environmental health requires 129-134 credits.

Preveterinary Medicine or Other Premedical
Careers Preveterinary, premedical, or prenursing students interested in the environment and disease may follow program options within the environmental health curriculum. These options provide the necessary basic science preparation and offer excellent career opportunities for the biomedical scientist.

Freshman Year			**Credits**
B	120	Principles of Plant Biology	4
		and	
Z	110	Principles of Animal Biology	4
		or	
BY	102	Attributes of Living Systems	4
		and	
BY	103A-B	Biology of Organisms	4
C	111, 113	General Chemistry I, II	7

C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
M	155	Calculus for Biological Scientists I	4
SP	200	Public Speaking and Discussion	3
		Arts and humanities 2	3
		Physical education/wellness	2

Sophomore Year			**Credits**
AY	300/PS 300	Principles of Human Anatomy and Physiology	4
C	245, 246	Organic and Biological Chemistry. Laboratory	5*
EH	220	Environmental Health	3
EII	307/ST 307	Introduction to Biostatistics	3
MB	300	General Microbiology	4
PH	121, 122	General Physics I, II	10
		or	
PH	141, 142	Physics for Scientists and Engineers I, II	10
		Arts and humanities 2	3
		Behavioral and social sciences 2	3

Junior Year			**Credits**
BC	301	Survey of Biochemistry	3
C	331, 334	Quantitative Analysis. Laboratory	4
EH	312, 313	Environmental Sanitation I, II	9
EH	332	Principles of Epidemiology	3
		Behavioral and social sciences 2	3
		Environmental health-related electives 3	6
		Electives	3

Senior Year			**Credits**
BN	300	Management Fundamentals	3
EH	446	Environmental Toxicology	3
EH	487	Internship-Environmental Health	10-15
EH	492	Environmental Health Seminar	1
Z	462/MB 462	Parasitology and Vector Biology	5
		Environmental health-related electives 3	3
		Electives	6

1. Students with no previous chemistry will take C 101 before C I I 1 and C I 13.

2. Twelve credits are required. Select six credits from list of courses in category III-A and six credits from list of courses in category IV-A in the University Studies Program. Credits in each category must be taken in at least two departments.

3. Select nine credits from 'departmental list.

Graduate Programs in Environmental Health
The Department of Environmental Health offers the master of science degree and the doctor of philosophy degree in environmental health. The graduate curriculum is accredited by the National Accreditation Council for Environmental Health Programs. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF MICROBIOLOGY
Office in Microbiology Building, Room B 116
Professor Carol D. Blair, Head
Microbiology is a science at the forefront of the revolution in molecular biology and biotechnology. It emerged as a distinct science in the late nineteenth century, with the discoveries that microorganisms were the cause of infectious diseases, and that they also played essential roles in the ecosystem and in industrial processes. It now forms the basis for many important developments in biomedical and environmental sciences.

Major in Microbiology

Microbiology majors acquire knowledge and laboratory skills in the structure, physiology. genetics, pathogenicity, ecology, and taxonomy of microorganisms. Students also learn how knowledge is obtained and techniques are developed. Specialties are in human and animal infectious diseases, immunology, bacteriology, virology, molecular genetics, and environmental and industrial processes. Required courses in other biological sciences, chemistry, physics, and mathematics support the major. The curriculum for microbiology majors adapts readily to fulfilling the requirements of the Biotechnology Interdisciplinary Studies Program (see University-Wide Instructional Programs section in this catalog). Micro-biology is an excellent major for students who are preparing for professional veterinary or human medical programs or other health professional careers.

The microbiology curriculum conforms to the guidelines of the American Society for Microbiology.

Student achievement of objectives is assessed through oral and written presentations and surveys of graduates.

Graduates may be employed in research and production laboratories in universities, government agencies, industries, and private foundations; or in diagnostic and research laboratories in hospitals, clinics, and public health agencies. Additional opportunities are in technical sales and public health and research management. The program provides an excellent background for graduate studies in various biological sciences.

Freshman Year			**Credits**
BY	102	Attributes of Living Systems	4
C	111, 113	General Chemistry I, II	7
C	112, 114	General Chemistry Laboratory I, II	2
CO	150	College Composition	3
M	120, 121	College Algebra I, II	2
M	124	Logarithmic and Exponential Function	1
M	125	Numerical Trigonometry	1
M	126	Analytic Trigonometry	1
M	155	Calculus for Biological Scientists I	4
		or	
M	160	Calculus for Physical Scientists I	4
		Arts and humanities or behavioral and social sciences 2	3
		Biology 3	3-4
		Physical education/wellness	2

Sophomore Year			**Credits**
C	341, 343	Organic Chemistry I, II	6
C	344	Organic Chemistry Laboratory	2
CS	110	Personal Computing I	4
		or	
Z	279	Biological Information Processing	**1**
EH	307/ST 307	Introduction to Biostatistics	3
		or	
ST	201	General Statistics	3
MB	300	General Microbiology	4
MB	342	Immunology	3
MB		Microbiology 4	2
		Arts and humanities or behavioral and social sciences 2	6
		Communication 5	3-5
		Elective	0-3

Junior Year			**Credits**
BC	351, 352	Principles of Biochemistry, Laboratory	5
		or	

BC	401, 403	Comprehensive Biochemistry I, II	6
		and	
BC	404	Comprehensive Biochemistry Laboratory	2
MB	351	Medical Microbiology	3
MB		Microbiology'	5
PH	121, 122	General Physics I, II	10
		or	
PH'	141, 142	Physics for Scientists and Engineers I, II	10
		Arts and humanities or behavioral and social sciences 2	3
		Electives	3-6

Senior Year			**Credits**
C	331, 334	Quantitative Analysis, Laboratory	4
MB	420	Medical and Molecular Virology	4
MB	443	Microbial Physiology	4
MB	450	Microbial Genetics	3
		Electives	12-15

1. Students with no previous chemistry will take C 101 before C 111 and C 113.

2. Select a minimum of six credits from list of courses in category III-A and a minimum of six credits from list of courses in category IV-A in the University Studies Program. Credits in each category must be taken in at least two departments.

3. Select from departmental list.

4. Four of the seven required upper-division microbiology elective credits must be selected from course offerings exclusive of supervised college teaching, independent study, or research.

5. Select from list of courses in category I-D in the University Studies Program.

Medical Technology Program

Students who complete the B .S. degree in microbiology are eligible to enter a 12-month medical technology internship at any hospital accredited by the American Medical Association's Committee on Allied Health, Education, and Accreditation (CAHEA). Students are awarded a certificate in medical technology by the hospital at the conclusion of the internship and, upon successful completion of a national accrediting examination, are certified to practice as professional clinical laboratory scientists.

Employment opportunities are abundant and are found not only in hospital laboratories, but also in research, the biotechnology industry, forensic medicine, public health, veterinary laboratories, physician offices, and educational programs.

Students who wish to enter a medical technology program should consult the key adviser in the Micro-biology Department for assistance in selection of elective courses, and in selecting and applying to an internship program.

Minor in Microbiology

A minor in microbiology will be of considerable benefit to students majoring in biological science, physical science, food science, biochemistry, some fields of engineering, and other science-related fields. Microbiology courses can be selected on the basis of students' specialized interest in biomedical, environmental, industrial (biotechnology), or food microbiology.

Upper Division			**Credits**
MB	300*	General Microbiology	4
MB	342*	Immunology	3

Select 14 credits, including a laboratory course, from the following:

MB	334/FT 334	Food Microbiology	4
MB	343	Immunology Laboratory	2

MB	350	Microbial Diversity	3
MB	351	Medical Microbiology	3
MB	352*	Medical Microbiology Laboratory	3
MB	420	Medical and Molecular Virology	4
MB	425*	Virologic and cell Culture Techniques	2
MB	432	Aquatic Microbiology	4
MB	436	Industrial Microbiology	4
MB	443	Microbial Physiology	4
MB	450	Microbial Genetics	3
MB	498	Research	Var.

Selected courses from departments teaching science, engineering, nutrition, computer science. or statistics may be substituted for one microbiology elective course. Although alternatives for fulfilling the minor may be accepted. these are subject to departmental approval. See departmental advising sheet for list of alternative electives.

*Additional course work may be required because of prerequisites.

Graduate Programs in Microbiology
Programs leading to the master of science and doctor of philosophy degrees are offered. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF PATHOLOGY
Office in Pathology Building, Room 110
Professor M. Glade Weiser, Chairman
The instructional program of the Department of Pathology serves the veterinary medicine and the graduate biomedical curricula. Emphasis is placed on the causes and mechanisms of disease processes. No undergraduate major is offered.

Graduate Programs in Pathology
Programs leading to the master of science and doctor of philosophy degrees are offered. A description of these programs may be found in the *Graduate and Professional Bulletin.*

DEPARTMENT OF PHYSIOLOGY
Office in Physiology Building, Room 101
Professor Rupert Amann, Head
Instructional programs in the Department of Physiology serve a number of undergraduate majors, the veterinary medicine curriculum, and graduate students enrolled in a variety of disciplines on campus. No undergraduate major is offered.

Graduate Programs in Physiology
The department offers programs leading to M.S. and Ph.D. degrees. A description of these programs may be found in the *Graduate and Professional Bulletin.* Interested students are encouraged to contact the Department of Physiology for more information, including applications.

DEPARTMENT OF RADIOLOGICAL HEALTH SCIENCES
Office in Molecular and Radiological Biosciences
Building, Room 308 Professor Edward L. Gillette, Chairman
No undergraduate major is offered by the department.

Graduate Programs in Radiological Health Sciences
Programs leading to the master of science and doctor of philosophy degrees are offered. A description of these programs may be found in the *Graduate and Professional Bulletin.*

UNIVERSITY SERVICES AND AFFILIATED ORGANIZATIONS

UNIVERSITY SERVICE

Conference Services

Offices in Rockwell Hall, West Wing

The Office of Conference Services assists University and non-University program sponsors in organizing and conducting conferences. seminars, workshops, and other short-term educational activities. Support services are available all year for programs meeting on the campus, in Fort Collins hotels, and at other sites around the state. In addition, limited services are routinely supplied for programs meeting throughout the United States. While campus lodging facilities are available only in summer months, certain campus meeting facilities can be used during the academic year and especially during University breaks. The Conference Services staff works with more than 300 programs per year, accommodating over 25,000 participants.

Office of Equal Opportunity

Office in Spruce Hall, Room 21 Dana Sims Hiatt, Director

Colorado State established an Affirmative Action Program July 1, 1971. Its purposes are to provide equal employment and admission opportunity for all individuals, to increase the number of women and minorities, and to ensure nondiscrimination in University programs and activities.

The Office of Equal Opportunity implements and monitors the Affirmative Action Program. A copy of this program is available in any college or administrative unit.

Office in Spruce Hall, Room 21
Roselyn Cutler, Title IX Coordinator

In compliance with the Title IX Regulations Colorado State engaged in an evaluation of current policies and practices concerning admission of students, treatment of students, and employment of both academic and nonacademic personnel working in connection with educational programs or activities. The Title IX Coordinator is charged with the responsibility of implementing resulting recommendations as well as monitoring practices and procedures which relate to Title IX protection of students and employees in the University environment.

Office in Spruce Hall, Room 21
Roselyn Cutler, Conciliation Officer

The Conciliation Officer considers and assists in resolving discrimination inquiries and complaints on the basis of race, age, color, religion, national origin, gender, sexual orientation, veteran status or disability, or handicap for former, present, or prospective University employees and students. The Conciliation Officer is assisted by the Director of the Office of Equal Opportunity, and the Equal Opportunity Council, which hears discrimination complaints according to the Grievance Procedure for the Resolution of Complaints of Discrimination, as passed by the State Board of Agriculture.

Office of Instructional Services

Office in Clark Building, Room A 71
A.J. Linck, Interim Director
Kay Herr, Associate Director

The Office of Instructional Services is a University-wide organization responsible for providing instructional media and professional development services for all faculty, staff, undergraduate and graduate students, including graduate teaching/research assistants. The prime mission of the organization is to assist in enhancing University programs in instruction, research, and service.

Instructional Media Services provide faculty, staff, and students with professional services which assist in enhancing the quality of educational programs across the University. Emphasis is on the improvement of courses, presentations at meetings and other events, public communications, and access to greater educational opportunities for distance learners and clientele off campus. Major media units are located in the Clark Building, and include the Audiovisual, Graphic. Photographic.

and Television Services. These units provide a full range of high-quality, media-related services for the campus community. Instructional Services is also responsible for the instructional facilities in general assignment classrooms, for SCOLA and Channel 25 on the local cable television system, a four-channel television transmitting satellite earth station, a microwave system linking Colorado State and the University of Wyoming, and other technological systems. A videotape library of over 8,000 items is maintained in Instructional Services with access in that office, in the library, and to everyone with access to Gopher on the campus computer network. An extensive photographic archive, including a large collection of historical photos, is also located in Instructional Services.

Professional Development Services focus on faculty, staff members. and teaching assistants themselves, rather than the courses they teach or programs they present. The responsibility for professional growth and development resides with each individual and his/ her department. The responsibility of Instructional Services is to provide services which assist in helping members of the University community to acquire knowledge, skills, sensitivity, and techniques related to their University responsibilities. Major programs include New Faculty Orientation, Graduate Student Orientation, individual consultation, a course on college teaching, the Colorado State Leadership Series, seminars and workshops, the annual Professional Development Institute, the Student Course Survey program, faculty exchange programs, and other professional development services.

A detailed brochure of all services accessible from this unit is available on request.

Academic Computing and Networking Services
Office in University Services Center, Sixth Floor
Julian Kateley, Jr., Director
Academic Computing and Networking Services (ACNS) provides services to the University's academic, research, and administrative community to augment local computing resources available in colleges and departments.

ACNS operates a number of computers which are used for research, course work, and administration. including an IBM 3084, two IBM RISC System/6000 computers, and a number of UNIX and VMS-based minicomputers. Some of these computers are owned by other departments such as the University Libraries, Housing and Food Services, and the University telephone management system.

The campus network, CSUNet, which connects college and departmental LANs to central computing resources and national networks. is supported and maintained by ACNS.

Account information, documentation, and assistance with the University's computing systems is available from the ACNS Consulting Office, 30 Weber Building. Seminars on the use of CSUNet and the University's computers are offered at the beginning of the semester.

Students may access CSUNet and the University's UNIX system at Student 1/0, a computing lab located in the basement of the Weber Building. Documentation, reference manuals, and *How To* sheets are available at Student llO.

Computer supplies, software, and manuals may be purchased at the Computer Store, 22 Weber Building. The store requires a University identification card for cash purchases.

Some brands of personal computers can be purchased at substantial discounts through the University's Personal Purchase program. Details of the program are explained in bulletins available at the Consulting Office.

In addition to providing hardware and software support, ACNS staff installs, repairs, and maintains personal computers. terminals, printers, and local area network cabling systems and components. Cables, switch boxes, surge protectors, and some replacement parts can be purchased from ACNS.

For more information about ACNS, a free copy of *VECTOR,* a bimonthly newsletter published by ACNS, is available at the Consulting Office or at the main offices in the University Services Center.

Information Systems

Office in University Services Center, Sixth Floor
Don M. Hesser, Director
Information Systems has the responsibility to support the basic requirements of institutional and program administrators to the extent of their need for organized data and information concerning the activities of the institution and its various programs.

Applications include support of all central accounting functions, payroll, student records, and many other specialized services to various departments. Approximately 1,200 computer programs are in regular operation in support of administrative functions.

OTHER UNITS OF THE UNIVERSITY

Agricultural Experiment Station

Office in Administration Building, Room 16
Charles W. Laughlin, Director
Agricultural research has been a part of Colorado State since the institution's beginning. In 1888, the Colorado General Assembly established the Agricultural Experiment Station to correspond with the federally created state agricultural experiment station system. That system now encompasses all fifty states and a number of United States territories.

The mission of the Agricultural Experiment Station is to conduct research basic to the problems of agriculture in its broadest aspects, and to develop and improve the maximum contribution of agriculture to the welfare of the consumer. Research conducted by the Station focuses on agricultural and natural resources as they pertain to production, processing, and marketing of food, fiber, and forest products.

Research endeavors are organized through the existing departments and colleges of the University and at several sites throughout Colorado. A number of farmers and ranchers cooperate with the Agricultural Experiment Station in various studies. Some work is conducted cooperatively with other state and federal agencies, especially in the United States Department of Agriculture.

The Station disseminates research results and serves as a source of information and support for government, especially for such agencies as Cooperative Extension, and for citizens of Colorado. Findings from these research studies, scientific investigations, and experiments add currency, depth, and breadth of knowledge, thereby enhancing programs of study throughout Colorado State.

The Station's research program is particularly important to the University's graduate program in that it provides financial support through graduate research assistantships. These assistantships have the added value of offering work experience in an area consistent with the student's chosen field of interest.

Colorado Cooperative Fish and Wildlife Research Unit

Office in Wagar Building. Room 201
David R. Anderson, Unit Leader
Eric P. Bergersen, Assistant Unit Leader
Kenneth P. Burnham, Assistant Unit Leader
The Cooperative Wildlife Research Unit, founded in 1947, and the Cooperative Fishery Research Unit. founded in 1962, were combined into the Colorado Cooperative Fish and Wildlife Research Unit in 1984.

The Unit facilitates cooperation among the federal government, colleges and universities, state and private organizations, and industry for cooperative programs of research, management, and education relating to fisheries and wildlife problems. Funds are occasionally available for graduate research assistantships.

The cooperators include the U.S. Fish and Wildfire Service; the Wildfire Management Institute; Colorado Division of Wildfire; and the Department of Fishery and Wildlife Biology. College of Natural Resources.

Colorado Institute for Irrigation Management
Office in University Services Center, Room 413
Merle H. Niehaus, Director
This University-wide, interdisciplinary unit was created in 1986 to provide integrated training, research, and technical assistance in irrigation management. The Institute is involved in projects in Sri Lanka and has submitted several major proposals to USAID for further project activity. Several short courses on various facets of irrigation management are offered by the Institute.

Colorado State Forest Service
Office in Forestry Building, Roam 203
Administrative Officers:
James E. Hubbard, Director/State Forester
William R. Wilcox, Assistant State Forester
The Colorado State Forest Service (CSFS) assists other state agencies and private landowners in forest stewardship, community forestry, fire protection, and conservation education. A seedling tree nursery is maintained in Fort Collins. The CSFS state office is located on campus and 20 field offices are maintained throughout Colorado.

Cooperative relationships are maintained with Colorado State University Cooperative Extension, College of Natural Resources, and other federal/state natural resource agencies. The State Forest Service, via media, publications, and personal contact, provides forestry-related information to Colorado citizens.

Colorado Water Resources Research Institute
Office in University Services Center, Room 410
Robert C Ward, Director
The Colorado Water Resources Research Institute, a state-wide center for problem-solving water research, works closely with Colorado water users and state water officials in formulation of research programs responsive to state water resources problems. Research is planned and supported in all of the research universities of the state. An external advisory committee, representative of state and federal water agencies, industry, agriculture, local government, and water user associations provides priority identification and program guidance.

Graduate training is provided by academic departments participating in the University's water resources program.

Cooperative Extension
Offices in Administration Building, Room 1, and in Aylesworth Hall, NW, First and Second Floors Administrative Officer:
Milan A. Rewerts, Director
Cooperative Extension is the off-campus educational arm of Colorado State University and provides educational programs for youth and adults throughout Colorado.

Function
Cooperative Extension was established in 1914 by federal legislation, accepted by Colorado's General Assembly in 1915, and reaffirmed in 1979. It is funded by federal, state, and county appropriations. Colorado State University Cooperative Extension provides information and encourages the application of research-based knowledge in response to local, state, and national issues affecting individuals, families, agricultural enterprises, and communities of Colorado. It also functions as the educational arm of the U.S. Department of Agriculture.

Cooperative Extension has off-campus offices and facilities in 58 of Colorado's 63 counties. Office locations and telephone numbers may be found in a local telephone directory under "Colorado State University Cooperative Extension" or " County, Colorado State University Cooperative Extension." Extension staff in field offices have resource support and assistance from a staff of Extension specialists located in 14 departments and 5 of the University's 8 colleges.

Broad objectives fall within the scope of the land-grant system and currently address the following high-priority initiatives: a productive and profitable agriculture, a protected and enhanced environment, stable communities, and strengthened families. Many Extension programs take place

in the program areas of: 1) agricultural production, marketing, management, and natural resource management, use, and conservation; 2) consumer and family education; and 3) 4-H and youth. Interdisciplinary team approaches to educational programs for Coloradans are used as appropriate and grow out of the base programs to address issues important to the state.

Agricultural Production, Marketing, Management, and Natural Resources
In agricultural production, marketing, and management programs, Cooperative Extension provides technical assistance and information to improve sustainability, profitability, production efficiency, crop quality, and marketing practices to ensure an environmentally sensitive agriculture which can compete in a global economy. Emergency assistance has been provided, particularly in rural areas in blizzards, drought, and other natural disasters.

Programs in natural resource management, use, and conservation embrace topics in soil and water conservation, natural resource development, wildfire management and predator control, and environmental stewardship education.

Consumer and Family Education
Consumer and family programs include individual and family financial management, nutrition and food safety, apparel, textiles. and home-based business, health and safety, consumer information, parenting, child development, and family living. Special emphasis is directed to a program in low-income human nutrition (EFNEP), utilizing special educational techniques and experiences adapted to minorities and other disadvantaged groups.

4-H Youth Development
The 4-H youth development program is the nationally recognized youth program of Cooperative Extension. It is the policy of the Colorado 4-H Youth Development program that youth belonging to 4-H from the ages of 5 to 19 be called 4-H members. Educational activities are developed on the basis of developmental stages of youth. There is no age requirement for the developmentally disabled. All programs are under the leadership of Cooperative Extension field staff and volunteer leaders. The shared goal of enabling youth to become self-directing. productive, contributing adults makes 4-H and Colorado families natural partners.

In order to provide new opportunities for participation in the Extension-sponsored 4-H youth development program, other types of enrollments are also offered. These include: individual members/family clubs, 4-H special interest (out of school or after school), 4-H school enrichment, 4-H instructional TV, and other organized activities for youth who have special needs. All activities may be either short term or long term.

Programs Available
Cooperative Extension educational programs are informal, do not carry credit, and are developed and conducted with local people at their level of needs. Most programs are free of charge, although intensive workshop training, farm management, seed certification, and other special activities involve specific fees or charges. Cooperative Extension disseminates useful and practical information and encourages its application through personal consultations. special workshops, group and field meetings, organizational support, and mass media. All educational programs are available to youth and adults regardless of race, age, color, religion, national origin. gender, sexual orientation, veteran status or disability, or handicap.

Off-Campus Extension Offices

Areas		**Telephone**
Golden Plains Area	Courthouse Annex. 181 Birch Akron 80720	345-2287
	251 16th Street, Suite 201 Burlington 80807	(719) 346-5571
	246 S. Interocean P.O. Box 328 Holyoke 80734-0328	854-3616
	310 Ash,	

	County Courthouse Way 80758-1800	332-4151
San Luis Valley Area	P.O. Box 329 Alamosa 81101	(719) 589-2271
	P.O. Box 40 Creede 81130	(719) 658-2848
	17705 State Hwy. 285 La Jara 81140	(719) 274-5200
	P.O. Box 334 San Luis 81151	(719) 672-3663
	San Luis Valley Research Center 0249 E. Road 9N Center 81125	(719) 754-3494
Southeast Research Extension Area	1001 S. Main, Maxwell Bldg. Lamar 81052	(719) 336-7734
	772 Colorado Street Springfield 81073	(719) 523-6971
	708 Carson Avenue Las Animas 81054'	(719) 456-0764
	P.O. Box 395 Cheyenne Wells 80810	(719) 767-5716
County Courthouse Annex	Ordway 81063 P.O. Box 97	(719) 267-4741
	Ends 81036 P.O. Box 190	(719) 438-5321
	Rocky Ford 81067	(719) 254-7608
Tri-River Area	P.O. Box 20,000-5028 Grand Junction 81502-5028	244-1834
	Courthouse Annex. 6th and Dodge Delta 81416	874-3519
	1001 N. 2nd Street Montrose 81401	249-3935
Counties		**Telephone**
Adams County	9755 Henderson Road Brighton 80601	659-4150
Arapahoe County	5804 S. Datura Street Littleton 80120	730-1920 or 1-800-331-3739
Archuleta County	P.O. Box 370 Pagosa Springs 81147	264-5931
Boulder County	9595 Nelson Road, Box B Longmont 80501	776-4865

Chaffee County	10165 County Road 120 Salida 81201	(719) 539-6447
Custer County	P.O. Box 360 Westclifle 81252	(719) 783-2514
Denver County TM	1700 S. Holly St. Denver 80222	692-5600
Dolores County	P.O. Box 527 Dove Creek 81324	677-2283
Douglas County	107 Wilcox. Suite 200 Castle Rock 80104	688-3096
Eagle County	P.O. Box 239 Eagle 81631	328-8775
Elbert County	P.O. Box 128 Simla 80835	(719) 541-2361
El Paso County 1	108 N. Pine. 4th Floor Colorado Springs 80905	(719) 520-6450
Fremont County	615 Macon Avenue, Suite 106 Canon City 81212	(719) 275-1514
Garfield County	109 8th Street, Suite 307 Glenwood Springs 81601-3303	945-7437
Grand County	Extension Hall. Box 475 Kremmling 80459	724-3436
Gunnison County	275 South Spruce Gunnison 81230	641-1260
Huerfano County	Courthouse Walsenburg 81089	(719) 738-2170
Jackson County	P.O. Box 1077 Walden 80480	723-4298
Jefferson County	15200 W. 6th Avenue Golden 80401	271-8980
La Plata County	P.O. Box 2607 Durango 81302 '	247-4355
Latimer County	P.O. Box 543 Fort Collins 80522	498-7400
Las Animas County	200 E. First Street Trinidad 81082	(719) 846-6878 or 846-6881
Lincoln County	Courthouse, P.O. Box 68 Hugo 80821	(719) 743-2542
Logan County	P.O. Box 950 Sterling 80751	522-3200
Moffat County	200 W. Victory Way Craig 81625	824-6673

Montezuma County	Courthouse. Room 102 109 W. Main Street Cortez 81321	 565-3123.
Morgan County	P.O. Box 517 Fort Morgan 80701	 867-2493
Park County	P.O. Box 603 Fairplay 80440	(719) 836-2771 ext. 237
Pitkin County	0405 Castle Creek Road, Suite 2 Aspen 81611	 920-5370
Pueblo County'	215 W. 10th Street Pueblo 81003-2992	(719) 546-6000 ext. 3190
Rio Blanco County	P.O. Box 270 Meeker 81641	 878-4093
	17497 Highway 64 Rangely 81648	 675-2417
Routt County	P.O. Box 772830 'Steamboat Springs 80477	 879-0825
San Miguel-West Montrose County	P.O. Box 130 Norwood 81423	 327-4393
Sedgwick County	3rd and Cedar, County Courthouse Julesburg 80739	 474-3479
Summit County	P.O. Box 70 Frisco 80443	 668-3595
Teller County	P.O. Box 368 Cripple Creek 80813	 (719) 689-2552
Weld County	425 N. 15th Avenue Greeley 80631	356-4000 ext. 4465

Area Specialists		**Telephone**
Animal Disease	Animal Disease Diagnostic Laboratory Rocky Ford 81067	 (719) 254-6382
	425 29 Road Grand Junction 81501	 243-0673
Community Development	150 E. 29th. Suite 265 Loveland 80538	 679-4502
	2200 Bonforte Blvd. Room Library Wing Pueblo 81001-4901	 (719) 549-2469
Fruit Pathology	Orchard Mesa Research Center 3168 B 1/2 Road Grand Junction 81501	 434-3264

Horticulturist - Fruit	Rogers Mesa Research Center 3060 Highway 92 Hotchkiss 81419	872-3387
Horticulturist- Landscape Plants	152110 W. Sixth Avenue Golden 80401	271-8994
Horticulturist - Seed Potatoes	San Luis Valley Research Center 1249 E. Road 9N Center 81125	(719) 754-3594
Farm Management Offices	124 Oak Street Eaton 80615	454-3384
	1001 S. Main Lamar 81052	(719) 336-7734
	P.O. Box 326 Monte Vista 81144	(719) 852-2871
Vegetable Crop	Arkansas Valley Research Center 27901 Road 21 Rocky Ford 81067	(719) 254-6312
Water Quality	Central Plains Research Station P.O. Box 400 Akron 80720	345-2259
	925 S. Broadway Agriculture Service Center Cortez 81321	565-8879
	690 Industrial Blvd. Delta 81416	874-5735
	Crossroads Building 2754 Compass Drive, Suite 170 Grand Junction 81501	242-4511
San Luis Valley Water Quality	Project 923 First Avenue Monte Vista 81144	(719) 852-0960
	101 Uncompaghre Montrose 81401	249-8407
	P.O. Box 190 Rocky Ford 81067	(719) 254-7609

Regional Farm Management Economists		**Telephone**
	Room 109. Administration Bldg. University of Southern Colorado 2200 Bonforte Blvd. Pueblo 81001-4901	(719) 549-2049
	2784 Compass. Room 236 Grand Junction 81506	245-9149
Communications	15200 W. 6th Avenue Golden 80401	271-8980

Western Livestock Marketing	655 Paffet. Suite E-310 Lakewood 80215
Information Project	236-2881

'These offices participate in EFNEP.

AFFILIATED ORGANIZATIONS

Cooperative Institute for Research in the Atmosphere

Foothills Campus
Thomas H. Vonder Haar, Director

The Cooperative Institute for Research in the Atmosphere (CIRA), established under the auspices of the Colorado State Graduate School and the Vice President for Research, was formed in 1980 by a memorandum of understanding between Colorado State University and the National Oceanic and Atmospheric Administration (NOAA) to increase the effectiveness of atmospheric research of mutual interest to NOAA, the University, the state, and the nation. Additional objectives are to provide a center for cooperation in specified research programs by scientists from Colorado, the nation, and other countries, and to enhance the training of atmospheric scientists. All University or NOAA organizational elements are invited to participate in CIRA's atmospheric research programs. Initial participation by NOAA has been primarily through the Environmental Research Laboratories (ERL) and the National Environmental Satellite, Data, and Information Service (NESDIS). At the University, the Departments of Atmospheric Science, Civil Engineering, Computer Science, Earth Resources, Economics, Electrical Engineering, Physics, Psychology, Recreation Resources. and Statistics are or have been involved in CIRA activities. In addition, there is also a research collaboration with the Natural Resource Ecology Laboratory (NREL) at Colorado State University in the form of the Center for Analysis of the Dynamics of Regional Ecosystems (CADRE). As its research themes, CIRA concentrates on global climate dynamics, local-area weather forecasting, cloud physics, mesoscale studies and forecasting, climate studies of satellite observations, numerical modelling, agricultural meteorology, and economic and societal aspects of weather and climate.

NATIONAL COMPUTER CENTER

Telecommunications and Applications Services Center

U.S. DEPARTMENT OF AGRICULTURE,
OFFICE OF INFORMATION RESOURCES MANAGEMENT

3825 East Mulberry
Fort Collins, Colorado
Sue Rachlin, Assistant Director

The National Computer Center's Telecommunications and Applications Services Center (TASC) provides USDA agencies a range of applications systems development and maintenance services, concentrating on full life-cycle development and maintenance of both mainframe and distributed ADP applications. The Center provides advice and consultation relating to the development, implementation, maintenance, and operation of applications and systems; and provides a range of other information resource management services.

The Center is also responsible for providing telecommunications support services to all agencies within the Department of Agriculture. Functions include providing technical and analytical assistance on designing, evaluating, and recommending optimal networking solutions. The Center provides coordination and user assistance; conducts network test**ing** and evaluation; conducts telecommunications research and development studies;and provides support to meet user requirements for services and equipment.

The Center cooperates with the Department of Computer Science, the Department of Computer Information Systems, and other Colorado State colleges and departments involved with computer technology and systems development. TASC staff members supervise work experience for students, help direct graduate student work, and make available to the University a means whereby the faculty can update their knowledge and skills in the world of computer technology.

Rocky Mountain Forest and Range Experiment Station
U.S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE
Office in Rocky Mountain Forest and Range
Experiment Station Building 240 West Prospect
H.M. Montrey, Director

The Rocky Mountain Forest and Range Experiment Station was headquartered at Colorado State in 1935 under a cooperative agreement between the Colorado State Board of Agriculture and the Secretary of the U.S. Department of Agriculture. This is one of eight regional stations maintained by the U.S. Forest Service. The station serves Arizona, Colorado, Kansas, Nebraska, New Mexico, North Dakota, South Dakota, Texas, and Wyoming. Laboratories are maintained at six locations. Field work is performed at experimental forests and ranges. Research is often conducted in cooperation with state agencies, universities, private industry, and other federal agencies.

The station's broad objective is to conduct research, and develop and communicate scientific information and technology that lead to better understanding of diverse ecological systems and their management. Research efforts are categorized in the following areas: 1) watersheds and fisheries; 2) wildlife and range; 3) air resources; 4) economics and recreation; 5) forest inventory and planning; 6) biological diversity; and 7) conservation forestry.

Station staff cooperate with the Agricultural Experiment Station, the College of Natural Resources, and other Colorado State colleges and departments engaged in natural resources research. They help direct the work of graduate students, give occasional lectures to classes, and make laboratories and experimental areas available to students and faculty.

COURSES OF INSTRUCTION

The University reserves the right to change courses in this section without notice.

The courses listed are those which are scheduled to be offered during the terms indicated. Since the frequency of class offerings is determined by the department in accordance with program needs, students should consult the official, applicable class schedule and addendum for a listing of courses to be offered in a given term. There is no assurance that a given course will be offered in complete accordance with the catalog listing.

The following types of courses do not indicate term; they will be offered when there is sufficient demand: -86, Practicums; -87, Internships; -90,-91, Workshops; -92,-93, Seminars; -94,-95, Independent Studies; -96, -97, Group Studies; -98, Research; and -99, Thesis or Dissertation.

COURSE SYMBOLS
The following symbols are used in front of the course number to provide additional information concerning the course offering.

° Offered in 1993-94 and alternate years thereafter.

* Offered in 1994-95 and alternate years thereafter.

+ Certain field trips are a required part of this course and incur additional expense to the student. See also the Tuition, Fees, Expenses, and Adjustments section in this catalog.

Special course fee charged. Check with department for the specific amount.

COURSE PREFIXES
Courses offered by colleges, departments, or units are indicated by the following course prefixes:

Adult Education	AD
Aerospace Studies (Air Force ROTC)	AS
Agricultural and Chemical Engineering	AC
Agricultural and Resource Economics	EA
Agricultural Engineering	AE
Agriculture	A
Agronomy	AG
Anatomy and Neurobiology	AY
Animal Science	AN
Anthropology	AP
Apparel and Merchandising	AM
Art	AR
Astronomy	AA
Atmospheric Science	AT
Biochemistry	BC
Biological Science	BY
Biotechnology	BH
Botany	B
Business Accounting	BA
Business Finance	BF
Business General	BG
Business Industrial Relations	BP
Business Information Systems	BD
Business Management	BN
Business Management Science	BQ
Business Marketing	BK
Business Production and Operations Management	BL
Cell and Molecular	CM
Chemical Engineering	CH

Chemistry	C
Civil Engineering	CE
Clinical Sciences	VS
Communication Disorders	CD
Composition	CO
Computer Science	CS
Consumer Sciences and Housing	HC
Dance	D
Design, Merchandising, and Consumer Sciences	DM
Earth Resources	ER
Ecology	EY
Economics	EC
Education	ED
Electrical Engineering	EE
Engineering	EG
Engineering Science	ES
English	E
Entomology	EN
Environmental Health	EH
Equine Science (see Animal Science)	AN
Exercise and Sport Science	EX
Family Studies	HD
Fishery and Wildlife Biology	FW
Food Science and Nutrition	FN
Food Technology	FT
Foreign Languages and Literatures	L
Forensic Science	FO
Forest Sciences	F
Geography	GR
Geology (see Earth Resources)	ER
Graduate School	GS
Higher Education	HE
Hispano-American	HA
History	HY
Home Economics	HM
Honors	HP
Horticulture	H
Housing and Consumer Sciences	HC
Human Development and Family Studies	HD
Human Services	HS
Industrial Sciences	IS
Interior Design	ID
International Education	IE
Journalism, Technical	JT
Landscape Architecture	LA
Languages and Literatures, Foreign	L
Liberal Arts	LB
Library Information	LI
Mathematics	M
Mechanical Engineering	ME
Microbiology	MB
Military Science (Army ROTC)	MS
Music	MU
Natural Resources	NR
Natural Sciences	NS
Neurobiology	NB
Nutrition	FN
Occupational Therapy	OT
Pathology	PA
Philosophy	PL
Physical Education	

(see Exercise and Sport Science)	EX
Physics	PH
Physiology	PS
Plant Disease	PD
Political Science	PO
Psychology	PY
Radiological Health Sciences	R
Range Science	RS
Recreation Resources	RR
Restaurant/Resort Management	RM
Social Work	SW
Sociology	S
Speech Communication	SP
Statistics	ST
Technical Journalism	JT
Textiles and Clothing	
(see Apparel and Merchandising)	AM
Theatre	TH
Veterinary Medicine	VM
Vocational Education	VE
Weed Science	W
Wildlife Biology	FW
Women's Studies	WS
Youth Administration	YA
Zoology	Z

COURSE NUMBERING
Course numbering is based on the content level of material presented in a course.

100-299	Courses primarily for freshman and sophomore students.
300-499	Courses primarily for junior and senior students. Acceptable for graduate credit for students holding bachelor's degrees when approved by the student's graduate committee.
500-599	Courses primarily for students enrolled in master's degree programs or equivalents. Qualified junior and senior students may enroll.
600-699	Courses primarily for students enrolled in master's-level programs or equivalents. Undergraduate students may not enroll to satisfy undergraduate degree requirements.
700-799	Courses primarily for students enrolled in Ph.D.-level programs or equivalents and professional veterinary medicine courses. Undergraduate students may not enroll.

CLOCK HOUR DISTRIBUTION AND CREDITS
The distribution of credit for lecture-laboratory-discussion or recitation class periods per semester is as follows: in the example 04(2-2-1), the figure outside the parentheses indicates the number of credits assigned to this class. Inside the parentheses, the first figure indicates the number of clock hours spent in lectures each week, the second figure indicates the number of clock hours spent in laboratory each week, and the third figure indicates the number of clock hours spent in discussion or recitation each week.

VARIABLE CREDIT COURSES
VAR indicates variable credit with no minimum credit or no maximum credit indicated.

VAR (3-9) indicates variable credit with minimum credit and maximum credit limitations per term. The course listing may indicate other credit limitations.

TERM

F	Taught Fall Semester

S Taught Spring Semester
SS Taught Summer Session

PREREQUISITES
Permission of the instructor for a student to attend a class is implied when the student has met specified prerequisites. All prerequisites may be considered to have been met if a student presents evidence of credit earned in equivalent courses or if knowledge equivalent to the prerequisites indicated is demonstrated.

Academic prerequisites notwithstanding, a department may limit the enrollment in a class; classes may be limited to a specified number of students, to students of particular majors, or to students of particular class levels.

COURSE FEES
Certain courses cam/a special fee which is assessed at the time a student registers for courses. Since the costs are determined annually, course fees may vary from the stated charge in this section.

Certain courses carry a variable fee which is determined by the academic department involved. Consult the academic department for specific amount.

AGRICULTURE COURSES

College of Agricultural Sciences

A 116 03(3-0-0)
Plants and Civilization.
F. Biology and diseases of consumable higher plants; role of plants worldwide in history. sociology. and religion.

A 300 02(2-0-0)
Issues in Agriculture.
F. Scientific. technical. cultural. and social issues facing agriculture. and their interrelationships.

A 320A-E 01(0-2-0)
Computer Applications in Agriculture.
F, S. SS. Prerequisite: CS 110. A) Optimization. B) Data base. C) Communications. D) Project management. E) Spreadsheets.

+A 340A-B 02(0-2-1)
Basic Agricultural Skills.
F.S. Special fee. $15 per subtopic. Livestock and crop skill practices and their economic importance. Laboratory practice aimed at skills needed in successful enterprise production. A) Basic agricultural skills 1. B) Basic agricultural skills II.

A 342 03(0-6-0)
Agricultural Mechanics-Farm Construction.
F. Safety; hand, power tools; planning. layout. completion of farm/ranch structures including electrical and plumbing.

A 344 03(0-6-0)
Agricultural Mechanics-Farm Machinery.
S. Safety; hand, power tools; skills in maintenance adjustment, operation, and repair of farm/ranch machinery.

A 346 03(3-0-0)
Principles of Cooperative Extension.
F. Traditional and contemporary delivery systems of Cooperative Extension emphasizing structures of nonformal education.

A 465 03. Pesticide Management .
F.S. SS. Offered as correspondence course only. Reasons for and safe correct pesticide use.

A 466 01. Management of On-Farm Stored Grain .
F.S. SS. Offered as correspondence course only. Basic principles of grain storage and management strategies for insects and fungi;chemical controls and safe pesticide use.

A 467 02. Management and Control of Wood-Destroying Pests .
F.S. SS. Offered as correspondence course only. Wood-destroying agents; wood preservative chemicals and treatment; industry regulations; labels; safety; environmental concerns.

A 468 03. Management and Control of Turfgrass Pests .
F.S. SS. Offered as correspondence course only. Classification of turfgrass pests; pest management. control; environmental concerns. industry regulations; safety. skill in pesticide applications.

A 475 03(3-0-0)
Space Agricultural Science.
S. Prerequisite: BY 310, MB 300. written consent of instructor. Agricultural sciences in space applications. Focusing on plant and animal growth in closed environments.

A 487 Var (1-12).
Internship.

A 495 Var.
Independent Study.

***A 545/B 545 02(2-0-0)**
Plant Tissue Culture.
F. Prerequisite: B 440. Credit not allowed for both A 545 and B 545. Theory. technology. and techniques of cell, organ. tissue, and protoplast culture of plants.

***A 546/B 546 01(0-2-0)**
Plant Tissue Culture Laboratory.
F. Prerequisite: A 545/B 545 or concurrent registration. Credit not allowed for both A 546 and B 546. Laboratory techniques of cell. organ. tissue. and protoplast culture of plants.

A 550 03(2-3-0)
Farming Systems Research and Development
F. Prerequisite: Written consent of instructor. Principles of farming systems research methods for agricultural development projects.

A 695 Var.
Independent Study.

A 698 Var.
Research.

ASTRONOMY COURSES

Physics Department College of Natural Sciences

AA 100 04(3-2-0)
Introduction to Astronomy.
F.S. SS. Astronomical techniques, solar system and stars and stellar systems with reflecting telescope.

AA 150 03(2-3-0)
Observational Astronomy.
SS. Astronomical objects in the night and day sky; observation with 16-inch telescope.

AA 301 05(4-2-0)
Astrophysics I.
F. Prerequisite: M 124. M 126;PH 110 or PH 121 or PH 141. Celestial mechanics, earth-moon systems, planets and satellites. interplanetary medium. origin of solar system.

°AA 302 05(4-2-0)
Astrophysics II.
S. Prerequisite: M 124, M 126;PH 110 or PH 121 or PH 141. Properties of sun and stars. variable stars, binary and multiple star systems. star clusters. interstellar medium. stellar evolution.

***AA 303 05(4-2-0)**
Astrophysics III.
F. Prerequisite: M 124, M 126;PH 110 or PH 121 or PH 141. Properties of the Milky Way, galaxies. quasars and related objects; special and general relativity; cosmology.

AA 495 Var (1-6)
Independent Study in Astrophysics.

AGRICULTURAL AND CHEMICAL ENGINEERING COURSES

Agricultural and Chemical Engineering Department College of Engineering

AC 101 02(1-2-0)
Agricultural and Chemical Engineering I.
F. Agricultural and chemical engineering professions. engineering approach to problem solving. computer programming.

AC 102 03(2-2-0)
Agricultural and Chemical Engineering II.
S. Prerequisite: AC 101 or concurrent registration in CS 151. Engineering design. engineering graphics. spreadsheets. and other engineering software. team projects.

AC 201 03(3-0-0)
Material and Energy Balances.
F. Prerequisite: AC 101 or CS 150. C 109 or C 111. M 160, PH 141. Principles of chemistry. physics, and mathematics applied to development of material and energy balances; illustration of concepts.

AC 304 03(3-0-0)
Unit Operations and Transport Phenomena I.
F. Prerequisite: AC 201. ME 237; concurrent registration in CE 300. Molecular mechanisms of momentum, heat transfer; application of design of fluid flow networks, heat exchangers. and drying systems; materials handling.

AC 305 03(3-0-0)
Unit Operations and Transport Phenomena II.
S. Prerequisite: AC 304 or CE 300. M 340. Mass transfer operations, simultaneous heat and mass transfer. equilibrium stage operations.

AC 306 02(0-4-0)
Momentum and Heat Transfer Laboratory.
S. Prerequisite: AC 304. Momentum and heat transfer experimentation: rheology. heat exchangers, steam condensation, drying.

AC 307 02(0-4-0)
Mass Transfer Laboratory.
F. Prerequisite: AC 305. Mass transfer experimentation: evaporation, gas phase diffusion. gas absorption, distillation, and solid-liquid extraction.

AC 405 03(3-0-0)
Nonpoint Source Pollution.
F. Prerequisite: One course in soil science. hydrology. or fluid mechanics. Principles, processes. impacts and control of nonpoint source pollution of surface and groundwater.

AC 462 03(3-0-0)
Environmental Law.
F, S. Prerequisite: CO 150. Laws and regulations governing air. surface, and groundwater quality. solid. hazardous, and toxic wastes.

ADULT EDUCATION COURSES

Occupational and Educational Studies School College of Applied Human Sciences

AD 495 Var.
Independent Study-Adult Education.

AD 520 03(0-0-3)
Adult Education.
F. Philosophical foundations, a description of program service areas. adult participation trends, and current issues.

AD 586A-B Var.
Practicum.
Participation in field experiences relevant to study program and objectives. A) Adult education. B) Community education.

AD 590A-C Var.
Workshop.
Specially designed learning situations to provide opportunities for concentrated problem-solving experiences. A) Adult education. B) Community education. C) Rural adult education/community development.

AD 620 03(0-0-3)
Processes and Methods.
F. Prerequisite: AD 520 or AD 624. Processes and methods including helping theories used by adult learning facilitators.

AD 624 03(0-0-3)
Adult Teaching and Learning I.
S. Prerequisite: AD 520. Theory. research, and practice of adult teaching and learning concepts of behavior related to adults as learners in contrast to the young.

AD 629 03(0-0-3)
Program Development.
S. Prerequisite: AD 520. Models for planning. implementing. and evaluating programs for adult learners.

AD 687A-B Var.
Internship.
Career or job fieldwork experience with an adult education institution. agency, or program. A) Adult education. B) Community education.

AD 692A-B Var.
Seminar.
A) Adult education. B) Community education.

AD 695A-B Vat.
Independent Study.
A) Adult education. B) Community education.

AD 698 Var.
Research.

AD 699 Var.
Thesis.

AD 724 03(0-0-3)
Adult Teaching and Learning II.
F. Prerequisite: AD 624. Adult teaching and learning, alternative delivery systems, performance technology, and faculty evaluation.

AGRICULTURAL ENGINEERING COURSES

Agricultural and Chemical Engineering Department College of Engineering

AE 204 03(2-2-0)
Agricultural and Environmental Measurements.
SS. Measurement techniques for analysis and design of agricultural and environmental systems based on engineering principles.

AE 364 03(2-2-0)
Landscape Irrigation.
SS. Practical design of sprinkler and trickle irrigation systems for commercial and residential landscapes.

AE 370 03(2-2-0)
Operations Research in Agriculture.
S. Prerequisite: CS 150, M 224. Mathematical programming. simulation, and modeling applied to analysis of agricultural systems.

AE 430 04(3-3-0)
S.B-Water Engineering.
S. Prerequisite: CE 300. Control of the plant-soil-water environment, irrigation and drainage. soil and water conservation.

AE 440/ME 440 04(3-2-0)
Design of Off-Highway Vehicles.
S. Prerequisite: ME 237, CE 261 or CE 262. Credit not allowed for both AE 440 and ME 440. Power sources, transmissions, wheels, tracks, and human factors for off-highway vehicles. tillage, and earthmoving machinery.

AE 460 03(3-0-0)
Engineering Law and Ethics.
S. Prerequisite: CO 150. Legal system as it applies to engineers, managers, and consultants including professional registration, liability. and ethics.

AE 470 01(0-0-1)
Engineering Design I.
S. Prerequisite: AC 201 or AE 204. Selection of engineering design project; development of project proposal.

AE 471 03(2-2-0)
Engineering Design II.
F. Prerequisite: AE 470. Engineering project requiring each student to work on an individual basis with adviser; technical progress reports. Final project report.

AE 495 Var.
Independent Study.

AE 496 Var.
Group Study.

AE 505 03(3-0-0)
Irrigation Scheduling.
F. Prerequisite: AE 430, Engineering principles related to crop evapotranspiration, irrigation requirements, water transport and budget. and climate monitoring.

AE 532 03(3-0-0)
Drainage Engineering.
S. Prerequisite: AE 430. Drainage design for agricultural applications. Subsurface and surface drainage for water table and salinity control.

AE 533 03(3-0-0)

Hydraulic Design of Farm Irrigation.
S. Prerequisite: CE 300. Hydraulic design of small irrigation structures used at the farm level to obtain water control.

AE 535 03(3-0-0)
Surface Irrigation Systems.
F. Prerequisite: AE 430. Design and evaluation of surface irrigation systems. Water measurements. conveyance and control structures. land forming.

AE 536 03(3-0-0)
Sprinkler and Trickle Irrigation Systems.
S. Prerequisite: AE 430. CE 300. Basic principles. design. and evaluation of pressurized irrigation systems.

AE 537 01 (0-3-0)
Surface Irrigation Laboratory.
F. Prerequisite: AE 535 or concurrent registration.
Outdoor laboratory experiments in surface irrigation.

AE 538 03(3-0-0)
Groundwater Hydrology.
F. Prerequisite: CE 300. Groundwater occurrence, distribution, movement. exploration and recharge. well hydraulics and design. interaction of ground and surface water.

AE 540 03(2-3-0)
Groundwater Measurements.
F. Prerequisite: AE 538 or concurrent registration. Groundwater measurements of hydraulic properties and water quality using laboratory and field methods.

***AE 548/CE 548 03(2-0-1)**
Water Quality Management.
F. Prerequisite: CE 422. Credit not allowed for both AE 548 and CE 548. Legal and administrative procedures used to guide technical control of water quality.

°AE 549/CE 549 03(3-0-0)
Design of Water Quality Monitoring Systems.
F. Prerequisite: CE 422 or ER 418. Credit not allowed for both AE 549 and CE 549. Information expectations. design criteria, network design. operating plans and procedures. and reporting formats and schedules.

+AE 567 03(1-4-0).
Monitoring and Evaluation of Irrigation Systems .
SS. Prerequisite: AE 430. written consent of instructor. Special fee. $85. Monitoring, evaluation. and feedback principles and practices applied to irrigation systems in northern Colorado.

***+AE 568 03(1-0-2)**
Irrigation System Management.
SS. Prerequisite: AE 567. Special fee, $35. Principles of irrigation system management; analysis of case studies of irrigation systems around the world.

+AE 610 02(0-0-2)
Irrigation Field Trip.
SS. Prerequisite: AG 370 or CE 300. Special fee. $150. Site visitations to observe various irrigation methods. practices. and water diversions in Colorado.

AE 638 03(3-0-0)
Groundwater Quality and Contaminant Transport.
S. Prerequisite: AE 538. Analysis of hydrochemical data. Advection with and without mixing. Retardation of reactive solutes. Design of groundwater quality investigations.

AE 693 01(0-0-1)
Seminar 1.

AE 695 Var.
Independent Study.

AE 696 Var.
Group Study.

AE 699A-D Var.
Thesis.
A) Irrigation and drainage. B) Power and machinery. C) Environmental engineering. D) Food engineering.

AE 733 03(3-0-0)
Flow in Porous Media.
S. Prerequisite: CE 300; AE 538 or AG 470. Mechanics of single and two-phase fluids in soils and porous rocks with application to infiltration. drainage. and petroleum production.

***AE 767 03(3-0-0)**
Advanced Irrigation Topics.
S. Prerequisite: AE 505. AE 535. AE 536. Advanced topics selected from soil-water-plant relationships. irrigation hydraulics, irrigation management. developments in equipment.

AE 784 Var.
Supervised College Teaching.
F.S. SS.

AE 793 01(0-0-1)
Seminar II.
Prerequisite: AE 693.

AE 795A-D Var.
Independent Study.
A) Irrigation and drainage. B) Power and machinery. C) Environmental engineering. D) Food engineering.

AE 799A-D Var.
Dissertation.
A) Irrigation and drainage. B) Power and machinery. C) Environmental engineering. D) Food engineering.

AGRONOMY COURSES

Agronomy Department College of Agricultural Sciences

AG 100 04(3-2-0)
General Crops.
F.S. Production and adaptation of cultivated crops; principles affecting growth. development, management. and utilization.

AG 240 04(3-2-0)
Introductory Soil Science.
F.S. SS. Prerequisite: C 107 or C 111. Formation. properties. and management of soils emphasizing soil conditions that affect plant growth.

°AG 304 02(2-0-0)
Seed Production, Conditioning. and Marketing.
S. Prerequisite: AG 100. Production. processing, storing. and marketing of seed.

AG 320/RS 320 04(3-2-0)
Forage and Range Management.
S. Prerequisite: One course in biological sciences. Credit not allowed for both AG 320 and RS 320. Biology and management of introduced and native forage crops including production, preservation, and utilization.

AG 330 03(3-0-0)
Principles of Genetics.
F. S, SS. Prerequisite: B 120 or BY 102 or Z 110. Transmission of heritable traits; probability; chromosomal aberrations; polyploidy; genes in populations; molecular genetics; gene regulation.

AG 331 01(0-2-0)
Genetics Laboratory.
F.S. Prerequisite: AG 330 or concurrent registration. Experimental techniques in transmission and molecular genetics.

AG 350 03(3-0-0)
Soil Fertility Management.
F. Prerequisite: AG 240. Managing soil fertility and fertilizers to meet plant nutrient requirements in an environmentally sound manner with emphasis on nutrient cycling.

AG 351 01(0-2-0)
Soil Fertility Laboratory.
F. Prerequisite: AG 350 or concurrent registration. Soil chemical analyses and development of fertilizer recommendations for crops.

AG 370 03(3-0-0)
Irrigation Principles and Management.
S. Prerequisite: AG 100 or H 100; AG 240. Application and measurement of irrigation water. measurement of soil water. soil-water-plant and irrigation efficiency/environment relationships.

AG 384 Var (1-5)
Supervised College Teaching.
F.S. SS. Maximum of 10 credits allowed in course.

AG 414 03(2-3-0)
Agricultural Experimental Design.
S. Prerequisite: ST 201 or ST 301. Design of agricultural experiments and statistical analysis of resulting data.

AG 420 03(3-0-0)
Crop and Soil Management Systems I.

S. Prerequisite: AG 100 or H 100, AG 240. Principles of crop, soil management emphasizing environmental factors influencing crop growth and development. interactions with soil organic matter.

AG 421 04(3-2-0)
Crop and Soil Management Systems II.
F. Prerequisite: AG 100 or H 100, AG 240. Principles of crop and soil management with emphasis on soil erosion control, water conservation, and plant-water relationships.

AG 440 03(2-3-0)
Soll Genesis and Survey.
F. Prerequisite: AG 240, Process of soil formation, characterization, classification of soils; soil survey methods.

AG 442 03(2-3-0)
Forest and Range Soils.
F. Prerequisite: AG 240. Soil and water relationships in forest and rangeland ecosystems; significant properties in their management,

AG 455 03(3-0-0)
Soil Microbiology.
F. Prerequisite: MB 300 or AG 240. Microbial activities in agricultural. Forest. and grassland soils; in soil-plant relationships; and in maintenance of environmental quality.

AG. 456 01(0-3-0)
Soil Microbiology Laboratory.
F. Prerequisite: AG 455 or concurrent registration. Techniques used in study of ecology and activities of soil microorganisms.

AG 460/H 460 03(3-0-0)
Plant Breeding.
S. Prerequisite: AG 330. Credit not allowed for both AG 460 and H 460. Theory and practice of plant breeding using principles of genetics and related sciences.

AG 461/11 461 01(0-2-0)
Plant Breeding Laboratory.
S. Prerequisite: AG 460/H 460 or concurrent registration. Credit not allowed for both AG 461 and H 461. Techniques and procedures used in public and commercial plant breeding programs.

AG 467 03(3-0-0)
Soil Chemistry.
S. Prerequisite: AG 240, C 331. Cation and anion exchange, soil reaction, soil mineralogy. soil solution relations. soil organic matter.

AG 470 03(3-0-0)
Sort Physics.
F. Prerequisite: AG 240. Physical properties of soils emphasizing mechanical composition, moisture, aeration. temperature, and structure related to management, plant growth.

AG 471 01(0-3-0)
Soil Physics Laboratory.
F. Prerequisite: AG 470 or concurrent registration. Familiarization of techniques and equipment used in evaluation of soil physical properties.

AG 475 03(3-0-0)
Tropical Soils, Crops, and Farming Systems.
S. Relationship of soils and crops to farming systems that will sustain production in the tropics.

AG 487 Var. (1-12)
Internship.

AG 492 01(0-0-1)
Seminar.

AG 495 Var.
Independent Study.

AG 496 Var.
Group Study.

AG 500 02(2-0-0)
Environmental Agronomy.
SS. Prerequisite: AG 100 or AG 240 or written consent of instructor, Agricultural practices in relation to global environment. including issues of sustainability, pollution. and resource utilization.

AG 522 03(3-0-0)
Plant Canopy Meteorology.
S. Prerequisite: BY 220 or B 440; PH 141; M 15 5 or written consent of instructor. Principles of microclimatology including energy balance concepts for soil and crop surfaces and methods of estimating evapotranspiration.

AG 530 03(2-3-0)
Cytogenetics.
S. Prerequisite: AG 330. Chromosome structure and behavior; structural changes, polyploidy, and aneuploidy as related to genetic and heritable abnormalities and evolution.

°AG 535 03(3-0-0)
Origin and Evolution of Cultivated Plants.
F. Prerequisite: AG 330. Origin and evolution of cultivated plants from viewpoints of archaeology, history, botany. taxonomy, and particularly cytology and cytogenetics.

AG 540 03(3-0-0)
S.B-Plant-Nutrient Relationships.
S. Prerequisite: AG 240, 440. Soil and plant factors affecting nutrient uptake, mechanistic models of up take, availability and functions of essential elements. diagnostic techniques.

AG 550 03(3-0-0)
Advanced Soil Genesis.
S. Prerequisite: AG 440. Modern concepts of specific mechanisms involved in formation of genetic soil groups and their relationship to environmental factors.

AG 560/C 560 03(3-0-0)
Chemical Equilibria In Soils.
F. Prerequisite: AG 240 or nine credits of chemistry. Credit not allowed for both AG 560 and C 560. Chemical reactions. solubility relationships. speciation in solution, mineral weathering, redox reactions, metal chelation, fixation of nutrients.

AG 504 03(1-6-0)
Chemical Analysis.
S. Prerequisite: AG 240, C 331. Sampling and analysis including total and available elements, exchange capacity. organic matter, soil testings; plant composition and growth.

AG 640 01(1-0-0)
Crop Physiology.
F, Prerequisite: B 440. Developmental, physiological, and biochemical determinants of crop yields as controlled by genetic and environmental effects.

AG 675 01(1-0-0)
Presentations for Scientific Audiences.
F, S. Organization and presentation of scientific information to audiences in oral and poster format.

AG 699 Var.
Thesis.

AG 720 03(3-0-0)
Advanced Plant Breeding.
S. Prerequisite: AG 460/11 460. ST 302. Systems of mating and selection in plants to maximize genetic gain. Evaluation of heterosis, germplasm diversity. stability indices, and strategies.

°AG 725 02(2-0-0)
Quantitative Inheritance In Plant Breeding.
S. Prerequisite: AG 530. AN 630. Quantitative genetic structure of populations. recognition of genetic. environmental variance. Methods of dealing with quantitatively inherited traits.

AG 730 01(1-0-0)
Topics in Plant Breeding and Genetics.
F. Prerequisite: AG 530. Current literature regarding mechanisms used for plant improvement.

AG 740/PD 740 03(3-0-0)
Plant Molecular Genetics.
F. Prerequisite: AG 330. BC 351. Credit not allowed for both AG 740 and PD 740.
Advances in study of organization and function of nuclear and organellar genomas, gene expression in higher plants. and plant-microbe interactions.

°AG 755 03(3-0-0)
Advanced Soll Microbiology.
S. Prerequisite: AG 455 or MB 624. Ecology of soil microorganisms emphasizing population and activity relationships. nitrogen fixation, and microbe-pesticide interactions.

AG 760 03(3-0-0)
Advanced Soil Chemistry.
S. Prerequisite: AG 560/C 560, one course in computer science. Applications to soil. water. and environmental problems. waste disposal. metal toxicities. nutrient relationships. and computer speciation modeling.

°AG 770 04(3-2-0)
Advanced Soil Physics.
S. Prerequisite: AG 470 or M 261. Description and analysis of principles of storage and movement of water. solutes. heat. and gases in soils.

AG 784 Var.
Supervised College Teaching.
F.S. SS.

AG 792 01(0-0-1)
Seminar.

AG 795 Var.
Independent Study.

AG 796 Var.
Group Study.

AG 799 Var.
Dissertation.

APPAREL AND MERCHANDISING COURSES

Design. Merchandising, and Consumer Sciences Department College of Applied Human Sciences

AM 101 03(3-0-0)
Fashion Industries.
F.S. Development. organization. and trends of domestic and foreign fashion industries.

AM 120 03(2-2-0)
Textiles.
F.S. Credit not allowed for both AM 120 and AM 121. Fibers. Fabrics. and finishes basic to selection. use. and care.

AM 121 03.
Selection and Use of Textiles.
F.S. SS. Credit not allowed for both AM 120 and AM 121. Offered as correspondence course only. Selection. use, and maintenance of apparel and interior textiles for consumer. entrepreneur. merchandiser. designer. and/or interior designer.

AM 207 03(3-0-0)
Apparel Production Fundamentals.
F.S. Corequisite: AM 208A. Basic production techniques affecting apparel performance, quality level. and cost. Evaluation of materials. equipment. components. sizing. and fit.

AM 208A-B 01(0-2-0)
Production Fundamentals Laboratory.
F, S. Corequisite: A) AM 207. Prerequisite: B) AM 208A. A) Shirt. blouse. dress. B) Women's pants. skin.

AM 242 03(2-2-0)
Fashion Design and Visual Analysis.
F, S. Analysis and design of apparel based on form qualities and visual perception.

AM 250 03(3-0-0)
Clothing and Human Behavior.
F. Clothing to meet psychological, physical. social. cultural, and economic needs.

AM 265 03(3-0-0)
Product Evaluation.
F. Evaluation of non-apparel products related to raw producers. manufacturers, and retailers.

AM 270 03(3-0-0)
Merchandising.
S. Prerequisite: EC 102. Buying procedures. advertising, pricing. and channel members in relation to consumer demand.

AM 290 Var.
Workshop.

AM 313 03(3-0-0)
Apparel Production Processes.
F. Prerequisite: AM 208A. Manufacturing processes. procedures. and developments used in mass production of apparel.

AM 314 03(2-2-0)
Apparel Production.
S. Prerequisite: AM 313. Production processes of sewn textile products; analysis of time/ motion studies; use of power sewing equipment.

AM 321 03(3-0-0)
Textile Science.

S. Prerequisite: C 104, AM 120. Formation and nomenclature of polymers; effect of structure on fibers; functional and aesthetic finishes: color and its application to textiles.

AM 330 03(3-0-0)
Textile and Apparel Economics.
F.S. Prerequisite: EC 10() or EC 102; AM 120. . Manufacture of textile and apparel products; structure of the industries; international trade and consumption.

AM 340 02(0-4-0)
Computer-Aided Apparel Design.
F. Prerequisite: AM 242. Preproduction design focusing on use of computer-aided design systems in apparel design and manufacture.

AM 341 03(1-4-0)
Flat Pattern Design.
F. Prerequisite: AM 208B. Techniques in developing flat patterns. One original design carried through from individual block to finished garment.

AM 342 03(1-4-0)
Computer-Aided Fabric Design.
S. SS. Computer-aided technology and multicultural research used to create fabric design motifs; fabric printing using silkscreen. batik. and bound-resist.

AM 363 03(3-0-0)
Historic Costume.
S. Influence of social. political. and economic conditions on costume of predynastic Egypt to present time.

AM 366 03(3-0-0)
Merchandising Promotion.
F, S. Prerequisite: AM 270 or BK 300 or written consent of instructor. Activities used to influence sale of merchandise and services; to promote trends and ideas.

AM 37104(3-2-0)
Fashion Merchandising Systems.
F, S. Prerequisite: AM 270 or BK 360. BA 210. Business mathematics and current practices related to acquisition. negotiation. distribution, and sale of fashion merchandise.

AM 377 03(3-0-0)
Professional Skill Development.
F.S. Roles. responsibilities, standards. and interactive skills for business and industry personnel in apparel-related fields.

AM 384 Var (1-3)
Supervised College Teaching.
F.S.

SS. AM 400 01(1-0-0)
U.S. Travel-New York City Fashion Industries.
S. Prerequisite: Six semester credits in design, merchandising. and consumer science courses or written consent of instructor. Visits to fashion designers. apparel manufacturers. buying offices. retail stores. Fashion magazine firms. etc.

AM 415 04(2-4-0)
Tailoring.
F. Prerequisite: AM 208B. Planning and constructing tailored garments using traditional and contemporary principles.

AM 417 02(2-0-0)
Apparel Production Management.
F. Prerequisite: AM 313 or BK 300. Management decisions within apparel production. Costing, return on investment, labor relations.

AM 421 03(1-4-0)

Textile Analysis.
F. Prerequisite: AM 120. Performance evaluation of selected fabrics through standard testing procedures; individual projects.

AM 440 03(1-4-0)
Fashion Illustration.
S. Prerequisite: Six credits studio art. Creating designs for different figures and ages. Fashion illustration using various media and techniques.

***AM 442 04(2-4-0)**
Apparel for Men and Children.
S. Prerequisite: AM 341. Creation and development of garments for men's wear and children's wear including design through production.

AM 445 03(1-4-0)
Draping Design.
S. Prerequisite: AM 208B. Special fee, $90. Apparel designing through basic draping techniques.

AM 446 03(1-4-0)
Apparel Design and Production.
F. Prerequisite: AM 314. AM 340. AM 341. Computer-aided design technology used in apparel sketching. pattern drafting. grading and marker making; final portfolio preparation and review.

AM 450 03(3-0-0)
Social-Psychological Aspects of Clothing.
S. Prerequisite: AM 250 or PY 100 or written consent of instructor psychological and social factors influencing clothing and its effect on others.

AM 460 03(3-0-0)
Historic Textiles.
F. Historic development of textiles from a global perspective, focusing on textiles produced by diverse cultures.

AM 472 03(3-0-0)
Consumer Behavior.
F. Prerequisite: BK 300 or HC 330. Credit not allowed for both AM 472 and BK 306.
Analysis and evaluation of consumer behavior in relation to areas of merchandising and consumer sciences.

AM 490A-D Var.
Workshop. A) Merchandising. B) Apparel design. C) Apparel production. D) Textiles and clothing.

AM 495A-D Var. (1-3)
Independent Study.
A) Merchandising. B) Apparel design. C) Apparel production. D) Textiles and clothing.
AM 496A-D Var. Group Study. A) Merchandising. B) Apparel design. C) Apparel production. D) Textiles and clothing.

AM 501A-B 03(0-0-3)
Seminar.
F.S. Prerequisite: Written consent of instructor. Critical evaluation of research. theoretical and scholarly review articles. A) Merchandising. B) Apparel and textiles.

***AM 519 04(2-4-0)**
Trends In Textiles and Clothing.
F. Prerequisite: Three credits in basic textiles and three credits in clothing construction courses. Current developments in textile-sewn products - raw materials to fabrication.

AM 52104(1-4-1)
Advanced Textile Analysis.
F. Prerequisite: AM 321. Intensive investigation of selected fiber and fabric properties using standard testing procedures and analysis techniques.

AM 542 03(1-4-0)

Advanced Fabric Design.
S. SS. Prerequisite: AM 342 or written consent of instructor. Use of computer-aided design system to produce fabric designs for apparel or interior professional end use.

A M 546 04(1-4-1)
Advanced Apparel Design and Production.
F. Prerequisite: AM 340. AM 341. Computer-aided design technology used in apparel sketching, pattern drafting. grading. and marker making.

AM 550 04(4-0-0)
Sociocultural Concepts of Clothing.
F. Prerequisite: AM 450. Clothing as communication and projection of personality. Review of research.

AM 563 03(3-0-0)
Advanced Historic Costume.
S. Prerequisite: Twelve credits of art history. history. and/or textiles and clothing. Theory and research in Western costume history.

AM 571 03(0-0-3)
Merchandising Analyses and Strategies.
S. Prerequisite: B K 360. AM 371; or written consent of instructor. Quantitative tools for analyzing merchandising problems.

AM 590A-B Var.
Workshop.
A) Merchandising. B) Apparel.

AM 596A-B Var.
Group Study.
A) Merchandising. B) Apparel.

AM 684 Var.
Supervised College Teaching.
F.S.

AM 687A-D Var. (4-16)
Internship.
Prerequisite: AM 377. A) Merchandising. B) Design. C) Apparel. D) Historic textiles and costume.

AM 695A-H Var. (1-5)
Independent Study.
A) Merchandising. B) Apparel design. C) Apparel production. D) Textiles and clothing. E) Sociopsychological aspects. F) Historic textiles and costume. G) Textiles. H) Advanced research techniques.

AM 698 Var.
Research.

AM 699 Var.
Thesis.

ANIMAL SCIENCE COURSES

Animal Sciences Department College of Agricultural Sciences

+AN 100 04(3-2-0)
Animal Sciences.
F.S. Special fee, $10. Composition quality of meat. milk. eggs. wool; principles of genetics. nutrition. anatomy. physiology applied to production of livestock. poultry.

AN 143A-B 02(04-0)
Elementary Equitation.
F.S. SS. Special fee. $150 per subtopic. Basics of horsemanship; proper horse handling procedures. A) Western. B) English.

AN 145 01(0-2-0)
Packing and Outfitting.
F.S. Special fee. $90. Outfitting and packing the horse; hitches. knots. and horse care; planning pack trips. setting up camp. Overnight pack trip in-eluded.

AN 192 01(0-0-1)
Animal Sciences Preprofessional Seminar.
Long-range academic planning. professional opportunities. and career planning.

AN 200 02(2-0-0)
Poultry Science and Production.
F.S. SS. Also offered as correspondence course. Application of biological science and management in production of low-cost. high-quality animal protein for human consumption.

AN 220 02(2-0-0)
Feeds and Feeding.
F.S. Prerequisite: AN 100. Advantages. limitations of feeds; nutrients and their functions and quantitative .requirement for growth. Finishing. lactation. breeding livestock.

AN 221 01(0-2-0)
Feed Formulation.
F.S. Prerequisite: AN 220 or concurrent registration; M 120. Calculating and balancing rations to fulfill nutrient requirements of farm animals and pets.

AN 240 03(2-2-0)
Equine Management.
F. SS. Equine industry. breeds. selection. Form to function. care and management. soundness. health. reproduction. Feeding and facilities.

AN 24103(3-0-0)
Equine Behavior.
S. Understanding of horse behavior; study of ethology and learned behavior.

AN 243A-B 02(04-0)
Intermediate Equitation.
F.S. Prerequisite: AN 143A-B or equivalent skills. Special fee. $150 per subtopic. Trail obstacles. caveletti control. basic dressage. A) Western. B) English.

AN 245 03(2-2-0)
Equine Evaluation.
S. Special fee. $10. System development for analyzing a horse's conformation and its relationship to performance.

AN 250 03(1-4-0)
Live Animal and Carcass Evaluation.
F, S. Special fee, $10. Growth. development. and value-determining characteristics of market animals.

AN 286 02(0-6-0)

Livestock Practicums.
Prerequisite:AN 100 or concurrent registration. Experiential learning with beef cattle. dairy cattle. and sheep; participate in Little National Western.

AN 292 01(0-0-1)
Career Identification and Preparation Seminar.
F. Career opportunities in animal sciences. Communication with industry leaders in student's anticipated career areas.

AN 310 04(3-2-0)
Animal Reproduction.
F, S. Prerequisite: AY 230/PS 230. Special fee. $25. Anatomy and physiology of the reproductive system; causes of reproductive failure in farm animals; methods of improving reproductive performance.

AN 311 01(0-2-0)
Bovine Artificial Insemination.
S. Special fee. $100. Proper technique for artificially inseminating cattle as well as an overview of reproductive anatomy and physiology.

AN 320 03(3-0-0)
Principles of Animal Nutrition.
F. 5. Prerequisite: AN 220. Nutrient sources and requirements of food-producing animals.

AN 3:12 02(;1-0-0)
Basic Nutrition for Pets.
F. Also offered as correspondence course. Basic nutrients. nutrient requirements, feeding practices. and sources for companion animals.

AN 330 03(3-0-0)
Principles of Animal Breeding.
F, S. Prerequisite: Three credits in statistics. Genetic principles underlying animal improvement; elementary population genetics; heritability; systems of mating; selection.

AN 340 03(0-6-0)
Horse Training Laboratory I.F.
Prerequisite: AN 240, AN 241, AN 343A or B. Special fee, $150. Practical training skills using a yearling or two year old: in-hand, restraint, ground driving, longeing, first rides, stable management.

AN 341 ***03(0-6-0)***
Horse Training Laboratory II.
S. Prerequisite: AN 340. Special fee, $150. Skills in training for specific riding maneuvers, conditioning, fitting for sale and stable management.

AN 343A-C 02(0-4-0)
Advanced Equitation.
F, S. Prerequisite: AN 243A or B or equivalent skills. Special fee, $150 per subtopic. Emphasis on individual work: A) Western. B) Dressage. C) Jumping.

AN 344 02(0-4-0)
Equine Performance Events.
S. Prerequisite: AN 343A. Special fee. $150. Advanced techniques in training and showing horses for performance events.

AN 345 02(2-0-0)
Farrier Science.
S. Prerequisite: AN 240 or equivalent experience. Anatomy and physiology of horse's foot. Principles of trimming and shoeing; therapeutic shoeing.

AN 346 ***03(3-0-0)***
Equine Disease Management.
F, Lameness and common diseases of horses.

AN 350A-E Var.
Animal and Product Judging.
F.S. Maximum 5 credits for each subtopic. Maximum of 10 credits allowed in course. A) Meat animal. B) Meats. C) Dairy. D) Horses. E) Wool.

AN 360/FT 360 03(3-0-0)
Principles of Meat Science.
F, S. Prerequisite: C 107 or C 111. Credit not allowed for both AN 360 and FT 360. Structure. composition. and biology of muscle and associated tissues; wholesomeness. nutritive value. and palatability of beef. pork. and lamb.

AN 371 03(3-0-0)
Commercial Poultry Industry.
S. Prerequisite: AN 100 or AN 200 or FT 110. Interrelated, unique aspects of modern poultry industry comparing specific commercial poultry production operations.

+AN 372 03(2-2-0)
Sheep Production.
S. Prerequisite: AN 250. AN 310. AN 320. AN 330. Special fee. $4. Sheep production under farm and ranch conditions; products. breeds. breeding. nutrition, reproduction, and management systems.

AN 375 03(3-0-0)
Computerized Livestock Records Management.
F, S. Prerequisite: CS 110. Effective use of computers and data base managers for management of livestock records; emphasis on horses and beef cattle.

AN 376 03(2-3-0)
Dairy Farm Operations.
S. Prerequisite: AN 310. AN 320, AN 330. Integration of nutrition. genetics. physiology. and economics for management decisions of dairy farm operations and production and marketing of milk.

AN 378 Var. (1-6)
Beef Production Practices.
F. S, Maximum of 6 credits allowed in course. Current production practices applicable primarily to commercial cow-calf and seedstock producers,

AN 384 Var. (1-5)
Supervised College Teaching.
F, S. SS, Maximum of 10 credits allowed in course.

AN 386A-C 02(1-2-0)
Equine practicum.
Prerequisite: C) AN 345 or concurrent registration, A) Equine training and management. B) Equine reproductive management. C) Equine farrier management.

***AN 410 03(2-2-0)**
Avian Biology.
F. Anatomical. physiological interrelationships and evolutionary significance of uniqueness of avian biological systems.

***AN 412 03(3-0-0)**
Milk Secretion.
F. Prerequisite: AY 230/PS 230. Anatomy and endocrinology in growth and function of the mammary gland. Syntheses of milk and factors affecting yield and composition of milk.

AN 420A-B 02(2-0-0)
Applied Animal Nutrition.
F.S. Prerequisite: AN 320. Digestive physiology and nutritional requirements. A) Ruminants. B) Nonruminants.

AN 422 03(3-0-0)
Animal Metabolism.

F. Prerequisite: C 245. C 246 or C 343, C 344. Various nutrients. their classification. nutritional properties, function and fats in metabolism, energetic transformations in domestic animals.

AN 430 02(1-2-0)
Applied Animal Breeding.
S. Prerequisite: AN 330. Planning and evaluating improvement program designed to direct genetic changes in livestock.

AN 440 03(2-2-0)
Equine Production and Industry.
S. Prerequisite: AN 240. AN 346. AN 444, AN 446. For students planning careers in the horse industry' emphasis on management.

AN 442 02(0-4-0)
Riding Instructor Training.
F.S. Prerequisite: AN 343A or B. Teaching techniques; theory;handling of large mounted groups. beginner through advanced levels.

AN 444 03(2-3-0)
Equine Reproductive Management.
S. Prerequisite: AN 310. Anatomy and physiology of genital tract. estrus detection. control of cycle. artificial insemination. infertility. stallion management.

AN 446 02(2-0-0)
Equine Nutrition.
F. Prerequisite: AN 320. Digestive physiology. nutrition and related diseases of the horse.

AN 460/FT 460 03(2-2-0)
Meat Processing.
F. Prerequisite: AN 360/1='F 360. Credit not allowed for both AN 460 and FT 460. Formulation. processing. and analysis of meat products.

***AN 4.74 03(2-2-0)**
Swine Production.
F. Prerequisite: AN 250. AN 310. AN 320. AN 330. Production of purebred and commercial swine; breeds. breeding. Feeding. marketing. and management.

AN 476 03(2-2-0)
Beef Feedlot Management.
F. Prerequisite: AN 320. Feedlot facilities; nutrition; procurement. merchandising. handling. processing cattle; health care; custom feeding; managerial duties.

°AN 477 02(2-0-0)
Incubation and Hatching.
F. Prerequisite: BY 103A orZ 110. Embryonic development. Flock and hatchery management. hatchery and incubator design.

AN 478 03(2-2-0)
Beef Production and Management.
F. Prerequisite: AN 250. AN 310. AN 320. AN 330. Beef production as related to consumer through seedstock segments. Major emphasis on cow-calf management.

AN 487 Var.
Internship.

AN 492 01(0-0-1)
Professional Orientation Seminar.
Prerequisite: AN 292. Preparation for employment opportunities in animal industries.

AN 495 Var.
Independent Study.

AN 496 Var (1-5)
Group Study.

AN 500 Var (1-6)
Recent Developments.
SS. Prerequisite: Fifteen credits in animal sciences. Recent developments in animal science. agrarian science. and food technology.

AN 510 03(3-0-0)
Bovine Reproduction Management.
F. Prerequisite: AN 310. Role of reproduction in economic efficiency of cattle production systems. Causes of delayed breeding and nonpregnancy. abortion and perinatal mortality.

***AN 515 03(2-2-0)**
Avian Disease Control Techniques.
S. Prerequisite: MB 149. Diseases of viral. protozoan. bacterial.
Fungus. and nutritional origins; laboratory emphasis in identification and control techniques.

°AN 520 05(1-8-0)
Animal Metabolism Measurements.
S. Prerequisite: AN 422. Metabolic interrelationships of various animal species as determined by measuring certain components of blood. bone. and soft tissues.

AN 560 03(3-0-0)
Issues in the Meat Industry.
F. Prerequisite: AN 100. Current issues in U.S. meat production. processing. marketing. and consumption.

AN 565 03(3-0-0)
Interpreting Animal Science Research.
S. Prerequisite: AN 100; ST 301 or ST 307/EH 307. Designing. conducting, analyzing. and reporting of animal science research.

AN 570 03(3-0-0)
World Animal Agriculture.
S. Prerequisite: AN 100. Production methods for selected countries of first. second. and third world. Effect of feed supplies. climate. and market demand upon choice of management and breeds.

AN 575 03(2-2-0)
Systems Analysis in Animal Science.
S. Prerequisite: CS 150. Use of systems analysis and computers in multidisciplinary approach to solving of animal science and related problems.

AN 578 03(2-2-0)
Beef Cattle Management Decisions.
S. Prerequisite: AN 478. Integration of principles of nutrition. meats. breeding. herd health. etc. into a total management program to meet needs of beef industry.

AN 587 Var. (1-9)
Internship.

°AN 610 02(2-0-0)
Hormonal Regulation of Growth.
S. Prerequisite: PS 501 or written consent of instructor. Cellular and molecular regulation of animal growth by hormones and growth factors.

***AN 621A-B 02(2-0-0)**
Animal Nutrition.
S. Prerequisite: AN 422 or BC 351. Metabolism. deficiency. toxicity symptoms and feed sources for animals. A) Vitamins. B) Minerals.

°AN 630 04(3-0-1)
Population Genetics.
F. Prerequisite: AG 330. ST 301. Forces which change genetic composition, mean. and variability; mating systems; heritability and genetic correlation; selection indexes.

°AN 631 03(2-0-1)
Selection Index Theory.
S. Prerequisite: AN 630. ST 304 or written consent of instructor. Quantitative methods for genetic evaluation: selection index theory and introduction to best linear unbiased prediction.

°AN 633 02(2-0-0)
Physiological Genetics.
S. Prerequisite: AG 330. Mechanisms of expression of genetic variation related to internal and external environment: not restricted to any species or organism.

°AN 660/FT 660 03(1-0-2)
Advanced Meat Science.
S. Prerequisite: AN 360/1='T 360 or AN 422 or BC 301 or FN 350. Credit not allowed for both N 660 and FY 660. Anatomical. biochemical. histological. and physical factors associated with transformation of muscle into meat.

AN 699 Var.
Thesis.

°AN 710 03(2-2-0)
Growth and Body Composition.
SS. Prerequisite: PS 501. Growth. development of animals; chemical composition; application to meat production and fatness. Techniques for in-vivo estimation.

°AN 720 03(3-0-0)
Nutritional Energetics.
F. Prerequisite: One graduate-level nutrition course or written consent of instructor.
Dietary energy use to meet animal requirements for maintenance. growth. pregnancy. and lactation; environmental, nutritional. and physiological effects.

***AN 725 03(3-0-0)**
Rumen Metabolism.
S. Prerequisite: One graduate-level nutrition course or written consent of instructor.
Physiology. metabolic function of ruminant microbial populations.

***AN 730 03(3-0-0)**
Advances in Cattle Breeding.
S. Prerequisite: AN 330. ST 302. Literature and research methods in beef cattle breeding.

***AN 73103(2-0-1)**
Parmeter Estimation for Genetic Prediction.
F. Prerequisite: AN 631. Models used in analysis of livestock data and restricted maximum likelihood procedures for mixed models.

AN 784 Var.
Supervised College Teaching.
F.S.

SS. AN 792A-F 01(0-0-1)
Seminar.
A) General. B) Breeding/genetics. C) Physiology. D) Meat sciences. E) Nutrition. F) Management.

AN 795 Var.t
Independent Study.

AN 799 Var.
Dissertation.

ANTHROPOLOGY COURSES

Anthropology Department College of Liberal Arts

AP 100 03(3-0-0)
Introductory Cultural Anthropology.
F.S. SS. Credit not allowed for both AP 100 and AP 320. Human societies and their cultural settings; variation in beliefs. social customs. and technologies; human differences in anthropological terms.

AP 150 03(3-0-0)
Beginnings of Humankind.
F.S. Evolutionary theory, socioecology of living primates. and human evolution from australopithecines to modern humans.

AP 15101(0-2-0)
Beginnings of Humankind Laboratory.
F.S. Prerequisite: AP 150 or concurrent registration. Examination of fossil cast materials. anthropometry. and other lab procedures in physical anthropology.

AP 215 03(3-0-0)
Archaeology of Colorado.
F. Prehistoric Indians in Colorado; development of archaeology in Colorado.

AP 244 02(2-0-0)
Ethnosexuality.
S. Prerequisite: AP 100 or AP 320. Cross-cultural survey of sexual beliefs. practices. lore. symbolism. and values among tribal and peasant peoples.

AP 250 03(3-0-0)
Introduction to Archaeology.
F, S. Origins of human society from Stone Age to urban civilization using architecture. art. tools. tombs, and other material remains.

***AP 251 03(1-4-0)**
Archaeology Laboratory Methods.
S. Prerequisite: AP 250. Nature of archaeological data and research; analysis of field and lab data; computer applications; interpretation and report preparation.

AP 260 02(1-2-0)
Introduction to Field Archaeology.
F.S. SS. Prerequisite: AP 250. Field methods including map preparation and interpretation. site location and recording, site excavation. and stratigraphy.

AP 295 Var (1-3)
Independent Study.

°AP 310 03(3-0-0)
Peoples and Cultures of Africa.
S. Prerequisite: AP 100 or AP *320.* Sub-Saharan life styles including marriage and family, traditional government. religion and magic. ecology and economy. art. music. and literature.

°AP 311 03(3-0-0)
Peoples and Cultures of the Pacific.
S. Prerequisite: AP 100 or AP 320. Native cultures of Australia and Pacific Islands; prehistoric migrations; racial. linguistic. and cultural patterns; European contact.

AP 315 03(3-0-0)
Psychological Anthropology.
F. Prerequisite: AP 100 or AP 320; PY 100. Cross-cultural studies of socialization. sex roles. perception. cognition. ethno psychiatry. altered states of consciousness. cultural change.

AP 320 03(3-0-0)
Nature of Culture.
F, S, SS. Credit not allowed for both AP 100 and AP 320. General cultural anthropology emphasizing role of culture in human affairs.

°AP 322 03(3-0-0)
Religion in Nonliterate Societies.
F. Prerequisite: AP 100 or AP 320. Religious beliefs and rituals among tribal and peasant peoples. Major anthropological theories of religion from Tylor to present time.

AP 324 03(3-0-0)
Folk Religion.
S, SS. Prerequisite: AP 100 or AP 320. European folk beliefs and their carry-over into America; ghosts. vampires. trolls. elves. saints. rituals. witchcraft. sorcery. Folk cures.

***AP 329 03(3-0-0)**
Cultural Change.
S. Prerequisite: AP 100 or AP 320. Cultural change and evolution emphasizing colonial origins of underdevelopment.

°AP 330 03(3-0-0)
Human Ecology.
S. Prerequisite: AP 100 or AP 320; AP 150 or BY 220 or Z 101. Roles of technology. economics. social organization. and ideology in human adaptations to and survival in natural and cultural environments.

AP 331 03(3-0-0)
Peoples and Cultures of Mexico.
F. Native cultures from prehistoric to modern times; Indian and mestizo peoples today;village social structures within urbanizing Mexico.

AP 333 03(3-0-0)
Food and Culture.
F. Prerequisite: AP 1 CO or AP 320 or S 100. Foods and foodways around the world; social roles, religious taboos. traditional technologies, ethnicity. and cuisines.

°AP 335 03(3-0-0)
Language and Culture.
S. Human language and primate communication. nonverbal channels. sociolinguistics. and language change.

AP 340 03(3-0-0)
Medical Anthropology.
S. Prerequisite: AP 100 or AP 320. Cultural adaptation to disease; non-Western theories of health and disease: categories, causes. cures; learned roles of patients and healers.

AP 350 03(3-0-0)
Archaeology of North America.
F. Prerequisite: AP 250. Indian life. tools. architecture. religion.
Food-getting from cultures of 12.000 years ago or earlier until European contact.

°AP 351 03(3-0-0)
Archaeology of Europe, Africa, and Asia.
S. Prerequisite: AP 250. Human culture. tools, *art.* religion. social life. trade and warfare from four million B.C. to 1200 B.C. in the Old World.

AP 372 03(2-2-0)
Human Osteology.
F. Prerequisite: AP 150 or Z 101. Human bones and teeth in a review of functional human evolution.

AP 373 03(3-0-0)
Human Evolution.

S. Prerequisite: AP 150 or Z 110; AP 250. Current topics and debates in human evolution concentrating on biocultural changes in the human lineage.

°AP 374 03(3-0-0)
Human Biological Variation.
F. Prerequisite: AP 150 or Z 101. Biological diversity of human populations; history review of the study of human races.

AP 412 03(3-0-0)
Indians of North America.
F.S. Native American peoples. their origins. languages. and cultural variation across the continent.

AP 413 03(3-0-0)
North American Indians Today.
F.S. Prerequisite: AP 100 or AP 320. Contemporary cultural and social problems of American Indians on reservations and in urban centers in United States and Canada.

***AP 421 03(3-0-0)**
Comparative Kinship Systems.
F. Prerequisite: AP 100 or AP 320. Sociocultural principles underlying human family and extended kinship patterns. Analysis of variation from perspectives of biocultural ecology.

°AP 440 03(3-0-0)
Theory in Cultural Anthropology.
F. Prerequisite: AP 100 or AP 320. Nature of theory in anthropology; historical development and current issues: evolutionary. diffusionist, functional. and ecological approaches.

***AP 441 03(3-0-0)**
Method In Cultural Anthropology.
S. Prerequisite: AP 100 or AP 320. Methodological orientations and research techniques. Ethnographic and cross-cultural approaches including quantitative and formal models.

***AP 455 03(3-0-0)**
Great Plains Archaeology.
F. Prerequisite: AP 250. Prehistoric people on Great Plains from earliest hunter-gather-ers to historic contact: cultural responses to changing conditions.

#+-AP 460 Var (3-8).
Field Class in Archaeology. SS. Prerequisite: Written consent of instructor. Special fee. $50 per credit. Directed fieldwork in local archaeology. site survey, and excavation: recovery, preservation. cataloging. analysis ofartiifactual and skeletal materials.

°AP 465 03(2-2-0)
Zoo archaeology.
F. Prerequisite: AP 150. AP 250. Analysis of animal bones from archaeological sites to develop interpretations of past human behavior.

AP 470 03(3-0-0)
Primate Behavior and Ecology.
S. Prerequisite: AP 150 or Z 101. Behavioral patterns, ecological relationships, and evolution of nonhuman primates.

***AP 479 03(3-0-0)**
Forensic Anthropological Methods.
F. Prerequisite: AP 372. Advanced human identification techniques: skeletal determination of sex, race, age. stature, idiosyncrasies, and time since death.

AP 484 Var (1-5)
Supervised College Teaching.
F, S. Prerequisite: Written consent of instructor.

AP 486 Var (1-6)
Practicum.
Application of anthropological methods under actual project conditions.

AP 492A-D 03(0-0-3)
Seminar.
Prerequisite: AP 100. A) Archaeology. D) Physical anthropology.

AP 493 01(0-0-1)
Seminar.
Integration of knowledge of discipline subfields; standardized exam helps to evaluate effectiveness of undergraduate training.

AP 495 Var (1-3)
Independent Study.

AP 496 Var (1-3)
Group Study.

AP 529 03(0-0-3)
Anthropology and Development.
S. Prerequisite: Written consent of instructor. Links between anthropology and development such as agriculture, agroforestry. pastoral systems, nutrition, and women's issues.

°AP 530 03(3-0-0)
Humans In Ecosystems.
S. Prerequisite: AP 100 or AP 320. Links between people and environments including human causes of land use change and adaptations people make to their environments.

°AP 541 03(1-0-2)
Seminar in Archaeological Method.
S. Prerequisite: Nine credits in anthropology or written consent of instructor.
Methods of archaeological recovery and interpretation. and process of archaeological analysis and reporting.

°AP 542 03(1-0-2)
Seminar In Archaeological Theory.
F. Prerequisite: Nine credits in anthropology or written consent of instructor.
Theories of recovery, reconstruction, and interpretation of the archaeological record.

AP 543 03(3-0-0)
Method and Theory In Ethnology.
F. Prerequisite: Nine credits in cultural anthropology. Major schools of thought in cultural anthropological theory, field work. and analytical methods and models.

AP 544 03(1-0-2)
Anthropological Method and Theory.
F.S. Prerequisite: Nine credits of anthropology. Current trends of research in archaeology; cultural and physical anthropology.

AP 545 03(1-0-2)
Theory and Method in Physical Anthropology.
F. Prerequisite: Six credits in physical anthropology. Method, theory in physical anthropology focusing on state-of-the-art syntheses, interpretations of primate ecology. racial variation, and hominid evolution.

°AP 550A-C 03(0-0-3)
Regional Prehistory.
S. Prerequisite: A-B) AP 350. C) Nine credits in anthropology or written consent of instructor. A) California prehistory. B) Great Basin prehistory. C) Southwestern.

AP 565 03(1-2-1)
Archaeological Spatial Analysis.
S. Prerequisite: AP 250, S 310 or ST 311. Quantitative and qualitative approaches to analysis of spatial data are used to aid development of behavioral interpretations.

#+AP 660 Var. (2-10)
Field Archaeology.

F, SS. Prerequisite: AP 460 or two seasons field experience. Special fee, $50 per credit. Field application of nondestructive survey methods, advanced cartographic and excavation methods, project supervision skills.

AP 684 Vat.
Supervised College Teaching.
F, S, SS:

AP 686 Var.
Practicum-Field Archaeology.
Direction of anthropological fieldwork underprofessional supervision.

AP 692 03(0-0-3)
Seminar.
Current trends of research in archaeology; cultural and physical anthropology.

AP 695 Var.
Independent Study.

AP 696 Var. (1-3)
Group Study-Anthropological Theory.
Intensive analysis of selected topics and theories in anthropology, both historical and contemporary.

AP 699 Var.
Thesis.

ART COURSES

Art Department College of Liberal Arts

AR 100 03(3-0-0)
Introduction to the Visual Arts.
F, S. Exploration of development of visual arts.

AR 101 03(0-6-0)
Visual Form.
F, S, SS. Two- and three-dimensional design to develop visual awareness and insight into structure and organization of visual arts.

AR 106A-E 03(0-6-0)
Art Studio.
F, S, SS. A) Painting. B) Printmaking. C) Sculpture. D) Fibers. E) Metalsmithing and jewelry.

AR 110 03(3-0-0)
History of Western Art I.
F. Western arts from prehistory through the medieval period.

AR 111 03(3-0-0)
History of Western Art II.
S. Prerequisite: AR 110. Western arts from Renaissance through the 19th century.

°AR 112 03(3-0-0)
History. of Oriental Art.
S. Arts of China. Japan. and India.

AR 113 03(3-0-0)
Native Art Survey.
F. Visual arts of native peoples of North America. Africa, and Oceania.

AR 135 03(0-6-0)
Introduction to Drawing.
F, S. SS. Special fee. $11. Elements of artistic freehand drawing emphasizing experimentation with wide variety of media.

AR 136 03(0-6-0)
Introduction to Figure Drawing.
F.S. SS. Prerequisite: AR 135. Special fee. $35. Human form as basis for self-expression through various drawing media.

AR 160 03(0-6-0)
Foundations Painting.
F.S. Concepts of organization and color theory structured for understanding and manipulation of two-dimensional space.

AR 170 03(0-6-0)
Foundations Sculpture.
F, S. Concepts of organization structured for understanding and manipulation of three-dimensional space: use of shop tools and materials.

AR 212 03(3-0-0)
History of Western Art III.
F.S. Prerequisite: AR 111. 20th-century visual arts.

AR 231103(0-6-0)
Photo Image Making 1.
F, S. Special fee, $25. Use of photographic imagery as an art medium.

AR 235 03(0-6-0)
Drawing Workshop I.

F.S. Prerequisite: AR 136. Special fee. $35. Drawing using models and various still life material.

AR 240 03(0-6-0)
Pottery. I.F.S.
SS. Special fee. $25. Basic techniques of studio ceramics; exploration of expressive potential in pottery.

AR 245 03(0-6-0)
Metalsmithing and Jewelry I.
F.S. Special fee. $28. Basic metal techniques; forming and construction; surface treatment and finishing processes; behavior and mechanical properties of metals.

AR 251103(0-6-0)
Fibers I.
F, S. Special fee. $35. Basic weaving and other fiber structure techniques.

AR 255 03(0-6-0)
Introduction to Graphic Design.
F.S. Prerequisite: Completion of required 100-level art courses. Special fee. $5. Problems emphasizing typography, layout, symbols. illustration, and package design.

AR 260 03(0-6-0)
Painting 1.
F, S. Prerequisite: AR 135, AR 160. Basic oil painting procedures. techniques. and concepts.

AR 265 03(0-6-0)
Printmaking I.
F.S. Prerequisite: AR 136. Special lee, 540. Problems in composition utilizing basic techniques and principles of printmaking processes.

AR 270 03(0-6-0)
Sculpture I.
F.S. Prerequisite: AR 170. Special fee. $35. Introduction to sculptural techniques and concepts.

AR 295A-L Var. (1-4).
Independent Study.
A) Painting. B) Printmaking. C) Sculpture. D) Fibers. E) Metalsmithing and jewelry. F) Drawing. G) Graphic design. H) Art history. 1) Art education. J) Pottery. K) Photo image making. L) Papermaking.

AR 305 03(0-6-0)
Paper Making I.
F. S, SS. Prerequisite: AR 101 or AR 160. Special lee, $55. Basic techniques and processes of handmade paper; emphasis on fiat design.

AR 306 03(0-6-0)
Paper Making II.
F.S. SS. Prerequisite: AR 305. Special fee, $55. Exploration of handmade paper as medium for personal expression; emphasis on sculptural form and pulp dyeing.

***AR 310 03(3-0-0)**
History of American Art.
F. Prerequisite: AR 212. History of American art from Colonial Period to end of World War II.

°AR 311 03(3-0-0)
Art of Africa.
S. Prerequisite: AR 1 CO or AR 111 or AR 113. History of the art of Africa.

***AR 312 03(3-0-0)**
History of Pre-Columbian Art.
S. History of the art of Central and South America.

AR 314 03(3-0-0)
Women in Art History.

F. Prerequisite: AR 100 or AR 110.
Women as artists in history. of art and women's media in an.

°AR 315 03(3-0-0).
Contemporary American Art.
SS Prerequisite: AR 212. Painting and sculpture in United States since 1945.

***AR 316 03(3-0-0).**
Art of the Pacific.
F. Prerequisite: AR 100 or AR 111 or AR 113. Arts of Australia, Indonesia. Melanesia, Micronesia. and Polynesia.

AR 318 03(3-0-0)
Native American Art.
F. Prerequisite: AR 110, AR 100 or AR 111 or AR 113. Arts and crafts of Northern American Indian groups.

AR 319 03(3-0-0)
History of Graphic Design.
S. Prerequisite: AR 212. History of graphic design emphasizing 19th- and 20th-century work.

AR 326 03(0-6-0)
Art Education Studio.
F.S. Prerequisite: ED 355, admission to teacher certification program. Art areas required for teacher certification as indicated by individual student needs.

AR 330 04(0-8-0)
Photo Image Making II.
F.S. Prerequisite: AR 230 or portfolio review. Special fee, $48. Studio course designed to develop the growth of photographic expression.

AR 33104(0-8-0)
Photo Image Making III.
F, S. Prerequisite: AR 330. Special fee, $50. Studio course designed to further growth of concept. materials in photographic expression as an *art* medium.

AR 335 03(0-6-0)
Drawing Workshop II.
F, S. Prerequisite: AR 235. Maximum of 9 credits allowed in course. Special fee, $35. Independent as well as common drawing experiences.

AR 336 03(1-4-0)
Drawing Workshop III.
F, S. Prerequisite: AR 335. Special fee. $35. Drawing with strong emphasis on reading assignments from fields of contemporary art history. aesthetics, and art criticism.

AR 340 04(0-8-0)
Pottery II.
F.S. SS. Prerequisite: AR 240. Special fee. $40. Beginning wheel throwing; investigation of the expressive potential of throwing technique.

AR 341 04(0-8-0)
Pottery III.
S. Prerequisite: AR 340. Special fee, $50. Exploration of form for expression of personal content; supportive technology; expression in historical pottery.

AR 345 04(0-8-0)
Metalsmithing and Jewelry II.
F.S. Prerequisite: AR 245. Special fee. $35. Raising and casting techniques in combination with construction; metal spinning.

AR 346 0410-8-0)
Metalsmithing and Jewelry III.

F.S. Prerequisite: AR 245. Special fee. $35. Forging and enameling techniques on nonferrous and ferrous metals; stone setting.

A R 350 04(0-8-0)
Fibers II.
F. Prerequisite: AR 250. Special fee. $50. Fabric decoration and surface design techniques; investigation of fabric as an expressive medium.

AR 351 04(0-8-0)
Fibers III.
S. Prerequisite: AR 250. Special tee. $50. Studio work investigating expressive potential of fibers and fabric.

AR 355 04(0-8-0)
Typography and Advertising Design.
F. Prerequisite: AR 255. Special fee. $5. Projects emphasizing typeface design and typographical arrangements in advertising.

AR 356 04(0-8-0)
Illustration.
S. Prerequisite: AR 255.6 credits in drawing. Special fee. $5. Problems emphasizing media. experimental techniques. and compositions.

AR 360 04(0-8-0)
Painting II.
F. Prerequisite: AR 260. Techniques and concepts inherent in acrylic and other water-based media.

AR 36104(0-8-0)
Painting III.
S. Prerequisite: AR 235. AR 260. Special fee. $35. Compositions and techniques in oil and/or acrylic emphasizing the human figure.

AR 365 04(0-8-0)
Printmaking II.
F.S. Prerequisite: AR 136. Special fee. $50. Preparation. processing. and printing techniques in stone and metal plate lithography.

AR 366 04(0-8-0)
Printmaking III.
F, S. Prerequisite: AR 365. Special fee. $50. Advanced intaglio. relief. pianographic. and stencil processes in the workshop; continued emphasis on individual creative growth.

AR 371 04(0-8-0)
Sculpture II.
F. Prerequisite: AR 270. Special fee. $40. Welding and other sculptural processes emphasizing assemblage techniques.

AR 372 04(0-8-0)
Sculpture III.
S. Prerequisite: AR 270. Special fee. $20. Carving in various materials emphasizing wood and stone.

AR 373 04(0-8-0)
Sculpture IV.
S. Prerequisite: AR 270. Special fee. $45. Casting in metal.

AR 384 Var (1-4)
Supervised College Teaching.
F.S. Maximum of 10 credits allowed in course. Supervised assistance in instruction.

AR 405 03(0-6-0)
Paper Making III.

F.S. SS. Prerequisite: AR 305. Special fee. $55. Further use of paper as a media for personal expression; emphasis on controlled serial editions.

°AR 410 03(3-0-0)
Greek Art.
F. Prerequisite: AR 110. Aegean and Greek architecture, painting. and sculpture.

***AR 411 03(3-0-0)**
History of Medieval Art.
F. Early Christian. Byzantine. Islamic. Romanesque. and Gothic visual art forms.

***AR 412 03(3-0-0)**
History of Renaissance Art.
F. Architecture. sculpture. painting. and minor arts, 1300 to 1600.

***AR 414 03(3-0-0)**
History of Baroque and Rococo Art.
S. 17th- and 18th-century European styles in architecture. painting. and sculpture and other *art* forms from Mannerism to neoclassicism.

°A R 415 03(3-0-0)
History of 19th-Century European Art.
F. Prerequisite: AR 111. Architecture. sculpture. painting. and other arts in Europe. 1780 to 1900.

°AR 416 03(3-0-0)
History of 20th-Century European Art.
S. Prerequisite: AR 212. Architecture. sculpture. painting. and other arts in Europe. 1900 to present.

°AR 417 03(3-0-0)
Roman Art.
S. Prerequisite: AR 110. Roman sculpture. painting. and architecture.

AR 419 03(3-0-0)
Historiography and Methodology of Art History.
S. Prerequisite: Written consent of instructor. Historiography/methodology/research methods in art history.

AR 430 04(0-8-0)
Advanced Photo Image Making I.
F, S. Prerequisite: AR 331. Special fee. $35. Advanced problems in use of photo image making as an art medium.

AR 43104(0-8-0)
Advanced Photo Image Making II.
F.S. Prerequisite: AR 430. Special fee. $35. Studio course to refine individual directions and professional goals in photography as an art medium.

AR 435 03(0-6-0)
Dawing Workshop IV.
F.S. Prerequisite: AR 336. Special fee. $35. Further definition of philosophical and aristic direction.

AR 436 03(0-6.0)
Drawing Workshop V.
F.S. Prerequisite: AR 435. Special fee. $35. Capstone course leading to a unified body of finished drawings.

AR 440 04(0-8-0)
Pottery IV.
F. Prerequisite: AR 341. Special fee. $50. Advanced individual research in pottery form and expression; supportive technology; expression in contemporary American pottery.

AR 44104(0-8-0)
Pottery V.

S. Prerequisite: AR 440. Special fee. $50. Advanced individual research in pottery form and expression of personal subject matter; supportive technology.

AR 445 04(0-0-0)
Metalsmithing and Jewelry IV.
F.S. Prerequisite: AR 346. Special fee. $35. Chasing and repousse techniques in two- and three-dimension; inlay. engraving, and etching techniques.

AR 446 04(0-8-0)
Metalsmithing and Jewelry V.
F. S. Prerequisite: AR 445. Special fee. $35. Advanced techniques: granulation. electroforming. photoetching. makume. niello; ferrous metals techniques.

AR 450 04(0-8-0)
Fibers IV.
F. Prerequisite: AR 350. AR 352. Maximum of 8 credits allowed in course. Special fee. $25. Advanced studio problems in expressive use of fibers and fabric.

AR 45104(0-8-0)
Fibers V.
S. Prerequisite: AR 351 or AR 450. Maximum of 8 credits allowed in course. Special fee. $25. Advanced individual research in the expressive use of fibers and fabric.

AR 455 04(0-8-0)
Packaging and Advanced Advertising Design.
F. Prerequisite: AR 160. AR 170. AR 255. Maximum of 8 credits allowed in course. Special fee. $5. Projects for special products and services emphasizing two- and three-dimensional solutions.

AR 456 04(0-8-0)
Advanced Illustration.
S. Prerequisite: AR 356. Maximum of 8 credits allowed in course. Special fee. $5. Projects in editorial and reportorial illustration emphasizing techniques applied to solving problems in advanced composition.

AR 460 04(0-8-0)
Advanced Painting I.
F. Prerequisite: AR 36(). AR 361. Maximum of 8 credits allowed in course. Advanced composition and exploration of individual creative expression.

AR 46104(0-8-0)
Advanced Painting II.
S. Prerequisite: AR 460. Maximum of 8 credits allowed in course. Continuation in direction of individual creative expression.

AR 465 04(0-8-0)
Printmaking IV.
F, S. Prerequisite: AR 366. Special tee, $50. Advanced printmaking workshop; intaglio. relief. pianographic. and stencil; continued emphasis on individual creative growth.

AR 466 04(0-8-0)
Printmaking V.
F.S. Prerequisite: AR 465. Maximum of 8 credits allowed in course. Special fee, $50. Advanced printmaking concepts in studio and research problems.

AR 470 04(0-8-0)
Sculpture V.
F.S. Prerequisite: Eleven credits in sculpture. Maximum of 12 credits allowed in course. Special fee. $40. Advanced problems in sculpture.

AR 492A-B 03(0-0-3)
Seminar.
B) Corequisite: AR 326. A) Art history. B) Art education.

#AR 495A-L Var. (1-4)

Independent Study.
Prerequisite: K) AR 330. Maximum of 8 credits allowed per subtopic. A) Painting B) Printmaking. Special fee. $36. C) Sculpture. Special fee. $10 per credit. D) Fibers. Special variable ($8-$25) fee determined by department. E) Metalsmithing and jewelry. Special fee. $12 per credit. F) Drawing. G)Graphic design. H) Art history. 1) Art education. J) Pottery. Special fee. $20 per credit. K) Photo image making. Special fee. $5 per credit. L) Papermaking. Special fee. $55.

#AR 496A-L Var (1-4)
Group Study.
Maximum of 8 credits allowed per subtopic. A) Painting. B) Printmaking. Special fee. $36. C) Sculpture. Special lee. $10 per credit. D) Fibers. Special variable ($8-$25) fee determined by department. E) Metalsmithing and jewelry. Special fee. $12 per credit. F) Drawing. G) Graphic design. H) *Art* history. 1) Art education. J) PotteD,. Special fee, $20 per credit. K) Photo image making. Special fee. $28. L) Papermaking. Special fee. 555.

AR 510A-P 03(3-0-0)
Advanced Study in Art History.
F. Prerequisite: Written consent of instructor. A) American art. B) African art. C) Pre-Columbian art. E) Contemporary' American art. F) Greek art. G) Medieval art. H) Renaissance art. 1) Baroque and rococo art. J) 19th-century European art. K) 20th-century European art. L) Native American art. M) Roman art. N) Graphic design. O) Women *in* art. P) Pacific art.

#AR 575A-G Var (1-15).
Studio Problems.
F. S, SS. A) Painting. B) Printmaking. Special variable ($45-$60) fee determined by department. C) Sculpture. Special fee. $10 per credit. D) Fibers. Special variable ($8-$25) fee determined by department. E) Metalsmithing and jewelry. Special fee. $12 per credit. F) Drawing. G) Graphic design.

AR 592 03(0-0-3)
Art History Seminar.
Prerequisite: Twenty-one credits of art history.

#AR 675A-G Var (1-15)
Studio Problems.
F.S. SS. Prerequisite: Ten credits of AR 575 in one concentration. A) Painting. B) Printmaking. Special variable ($45-$60) fee determined by department. C) Sculpture. Special fee. $10 per credit. D) Fibers. Special variable $18-$25) fee determined by department. E) Metalsmithing and jewelry. Special fee. $12 per credit. F) Drawing. G) Graphic design.

AR 684 Var.
Supervised College Teaching.
F, S. SS.

#AR 695A-H Var.
Independent Study.
A) Painting. B)Printmaking. C) Sculpture. Special fee. $10 per credit. D) Fibers. Special variable (558-$25) fee determined by department. E) Metalsmithing and jewelry. Special fee. $12 per credit. F) Drawing. G) Graphic design. H) Art history.

#AR 699A-G Var.
Thesis.
Prerequisite: Twelve credits in studio area of concentration. A) Painting. B) Printmaking. Special fee. $36. C) Sculpture. Special lee. $10 per credit. D) Fibers. Special variable ($8-$25) fee determined by department. E) Metalsmithing and jewelry. Special fee. $12 per credit. F) Drawing. G)Graphic design.

AEROSPACE STUDIES COURSES

Office of Provost/Academic Vice President

AS 101 01(1-2-0)
Aerospace Studies.
F. Organizational structure and missions of Air Force commands; emphasis on officership. professionalism. and communicative skills.

AS 102 01(1-2-0)
Aerospace Studies.
S. Organizational structure and missions of U.S. defense services; emphasis on defense policy and geopolitics.

AS 201 01 (1-2-0)
Aerospace Studies.
F. History' of the development of air power and air doctrine from balloons to end of World War II emphasizing role of air power in World War I and II.

AS 202 01 (1-2-0)
Aerospace Studies.
S. History of air power from World War II to present examining role of air power in Berlin Airlift, Korean Wax. Mideast, and Vietnam War.

AS 250 03(2-2-0)
Aerospace Studies.
F.S. Ground school instruction in principles of flight, weather. navigation. radio communications, flight planning, emergency procedures. FAA regulations.

AS 301 03(3-2-0)
Aerospace Studies.
F. Integrated management emphasizing total quality management (TQM) in Air Force environment; leadership. management fundamentals, and communicative skills.

AS 302 03(3-2-0)
Aerospace Studies.
S. Leadership emphasizing strategy and tactics in a quality Air Force environment for developing professional junior officers.

AS 401 03(3-2-0)
Aerospace Studies.
F. Evolution and formulation of U.S. defense policy and strategy. methods for managing conflict. alliances. arms control. terrorism. regional security.

AS 402 03(3-2-0)
Aerospace Studies.
S. Officership. military ethics. joint doctrine. Air Force roles and missions. military law. current issues, and emphasis on communicative skills.

ATMOSPHERIC SCIENCE COURSES

Atmospheric Science Department College of Engineering

AT 150 02(2-0-0)
Science of Weather and Climate.
F.S. Prerequisite: High school algebra; high school chemistry or physics. Basic principles governing weather and climate. Contemporary topics including global warming, ozone hole. acid rain.

AT 151 01(0-3-0)
Weather and Climate Laboratory.
F.S. Prerequisite: AT 150 or concurrent registration. Practical methods used 10 analyze weather and climate data; specific meteorological events.

AT 300 02(2-11-0)
Climate of Colorado.
S. Fundamentals of climate and climate changes; seasonal and regional Colorado climate regimes; types and availability of climate information.

AT 350 02(2-11-0)
Introduction to Weather and Climate.
F.S. Behavior of atmosphere and its influence upon man' s activities.

AT 351 01 (0-3)
Introduction to Weather and Climate Laboratory.
F.S. Prerequisite: AT 350 or concurrent registration. Actual weather data. visualization of meteorological phenomena. in-depth discussion of current environmental issues.

AT 440 02(2-0-0)
Meteorology.
F. Prerequisite: M 255, PH 122. Atmospheric processes; application to agriculture, engineering, and forestry.

AT 492 Var.
Seminar.

AT 495 Var.
Independent Study.

AT 540 03(I -6-0)
Dally Weather Laboratory I.
F. Corequisite: AT 440 or AT 601. Synoptic analysis; cyclones, anticyclones, fronts. associated weather; long waves in the westerlies; upper troughs, ridges. basic currents; weather phenomena.

AT 541 01(0-3-0)
Daily Weather Laboratory II.
S. Prerequisite: AT 540. Synoptic computation of cyclone and anticyclone movement. circulation. and intensity changes; mesoscale weather phenomena; precipitation processes.

AT 555 03(3-0-0)
Air Pollution.
S. Prerequisite: C 114, M 261 or M 340, PH 122 or PH 142. Nature, ambient concentrations, sources, sinks, and physiological activities of pollutants; meteorology; legislation; social and economic factors.

AT 560 02(1-3-0)
Air Pollution Measurement.
SS. Prerequisite: C 114., Measurements of pollutant concentrations and comparison with theoretical air pollution dispersion models.

AT 601 02(2-0-0)

Atmospheric Dynamics I.
F, Prerequisite: M 261, M 531. Momentum, continuity equations; circulation, vorticity, thermodynamics; boundary layer; synoptic scale motions in mid latitudes,

AT 602 02(2-0-0)
Atmospheric Dynamics II.
S, Prerequisite: AT 601. Sound waves. gravity waves, Rossby waves; numerical weather prediction; baroclinic instability; general circulation; tropical dynamics.

°AT 604 02(2-0-0)
Atmospheric Modeling.
F, Prerequisite: AT 602 or written consent of instructor, Design and applications of atmospheric, numerical models to current problems. Spectral models and physical parameterizations.

AT 605 02(2-0-0)
Atmospheric Circulation.
S. Corequisite: AT 602. General circulation theory, transports. energetics. cyclones, jetstreams.

AT 606 02(2-0-0)
Climatology.
S. Prerequisite: ST 301. Climatic controls; distribution. analysis of climatic parameters of surface and in atmosphere; climate classification; hydrologic cycle; climate change.

***AT* 620 03(3-0-0)**
Thermodynamics and Cloud Physics.
F, Prerequisite: M 340, PH 142. Equilibrium thermodynamics, cloud microphysics. cloud dynamics, precipitation formation, and cloud electrification.

***AT 621 02(2-0-0)**
Atmospheric Chemistry.
F. Prerequisite: C 114. M 340. PH 142. Overview of chemical kinetics and equilibria; sources and sinks of pollutants; photochemistry and smog formation; aqueous-phase chemistry; acid rain.

AT 622 02(2-0-0)
Atmospheric Radiation.
S, Prerequisite: AT 620, concurrent registration in AT 602. Terrestrial, solar radiation propagation in the atmosphere; radiative components in energy budgets, weather systems, climate studies; remote sensing.

AT 623 02(2-0-0)
Atmospheric Boundary Layer.
S, Prerequisite: AT 601. Equations for shallow atmospheric motions; thermal instability of a fluid layer; atmospheric turbulence; flow stability; I -D mixed layer models.

AT 650 02(2-0-0)
Measurement Systems and Theory.
F. Prerequisite: PH 142. ST 301. Surface and upper air measurement systems; theory and system response. sensor design; automated data collection, analysis and display systems.

°AT 652 02(2-0-0)
Atmospheric Remote Sensing.
F. Prerequisite: AT 622 or written consent of instructor. Concepts of electromagnetic and acoustic wave propagation; active and passive remote sensing techniques including radar, lidar, thermal emission systems.

AT 655 02(1-24)
Meteorological Analysis and Forecasting.
S. Prerequisite: AT 602. AT 620. Analysis of formation. maintenance of synoptic weather systems. Application of basic dynamic. energetic principles to forecasting.

AT 695 Var.
Independent Study.

AT 699A-Q Var.

Thesis.
A) Atmospheric dynamics. C) Climatology. D) Cloud physics. F) Tropical meteorology. G) General circulation. H) Meteorological instruments. I) Atmospheric chemistry. 1) Atmospheric radiation. K) Dynamic meteorology. L) Satellite applications. M) Mesoscale meteorology. N) Dynamics of clouds. O) Mesoscale modeling. P) Radiation theory. Q) Radar meteorology.

***AT 703 02(2-0-0)**
Numerical Weather Prediction.
F. Prerequisite: AT 602, Quasi-geostrophic approximation; barotropic, baroclinic, *primi*tive equation, and general circulation models; numerical methods,

°AT 704 02(2-0-0)
Planetary Circulations.
S. Prerequisite: AT 602. Quasi-static, quasi-geostrophie equations; planetary waves; geostrophic adjustment; barotropic, baroclinic instability; frontogenesis; tropical cyclones.

***AT *707* 03(2-0-1)**
Atmospheric Waves.
S, Prerequisite: AT 605. Atmospheric wave motions; horizontal and vertical structure; scaling; atmospheric tides; wave instabilities; wave/mean flow interaction.

***AT 710 03(3-0-0)**
Geophysical Vortices.
F. Prerequisite: AT 623. Dynamical, thermodynamical structure of geophysical vortices: dust devils, waterspouts, tornadoes, hurricanes, cyclones. Laboratory, numerical models.

***AT 71102(2-0-0)**
Micrometeorology.
F. Prerequisite: AT 623. Laminar and turbulent flow; momentum, heat, and water vapor transports near the surface; radiation, evaporation, and diffusion in boundary layer.

°AT 712 03(3-0-0)
Dynamics of Clouds.
S. Prerequisite: AT 623. General theory of cloud dynamics; parameterization of micro-physics and radiation; models of fog, stratocumuli, cumulonimbi, and orographic clouds.

°AT 721 03(3-0-0)
Theoretical Topics in Radiative Transfer.
F. Prerequisite: AT 622, Physics of atmospheric radiation; theoretical techniques used to show radiation transfer equation.

°AT 722 03(2-0-1)
Atmospheric Radiation and Energetics.
S Prerequisite: AT 622. Radiative transfer in the atmosphere: implications on remote sensing and energetics,

°AT 724 02(2-0-0)
Cloud Microphysics.
S. Prerequisite: AT 621. Theories and observations of nuclearion; cloud droplet spectra broadening; precipitation growth and breakup; ice multiplication; cloud electrification.

***AT 730 03(3-0-03.**
Mesoscale Modeling.
F. Prerequisite: AT 602, AT 623. Development of basic equations used in mesoscale models and methodology of solution.

°AT 735 03(3-0-03.
Mesoscale Dynamics.
S. Prerequisite: AT 602. Analysis of physical and dynamical processes that initiate. maintain, and modulate atmospheric mesoscale phenomena.

***AT 737 03(3-0-0)**
Satellite Observation of Atmosphere and Earth.

S. Prerequisite: AT 622. AT 6.50. Satellite measurements: basic orbits and observing systems; applications of remote probing and imaging to investigations of atmospheric processes.

°AT 741 0313-0-0)
Radar Meteorology.
S. Prerequisite: AT 652 or written consent of instructor. Radar systems: radar equation and applications: multiple Dop-pier observation and processing: radar studies of mesoscale systems.

°AT 742 03(2-2-0)
Tropical Atmosphere.
F. Prerequisite: AT 6A15. AT 623. AT 655. Climatology and general circulation of the tropics; air-sea. cumulus energy. and momentum exchanges; tropical storm dynamics.

***AT 745 03(3-0-0)**
Advanced General Circulation.
S. Prerequisite: AT 602, AT 605. Theories of the atmospheric general circulation. Numerical modeling findings. Index cycles. blocking action. transient rs. standing wave activity.

°AT 752 03(3-0-03.
Weather Modification.
S. Prerequisite: AT 621. Physical basis. technology. potential. and consequences of intentional and inadvertent weather and climate modification.

***AT 753 03(3-0-0)**
Atmospheric Water Resources.
F. Prerequisite: AT 605. AT 606. AT 623. CE 422. ST 301. Hydrologic cycle; moisture transport and air-ground exchange; water budgets of meteorological phenomena; climatology of atmospheric water.

***AT 755 03(3-0-0)**
Theoretical and Applied Climatology.
F. Prerequisite: AT 606. Forcing functions; atmospheric response.
Feedback loops; climatic models. change hypotheses; applications to agriculture, industry. business.

***AT 770 03(3-0-0)**
Physical Oceanography.
F. Prerequisite: AT 602. Properties of sea water and ice; oceanic structure; dynamics of current systems; air-sea interaction; tides.

°AT 772 02(2-0-0)
Aerosol Chemistry.
F. Prerequisite: C 114. M 161. PH 122 or PH 142. Physics and chemistry of atmospheric aerosols including composition. surface properties. size. interaction with radiation sources. sinks.

AT 784 Var.
Supervised College Teaching.
F.S. SS.

AT 786 Var.
Practicum.

AT 795 Var.
Independent Study.

AT 796 Var.
Group Study.

AT 799A-Q Var.
Dissertation.
A) Atmospheric dynamics. B) General meteorology. C) Climatology. D) Cloud physics. F) Tropical meteorology. G) General circulation. H) Meteorological instruments. I) Atmospheric chemistry. J) Atmospheric radiation. K) Dynamic meteorology. L) Satellite applications. M) Mesoscale

meteorology. N) Dynamics of clouds. O) Mesoscale modeling. P) Radiation theory. Q) Radar meteorology.

ANATOMY AND NEUROBIOLOGY COURSES

Anatomy and Neurobiology Department College of Veterinary Medicine and Biomedical Sciences

AY 160 01(1-0-03).
Issues in Veterinary Medicine.
F. Credit not allowed for both AY 160 and MB 192. Veterinary medicine from perspective of its history. current issues. and future directions.

AY 230/PS 230 05(3-4-03).
Animal Anatomy and Physiology.
F. Prerequisite: BY 102. C 107. Credit not allowed for both AY 230 and PS 230. Comparative systemic anatomy and physiology of farm animals.

AY 254/D 254 03(3-0-01).
Biological Aspects of Human Development.
F.S. Prerequisite: Z 101 or Z 110 or BY 102. Credit not allowed for both AY 254 and HD 254. Human embryology. genetics. developmental processes resulting in birth defects. human physical development through the lifespan and aging.

AY 300/PS 300 04(4-0-0)
Principles of Human Anatomy and Physiology.
F.S. SS. Prerequisite: C 133 or C 107 or C 111; BY 102 or Z I 01 or Z 110. Credit not allowed for both AY 300 and PS 300. Anatomy and physiology of mammalian systems with emphasis on humans.

AY 301 05(3-4-03).
Human Gross Anatomy.
F. S, SS. Prerequisite: AY 300/PS 300. Structure and function of the human body including living anatomy. Clinical applications laboratories involve dissection and study of prosected material.

AY 345 03(1-3-1)
Functional Neuroanatomy.
F. Prerequisite: AY 300/PS 300. Structural basis of human nervous system function presented from a systems perspective.

AY 365 03(3-0-0)
Nerve and Muscle-Toxins, Trauma. and Disease.
S. Prerequisite: AY 300/PS 300 or BY 310. Understanding cellular and molecular basis of nerve and muscle activities in health and disease.

AY 384 Var (1-51).
Supervised College Teaching.
F.S. SS. Maximum of 10 credits allowed in course.

AY 400-04(3-3-03).
Microscopy of Animal Ceils and Tissues.
F. Prerequisite: BY 103A and B or Z 110. and C 245 or BY 310. Analysis of animal cells. tissues. and organs emphasizing light microscopy: reference to ultrastructural details.

AY 401 03(3-0-0)
Animal cell Ultrastructure.
S. Prerequisite: AY 300/PS 300 or AY 400 BY 310. Ultrastructure and function of animal cells: emphasis on organelle structure and function in mammalian tissues.

AY 404 02(1-3-0)
Biological Preparation for Light Micros-copy.
S. Prerequisite: BY 310 or concurrent registration in AY 400. Traditional and contemporary techniques for preparation of tissues for light microscopy.

AY 445 03(3-0-0)

The Human Brain and Its Disorders.
F. Prerequisite: AY 345 or BY 310. Principles of neuroscience; application to disorders of the human nervous system.

AY 475 04(0-8-0)
Human Anatomy Dissection.
F.S. SS. Prerequisite: AY 301 and written consent of instructor. Regional approach to gross human anatomy and laboratory dissection of human cadaver.
AY 495 Var. Independent Study.

AY 520/PS 520 05(3-4-0)
Principles of Neural Science.
S. Prerequisite: AY 300/PS 300. Credit not allowed for both AY 520 and PS 520. Neuroanatomy and neurophysiology,

AY 550 02(1-3-0)
Transmission Electron Microscopy.
F. Prerequisite: PH 110. For biologists and materials scientists. Special fee. $70. Electron optics. electron beam/specimen interaction. chemical fixation. equipment operation, and image interpretation.

AY 552 02(1-3-0)
Introduction to Scanning EM.
F.S. Prerequisite: Any 100-level physics course. Special fee, $70. Theory and operation of scanning electron microscopes: secondary and backscatter imaging: detector systems: digital image analyses.

AY 619 06(0-15-1)
Advanced Human Gross Anatomy.
S. Prerequisite: Written consent of instructor. Advanced dissection of the human body; emphasis on clinical applications,

AY 672A-C.
Advanced Topics in Electron Microanalysis.
A) Freeze fracture 02(1-3-0) *SS.* Prerequisite: AY 550. Special fee, $76. B) X-ray microanalysis 01 (0-3-0) SS, Prerequisite: AY 552. C) STEM and EM cytochemistry Of (0-3-0) S. Prerequisite: AY 550 or AY 552.

AY 692 01(0-0-1)
Seminar-Classics In Neurosciences.
Prerequisite: Admission to graduate program or written consent of instructor. Review of classic papers in the neurosciences.

AY 695A-F Var.
Independent Study.
A) Developmental anatomy. B) Microscopic anatomy. C) Neuroanatomy. D) Radiographic anatomy. E) Surgical anatomy. F) Gross anatomy.

AY 696 Var 11-3)
Group Study in Neurosciences.
Current topics in neuroscience; how to evaluate scientific presentations,

AY 699 Var.
Thesis.

AY 784 Var.
Supervised College Teaching.
F, S,

SS. AY 792 01(0-0-1)
Seminar.

AY 799 Var.
Dissertation.

BOTANY COURSES

Biology Department College of Natural Sciences

B 104 03(3-0-0)
Basic Concepts of Plant Life.
F, S. For nonscience and physical science majors. Credit not allowed for students who have already taken B 120 or BY 102 or BY 103A and B. Broad concepts of biology with major emphasis on plant life,

B 105 01(0-2-0)
Basic Concepts of Plant Life Laboratory.
F, S. Prerequisite: B 104 or concurrent registration, Modern biology exercises including viruses, Mortera, Protista, fungi, plants, genetics, physiology, and ecology.

B 120 04(3-2-0)
Principles of Plant Biology.
F.S. Diversity of relationships of plants and their structural and functional characteristics.

B 223 03(2-2-0)
Plant Identification.
F.S. Prerequisite: B 120 or BY 103B. Relationships and identification of flowering plants.

B 250 03(3-0-0)
Economic Biology.
F. Prerequisite: B 120. Z 110; or BY 103A and B. Plants and animals of economic importance to mankind.

°B 302 03(2-2-0)
Poisonous Plants.
F. Prerequisite: B 120 or BY 103B. Identification and toxic properties of certain plants; animal reactions to more important ones.

***B 321 03(1-4-0)**
Aquatic Vascular Plants.
F. Prerequisite: B 223 or B 325 or written consent of instructor. Taxonomic relationships and identification of aquatic vascular plants.

***B 325 03(2-:2-0)**
Plant Systematics.
S. Prerequisite: B 120 or BY 103B. Modern systematics emphasizing application and evolutionary relationships among plants.

B 33104(2-4-0)
Plant Anatomy.
F. Prerequisite: B 120 or BY 103B. Structure of plant cells. tissues. and organs.

°B 332 04(3-2-0)
Introductory Phycology.
F. Prerequisite: B 120 or BY 102 or BY 103B. Morphology. ultrastructure. physiology. ecology. and phylogeny of freshwater and marine algae.

B 333 04(24-0)
Introductory Mycology.
F. Prerequisite: B 120 or BY 103B or written consent of instructor. Groups of fungi including classification. 'structure. morphogenesis. phylogeny. and genetics and reproduction.

***B 338 04(2-4-0)**
Comparative Morphology of Vascular Plants.
S. Prerequisite: B 120 or BY 103B. Origin. evolution. structure. and reproduction of the vascular plants. including comparative study of organs occurring in each group.

B 350/Z 350 03(3-0-0)

Molecular and General Genetics.
S. Prerequisite: BY 202; concurrent registration in organic chemistry. Credit not allowed for both B 350 and Z 350. Primarily for students in biological sciences. Mendelian genetics, molecular genetics, and population genetics. emphasizing molecular basis of genetics.

B 355 03(3-0-0)
Ecology of Landscapes.
S. Prerequisite: Three credits of biology. Principles and techniques necessary to describe and interpret natural and man-modified landscapes.

B 384 Var. (1-5)
Supervised College Teaching.
F, S. Maximum of 10 credits allowed in course.

B 402/Z 402 03(3-0-0)
Chromosomes of Eukaryotes.
S. Prerequisite: BY 310. Credit not allowed for both B 402 and Z 402. Structure. Function. and behavior of normal eukaryotic chromosomes during interphase. mitosis. and meiosis.

B 421 03(1-4-0)
Grass Systematics.
S. Prerequisite: B 223 or B 325 or written consent of instructor. Systematic relationships and identification of grasses and grass-like plants.

B 440 03(3-0-0)
Plant Physiology.
F, S. Prerequisite: B 120 or BY 103B; C 245 or concurrent registration. Functions and activities of plants.

B 441 02(0-2-1)
Plant Physiology Laboratory.
F.S. Prerequisite: B 440 or concurrent registration. Laboratory applications of plant physiology principles.

°B 445 03(2-2-0)
Physiology of Plant Growth and Development.
S. Prerequisite: B 440. Nature and physiological mechanisms of plant growth.

°B 446 02(2-0-0)
Physiology of Seeds.
F. Prerequisite: B 440. Effects of environmental factors on germination. dormancy. and longevity of .seeds.

B ,150 04(3-2-0)
Plant Ecology.
F. Prerequisite: B 223 or B 325. Relation of plants to their environment.

B ,195 Var. (1-3)
Independent Study.
Maximum of 7 credits allowed in course.

B 530 02(2-0-0)
Ecological Plant Morphology.
S. Prerequisite: One course in ecology. written consent of instructor. Adaptive significance and evolution of plant form and structure.

B 533 02(0-4-0)
Botanical Microtechnique.
F. Prerequisite: B 331. Practice in preparation of microscope slides.

***B 536 03(2-2-0)**
Topics In Mycology.
S. Prerequisite: B 333. Features common to all fungi; trends in structure. Function, and behavior.

B 540 02(2-0-0)
Translocation in Plants.
S. Prerequisite: B 331. B 440. Transport of sugars. organic and inorganic ions. water. and hormones across membranes and through vascular systems of plants.

***B 545/A 545 02(2-0-0)**
Plant Tissue Culture.
F. Prerequisite: B 440. Credit not allowed for both B 545 and A 545. Theory. technology. and techniques of cell. organ. tissue. and protoplast culture of plants.

***B 546/A 546 01(0-2-0)**
Plant Tissue Culture Laboratory.
F. Prerequisite: B 545/A 545 or concurrent registration. Credit not allowed for both B 546 and A 546. Laboratory techniques of cell. organ. tissue. and protoplast culture of plants.

°B 550 03(2-2-0)
Research Methods In Plant Ecology.
S. Prerequisite: B 450. Quantitative analysis of plant communities.

***B 551 03(3-0-0)**
Plant Geography.
S. Prerequisite: B 450. Floristic and ecological principles of plant geography.

***B 555 03(3-0-0)**
Reproductive Biology of Higher Plants.

F. Prerequisite: B 223 or B 325 or written consent of instructor. *B 642 03(3-0-0)
Plant Metabolism.
F. Prerequisite: B 440. B 351. Biosynthesis and transformations of important plant metabolites.

B684 Var.
Supervised College Teaching.
F.S.

B695 Var (1-3)
Independent Study.

B698 Var.
Research.

B699 Var.
Thesis.

B792 01(0-0-1)
Seminar.

B795 Var (1-31.
Independent Study.

B798 Var.
Research.

B799 Var.
Dissertation.

BUSINESS ACCOUNTING COURSES

Accounting and Taxation Department College of Business

BA 210 03(3-0-0)
Financial Accounting.
F.S. SS. Principles and procedures for preparation and use of accounting information.

BA 215 02(2-0-0)
Topics In Accounting.
F.S. SS. For transfer students who need to complete the accounting sequence.

BA 220 03(3-0-0)
Managerial Accounting Concepts.
F.S. Prerequisite: BA 210. Managerial use of accounting for planning and controlling business operations.

BA 311 03(3-0-0)
Intermediate Accounting I.V.S. Prerequisite: BA 220.
Asset and liability accounting.

BA 312 03(3-0-0)
Intermediate Accounting II.
F.S. Prerequisite: BA 311. Equity structure of corporations; analysis and interpretation of accounting data.

BA 321 03(3-0-0)
Cost Accounting.
F.S. Prerequisite: BA 220. Utilizing budgetary and cost accounting information for planning and controlling business operations; process cost. joint-products. and by-products.

BA 350 03(3-0-0)
Accounting Information Systems.
F.S. Prerequisite: BA 311. BA 321. BD 140. BD 141. Accounting system: its support of financial and managerial information needs of the firm. Computer environment is emphasized.

BA 370 03(3-0-0)
Governmental and Nonprofit Accounting.
F. Prerequisite: BA 311. Accounting for governmental and other nonprofit entities.

BA 41103(3-0-0)
Advanced Accounting.
F.S. Prerequisite: BA 312. Accounting for branches and subsidiaries. partnerships. and business combinations.

BA 421 03(3-0-0)
Advanced Cost Accounting.
S. Prerequisite: BA 321. Cost systems and analysis emphasizing information for planning and control.

BA 430 03(3-0-0)
Income Tax.
F.S. Prerequisite: BA 210. Basic structure of federal income tax law; impact of taxes on decision making; social security taxes.

BA 431 03(3-0-0)
Advanced Income Tax.
S. Prerequisite: BA 430. Federal taxation of corporations. partnerships. estates. gifts, and trusts.

BA 44103(3-0-0)
Auditing.

F.S. Prerequisite: BA 312. BA 350. Principles and techniques applied in examining financial statements and verifying underlying data.

BA 487 Var.
Internship.
Supervised work experience in public. industry. or governmental accounting.

BA 495 Var.
Independent Study.

BA 496 Var.
Group Study.

BA 500 03(3-0-0)
Accounting Concepts.
F. Prerequisite: EC 102. Credit not allowed toward any degree in business. Basic concepts. techniques, and terminology of accounting.

BA 592 02(0-0-2)
Seminar.
Prerequisite: BA 312.

BA 600 03(3-0-0)
Managerial Accounting.
S. Prerequisite: BA 500 or BA 210. Accounting concepts and reports related to management objectives.

BA 611 04(4-0-0)
Financial Measurement and Reporting.
S. Prerequisite: BA 220 or BA 500. Theory and standards for measurement and reporting of income. Financial position. cash flows and equity. as well as related disclosure.

BA 612 03(3-0-0)
Contemporary Financial Accounting Issues.
S. Prerequisite: BA 312. Historical development of accounting: controversial issues involved in calculations and disclosure of enterprise periodic income.

BA 622 03(3-0-0)
Cost-Based Decision Making.
S. Prerequisite: BA 321 or BA 600. Contributions of cost accounting to decision making and planning.

BA 630 03(2-2-0)
Tax Research.
F. Prerequisite: BA 430. Research aspects of professional tax practices; case materials.

BA 631 03(3-0-0)
Corporate Taxation.
F. Prerequisite: BA 430. Federal income tax principles and.problems pertaining to corporations.

BA 632 03(3-0-0)
F,state and Gift Tax Laws.
S. Prerequisite: BA 630. Statutory. administrative. and judicial laws.

BA 633 03(3-0-0)
Partnership Taxation.
S. Prerequisite: BA 630. Federal income tax principles and problems pertaining to partnerships.

BA 634 03(3-0-0)
Tax Planning and Procedures.
SS. Prerequisite: BA 630. Administrative. ethical. and legal aspects; procedures in dealing with IRS. Merits. goals. and techniques of tax planning.

BA 640 03(3-0-0)

Professional Ethics and Legal Responsibilities.
SS. Prerequisite: BA 312. BA 321. BA 430. Professional practice of public accounting.

BA 641 03(3-0-0)
Audit Problems.
S. Prerequisite: BA 441. Auditing function including statistical sampling. internal control. computerized systems. Flow charting. report writing. and case studies.

BA 695 Var.
Independent Study.

BA 696 Var.
Group Study.

BA 699 Var.
Thesis.

BIOCHEMISTRY COURSES

Biochemistry, and Molecular Biology Department College of Natural Sciences

BC 103 03(3-0-0)
Cells. Genes. and Molecules.
S. Prerequisite: High school chemistry and biology. Intended for nonscience. majors. Cellular/molecular biology and its social implications.

BC 193 01(0-0-1)
Introductory Seminar.

BC 293 01(0-0-1)
Seminar.
Prerequisite: BC 193 or written consent of instructor.

BC 301 03(3-0-0)
Survey of Biochemistry.
F.S. Prerequisite:C 245. Introduction to chemical processes of living systems emphasizing structure and function of biological molecules.

BC 351 04(4-0-0)
Principles of Biochemistry.
F.S. SS. Prerequisite: C 245 or C 343 or concurrent registration in C 343. For majors in biological sciences. engineering. and preprofessional students in the health sciences.
Structure and function of biological molecules; biocatalysis; metabolism and energy transduction; gene expression.

#BC 352 01 (0-3-0)
Principles of Biochemistry Laboratory..
F. S. Prerequisite: BC 301 or BC 351 or concurrent registration. 2 credits of college chemistry laboratory. Introduction to laboratory techniques in biochemistry.

BC 401 03(3-0-01).
Comprehensive Biochemistry 1.
F. Prerequisite: C 245 or C 343 or concurrent registration in C 343; M 155 or M 160. Macromolecular structure and dynamics; membranes; enzymes; bioenergetics.

BC 403 03(3-0-0)
Comprehensive Biochemistry II .
S. Prerequisite: BC 401. Metabolic regulation; cellular biochemistry; gene structure. replication, and regulation.

#BC 404 02(0-6-0)
Comprehensive Biochemistry Laboratory.
F.S. Prerequisite: BC 401 or concurrent registration; C 246 or C 344. Experimental approaches to studying macromolecules. metabolism. and gene expression.

#BC 406 03(0-6-0)
Investigative Biochemistry.
S. Prerequisite: BC 404; an average grade point of 2.75 for all completed BC lecture and laboratory courses. Advanced biochemical and molecular biological techniques and methods used in cellular biochemistry. protein analyses. and molecular genetics.

BC 461A-E 03(3-0-0)
Special Topics in Biochemistry.
F.S. Prerequisite: BC 351 or BC 403 or concurrent registration. A) Biochemistry of disease. B) Biochemical toxicology. C) Biochemistry of nerves. E) Protein chemistry.

BC 463 04(4-0-0)
Molecular Genetics.

F. Prerequisite: BC 351 or BC 401 or concurrent registration. Molecular basis of gene structure. replication. repair. recombination. and expression.

BC 487 Var.
Internship.
Prerequisite: BC 401. BC 403. BC 404 with minimum GPA of 2.0. written consent of instructor. Work experience with an approved preceptor outside of a university laboratory environment.

BC 493 01(0-0-1)
Seminar.

BC 495 Var.
Independent Study.

BC 503/NB 53 02(2-0-0)
Developmental Neurobiology.
F. Prerequisite: One college-level course in each: biology. biochemistry, physics. calculus. Credit not allowed for both BC 503 and NB 503. Molecular mechanisms of neuronal growth. pathfinding. and synaptogenesis; regulation of neuronal gene expression.

BC 511 03(3-0-0)
Macromolecular Structure and Function.
S. Prerequisite: BC 403. C 471. Structure and properties of macromolecules and their interactions.

BC 513 01(1-0-0)
Enzymology.
S. Prerequisite: BC 403. Kinetic methods. mechanism. and regulation of enzyme catalysis.

BC 515 03(3-0-0)
Gene Expression.
S. Prerequisite: BC 463. Eukaryotic transcription mechanisms with emphasis on methods of study and regulatory mechanisms.

BC 517 02(2-0-0)
Metabolism.
F. Prerequisite: BC 351 or BC 403. Design and regulation of metabolic pathways.

BC 519 03(3-0-0)
Cellular Biochemistry.
F. Prerequisite: BC 351 or BC 403; BY 310. Cellular response to environment including mechanisms of membrane signal transduction. motility. organelle biogenesis. and proliferation.

BC 561 03(3-0-0)
Biomolecular Spectroscopy.
F. Prerequisite: BC 403. C 473. Spectroscopic methods and their application to proteins and nucleic acids.

BC 589 02(1-2-0)
Current Trends In Molecular Biosciences.
SS. Prerequisite: B.S. or B.A. in biology or chemistry: secondary school teaching certification. Biochemical and molecular biological foundations of molecular genetics/genetic engineering; molecular analysis of genes.

BC 660/PS 660 03(3-0-0)
Receptor Biochemistry and Physiology.
S. Prerequisite: PS 500. BC 403; or written consent of instructor. Credit not allowed for both BC 660 and PS 660. Biochemistry and physiology of an array of biological receptors; receptor theory and mathematics; pharmacokinetics; pharmacodynamics.

BC 698 Var.
Research.

BC 699 Var.
Thesis.

BC 784 Var (1-3)
Supervised College Teaching.
F.S.

SS. BC 793 01(0-0-1)
Seminar.

BC 795 Var.
Independent Study.

BC 796 Var (1-5)
Group Study.

BC 798 Var.
Research.

BC 799 Var.
Dissertation.

BUSINESS INFORMATION SYSTEMS COURSES

Computer Information Systems Department College of Business

BD 140 02(2-0-0)
Computers In Business.
F.S. SS. Applications of the computer in business; technology and economics of information systems.

BD 141 01(0-2-0)
Computers In Business Laboratory.
F.S. SS. Corequisite: BD 140. Laboratory exercise in BASIC and commercial application packages.

BD 240 03(3-0-0)
Business Computer Programming.
F. 5. SS, Prerequisite: BD 140. BD 141. Introduction to program design and structured COBOL programming, including table handling. data validation. and sequential file updating.

BD 301 03(3-0-0)
End User Computing.
F.S. SS. Prerequisite: BD 140. BD 141. Introduction to end user hardware/software environment with PC emphasis. including DOS. spreadsheets. and other common end user applications.

BD 305 03(3-0-0)
Hardware and Software Concepts.
F. Prerequisite: BD 240. Concepts of computer hardware. logical computer organization. operating systems and data communications; systems life cycle.

BD 310 03(3-0-0)
Microcomputer-Based Systems.
F. Prerequisite: BD 305 or concurrent registration. Microcomputer-based systems. design and implementation. applications networking. issues regarding use.

BD 340 03(3-0-0)
Advanced Business Programming Applications.
S. Prerequisite: BD 240. Advanced COBOL applications. Introduction to C with business data structures applications.

BD 345 03(3-0-0)
Job Control Systems.
S. Prerequisite: BD 305. Job control language and operating system concepts on specific business computer systems.

BD 405 03(3-0-0)
Telecommunications.
S. Prerequisite: BD 305. Network components and configurations; common carriers and regulations; protocol and interfaces; system design and management.

BD 445 03(3-0-0)
Business Database Systems.
F. Prerequisite: BD 240. Design and implementation of database management systems; physical, logical database models; database applications; security; database administration.

BD 460 03(3-0-0)
Systems Analysis and Design.
F. Prerequisite: BD 240. Coverage of structured systems development methodologies. techniques. and tools along with hands-on experience in use of some commercial packages.

BD 462 03(3-0-0)
Systems Development Project.

S. Prerequisite: BD 460. Application of concepts. techniques. and tools used in analysis. design. and implementation of computer-bused information systems in applied setting.

BD 407 Var.
Internship.
Supervised and planned work experience paralleling concentration in industry.

BD 492 03(3-0-0)
Seminar.
Current topics in computer-based information systems.

BD 495 Var.
Independent Study.

BD 496A-E Var.
Group Study.
A) Functional business applications. B) Small business information systems. C) Communications and distributed systems. D) Information systems performance measurement.
E) Current issues in business computing systems.

BD 500 03(3-0-0)
Computer Information Systems.
F. Credit not allowed toward any degree in business. Applications of computers in profit and not-for-profit sectors; introduction to information systems; BASIC programming; software packages.

BD 56$all 565 03(2-3-0)
Computer-Integrated Manufacturing Systems.
F. Prerequisite: BL 300 or BL 500. Credit not allowed for both BD 565 and BL 565. Global and competitiveness reasons for CIMs. CIM architecture, CAD/CAM. database considerations. MRP II, JIT. TOC. TQM. MAP/TOP.

BD 600 03(3-0-0)
Computer Applications In Decision Making.
F, S. Prerequisite: BD 500. Procedures to recognize impact of information technology activity and to achieve effective information services management.

BD 605 03(3-0-0)
Business Application Software.
F. Prerequisite: BD 500. Design. construction, and testing of business application systems including leading-edge languages and tools.

BD 606 03(3-0-0)
Application Software Infrastructure.
F. Prerequisite: BD 500. Design. construction, and testing of business application software infrastructure including hardware. operating software. and communications network.

BD 610 03(3-0-0)
Information Systems Planning and Analysis.
F. Prerequisite: BD 500. Procedures and techniques used during planning and analysis phases of systems development.

BD 611 03(3-0-0)
Information Systems Design and Construction.
S. Prerequisite: BD 610. Procedures used in successful design and implementation of an information system,

BD 620 03(3-0-0)
Advanced Information Systems Topics.
F. Prerequisite: BD 500. Current computer-based information systems topics.

BD 655 03(3-0-0)
Business Database Systems.
S. Prerequisite: BD 605. Database analysis. design. administration; data modeling; data sublanguages, query facilities; distributed database systems.

BD 678 03(3-0-0)
Applied Information Systems Research.
S. Prerequisite: BQ 270. Information systems research techniques including multiple regression, time variant techniques. Factor analysis. experimental design. and survey analysis.

BD 692 03(0-0-3)
Information Systems Seminar.
Topics dealing with state-of-the-art. computer-based information systems.

BD 695 Var.
Independent Study.

BD 696 Var.
Group Study.

BD 698 Var.
Research.

BD 699 Var.
Thesis.

BUSINESS FINANCE COURSES

Finance and Real Estate Department College of Business

BF 250 03(3-0-0)
Personal Investments.
F. Investment in securities. insurance. real estate; use of credit in personal investment programs.

BF 300 03(3-0-0)
Principles of Finance.
F.S. SS. Prerequisite: BA 210. *EC* 100. EC 102. Overview of financial markets and institutions. analysis of securities and investigation of financial management techniques.

BF 311 03(3-0-0)
Investments-Fixed Income Securities.
F.S. SS. Prerequisite: BF 300. Analysis of money market and long-term debt instruments. Coverage includes corporate, government. and mortgage-based obligations.

°BY 340 02(2-0-0)
Life Insurance.
S. Life insurance principles involved in managing life insurance programs for individuals and business organizations.

BE 342 03(3-0-0)
Risk Management and Insurance.
F. Prerequisite: BF 300. Management of insurable risks for the individual and business firm.

BF 355 03(3-0-0)
Investments-Equity Securities.
F.S. SS. Prerequisite: BF 300. Analysis of common stock and other equity securities; extensive portfolio management techniques.

BF 360 03(3-0-0)
Real Estate Principles.
F.S. Prerequisite: EC 100. EC 202. Broad survey of real estate emphasizing land use. urban structure and growth, market analysis, real estate finance and valuation. and property rights.

BF 370 03(3-0-0)
Financial Management-Theory and Application.
ES. Prerequisite: BF 300. Theory and application of financial management to business firms; case problems used for illustration.

BF 455 03(3-0-0)
Investments-Derivative Securities.
S. Prerequisite: BF 311. BF 355. Analysis of futures. options. and swap contracts; hedging techniques for investment and financial management.

BF 460 03(3-0-0)
Real Estate Finance and Investment.
F. Prerequisite: BF 300. BF 360. Financing of real estate resources: real estate financial markets. policies; use of leverage and real estate investment analysis in real estate investment programs.

BF 465 03(3-0-0)
Real Estate Appraisal.
S. Prerequisite: BF 360. Various approaches to value as applied to real property; problems in appraising urban and rural property. Preparation of detailed appraisal reports.

BF 470 03(3-0-0)
Management of Financial Institutions.
F. Prerequisite: BF 300. BF 311. Financial management concepts applied to financial intermediaries. Analysis includes deposit. insurance. and investment financial intermediaries.

BF 475 03(3-0-0)
International Business Finance.
F.S. Prerequisite: BF 300. International business financial management emphasizing instruments. policies. and decision strategies.

BF 478 03(0-0-3)
Case Studies in Financial Management.
F. S. Prerequisite: BF 370.
Financial analysis and decision making using advanced case studies of business and some specialized organizations.

BF 487 Var.
Internship.

BF 495 Var.
Independent Study.

BF 496 Var.
Group Study.

BF 500 03(3-0-0)
Financial Environment and Operations.
S. Prerequisite: BA 500. EC 100. EC *102.* Credit not allowed toward any degree in business. Financial management concepts; interrelationships between business firms. Financial institutions. and money and capital markets.

BF 600 03(3-0-0)
Financial Management-Theory and Case Studies.
F. Prerequisite: BF 300 or BF 500. Financial problems for various types of business organizations.

BF 610 03(3-0-0)
Financial Markets.
S. Prerequisite: BF 300 or BF 500. Analysis of money and capital markets and their relevance for the business decision-making process.

BF 655 03(3-0-0)
Investments.
F. Prerequisite: BF 300 or BF 500. Investment analysis and decision making: investment instruments and investment process.

BF 660 03(3-0-0)
Land Development Decisions.
S. Prerequisite: BF 360 or written consent of instructor. Impact on long-run environmental development and change; decisions relating to public. private problems.

BF 675 03(3-0-0)
International Finance.
F. Prerequisite: BF 500. International business financial management emphasizing instruments. policies. and decision strategies.

BF 678 03(3-0-0)
Financial Decisions-Theory and Practice.
S. Prerequisite: BF 655. Analysis of theory of corporate finance with emphasis on underlying assumptions and implications for financial decisions.

BF 692 03(0-0-3)
Seminar-Banking and Financial Institutions.
Prerequisite: BF 470. Topics dealing with internal and external decision areas in banks and financial institutions.

BF 695 Var.
Independent Study.

BF 696 Var.
Group Study.

BF 699 Var.
Thesis.

BUSINESS GENERAL COURSES

College of Business

BG 200 03(3-0-0)
Business Communications and Report Writing.
F.S. SS. Prerequisite: BD 142. CO 150. Credit not allowed for both BG 200 and JT 302. Theory and principles of business communication with emphasis on written communication and presentation of reports.

BG 235 02(2-0-0)
Inquiry Into Capitalism.
F. History and writings in development of capitalistic system.

BG 260 03(3-0-0)
Legal Environment of Business.
F. S, SS. Nature of the legal system with special emphasis on its application to business relations through government regulation.

BG 295 Var.
Independent Study.

BG 305 03(3-0-0)
Managerial Economics.
F, S. Prerequisite: EC 102. Credit allowed for only one of the following: BG 305. EA 300, EC 300. Economic principles in managerial decision making including cost, price. demand. market structure. and related analysis emphasizing case studies.

BG 350 03(3-0-0)
Travel Abroad-International Comparative Management.
SS. Prerequisite: Six credits of business courses. Travel tour of European business to compare and contrast their business strategies to those of U.S. Firms.

BG 367 02(2-0-0)
Real Estate Law.
S. Prerequisite: BG 260 or HR 410. Legal principles applicable to ownership. transfer, use, and regulation of real property.

BG 410 03(3-0-0)
Business Research Methods.
F. Prerequisite: BQ 270. Role and methodology of research in business emphasizing selection of study's direction. collecting data, and choosing techniques for analyzing these data.

BG 420 ***03(3-0-0)***
Entrepreneurship.
S. Prerequisite: Completion of business core courses except BG 479. Entrepreneurs and the entrepreneurial process. Growth of an independent business.

BG 425 03(3-0-0)
Starting and Managing Your Own Business.
F. Prerequisite: Written consent of instructor. Business aspects of starting and managing your own small enterprise.

BG 430 03(3-0-0)
Business and Its Environment.
F, S. Social responsiveness of managers as they face expectations in the firm's internal and external environment.

BG 46103(3-0-0)
Legal Aspects of Commercial Transactions.
F. Prerequisite: BG 260. Legal problems associated with acquiring, disposing, insuring. Financing, and protecting property interests.

BG 462 03(3-0-0)
Legal Aspects of the Management Process.
S. Prerequisite: BG 260. Legal doctrines. laws. and institutions governing management decisions as related to modem business organizations and associations.

BG 479 03(3-0-0)
Business Policy and Administration.
F, S. Prerequisite: Business core courses. An integration of various business subject areas in terms of top-level policy and decision making.

BG 495 Var.
Independent Study.

BG 500 03(3-0-0)
Law of Business and Industry.
F. Prerequisite: EC 102. Credit not allowed toward ;my degree in business. Nature of the legal system emphasizing its application to business relations through government regulation.

BG 605 03(3-0-0)
Managerial Economics.
S. Prerequisite: EC 102, M 141. BQ 270. BA 500. Economic analysis of management decision making involving productivity. cost. demand. price. profit. and volume.

BG 610 03(3-0-0)
Managerial Communication.
S. Prerequisite: BG 200 or CO 301 A or B or C or JT 300 or JT 301. Communication theory applied to written communication; criteria of effective writing.

BG 675 03(3-0-0)
International Business.
S. Prerequisite: Nine credits of business and/or economics. Managerial requirements for understanding and conducting multinational business operations.

BG 678 03(3-0-0)
Business Research.
F. Prerequisite: BQ 270. Techniques for designing, conducting. and evaluating business research.

BG 679 03(3-0-0)
Business Policy.
S. Prerequisite: Ten credits of graduate-level business courses. Formulating and executing top-level business policies.

BG 695 Var.
Independent Study.

BG 699 Var.
Thesis.

BIOTECHNOLOGY COURSES

College of Veterinary Medicine and Biomedical Sciences

BH 306 04(3-2-1))
Bioprocess Engineering.
S. Prerequisite: C 107. C 108 or C 111,C 112;PH 121. Material, energy balances: fluid flow. heat exchange, mass transfer; application to operations in food, fermentation, other bioprocess industries.

BH 450 02(2-0-0).
Topics in Biotechnology.
S. Prerequisite: BC 351. BH 306. MB 436. Developments, trends in biotechnology; products from genetically engineered microorganisms. plant or animal cell cultures; advances in bioengineering.

BH 499 Var (1-3).
Biotechnology Thesis.
Prerequisite: Twelve credits from biotechnology core; approval of program coordinator.

BUSINESS MARKETING COURSES

Marketing Department College of Business

BK 300 03(3-0-0)
Marketing.
F, S. SS. Prerequisite: EC 102. Market and buyer analysis, product and service development, pricing. promotion, advertising, selling, and distribution.

BK 306 03(3-0-0)
Buyer Behavior.
F.S. Prerequisite: BK 300. Credit not allowed for both BK 306 and AM 472. Marketing analysis of buying behavior of individuals, households. businesses, and not-for-profit organizations.

BK 310 03(3-0-0)
Professional Selling.
F, S. Prerequisite: BK 300. Persuasive personal communications in selling consumer and industrial products and services.

BK 320 03(3-0-0)
Advertising.
F, S. Prerequisite: BK 300. Principles and practices of managing advertising activities. Covers all major forms of media.

BK 340 03(3-0-0)
Sales Forecasting.
F. Prerequisite: BQ 270, BK 300. Interpretation and application of forecasting techniques and model building to marketing decision areas.

BK 360 03(3-0-0)
Retailing.
F.S. Prerequisite: BK 300. Retail markets, institutions. operations. and problems.

BK 411 03(2-2-0)
Research Applications.
S. Prerequisite: BG 410. Participation in collecting data and analyzing results of a research project in area of interest.

BK 430 03(3-0-0)
Sales Management.
S. Prerequisite: BK 310. Recruiting, *selecting,* training. compensating, motivating. supervising, and evaluating a sales force.

BK 435 03(3-(l-0)
Marketing to Businesses and Organizations.
F. Prerequisite: BK 300. Market analysis, strategies. and tactics for marketing to businesses, governmental entities, nonprofit units, and other organizations.

BK 450 03(3-0-0)
Transportation and Distribution Systems.
F. 5. Prerequisite: BK 300. Administration and coordination of distribution systems linking product producer with ultimate buyer.

BK 470 03(3-0-0)
International Marketing.
S. Prerequisite: BK 300. Analysis of international markets and development of strategic and tactical options for marketing across national boundaries.

BK 479 03(3-0-0)
Marketing Management.
F.S. Marketing decisions involving integration of elements of the marketing mix.

BK 487 Var.
Internship.
Prerequisite: Marketing majors with written consent of instructor. Maximum of 6 credits allowed in course.

BK 492 03(0-0-3)
Seminar.
Prerequisite: BK 300. written consent of department head.

BK 495 Var (1-5)
Independent Study.
Prerequisite: 2.75 GPA or better.

BK 496 Var (1-3)
Group Study.

BK 500 03(3-0-0)
Marketing Systems.
S. Prerequisite:EC 102. Credit not allowed toward any degree in business. Marketing activities emphasizing pricing. channel selection. promotion. and product evaluation.

BK 575 03(3-0-0)
Promotional Strategy.
S. Prerequisite:Graduate student or BK 320 and 3.0 GPA. Application of principles and strategies of advertising. sales promotion. publicity. and personal selling. Involves development of promotional campaign.

BK 600 03(3-0-0)
Marketing Strategy.
F. Prerequisite: BK 500. Formulating. evaluating. and executing marketing strategies.

BK 610 03(3-0-0)
Demand Analysis and Forecasting.
F. Prerequisite: BQ 270. Development of information for planning and decision making.

BK 635 03(3-0-0)
Business and Government Markets.
S. Prerequisite: BK 500. Market analysis. planning. and decision making in marketing to business. governments. and other organizations.

BK 679 03(3-0-0)
Marketing Management.
S. Prerequisite: BK 60). Market decisions and implementation of marketing strategy.

BK 692 03(0-0-3)
Seminar.
Prerequisite: BK 500. Critical review and discussion of relevant marketing topics.

BK 695 Var (I-3)
Independent Study.
Prerequisite: 3.25 GPA or better.

BK 696 Var.
Group Study.

BK 699 Var.
Thesis.

BUSINESS PRODUCTION AND OPERATIONS MANAGEMENT COURSES

Management Department College of Business

BL 300 03(3-0-0)
Production Fundamentals.
F.S. SS. Prerequisite: BQ 270. Design. operation. analysis. and control of producing systems emphasizing decision making.

BL 420 03(3-0-0)
Macro Issues in Production Management.
S. Prerequisite: BD 301. BL 300. BQ 375. Macro issues in production planning and scheduling: forecasting. aggregate planning. project scheduling. and associated managerial decisions.

BL 47103(3-0-0)
Production Scheduling and Inventory Management.
F, S. Prerequisite: BL 300. Micro applications of scheduling strategies and inventory management applied in day-to-day operations and material management; MRP II systems. *

BL 475 03(3-0-0)
Managerial Decisions-Issues and Analysis.
F.S. Prerequisite: BD 301. BL 300. BN 320 or BN 300. Integration of managerial decision issues and methods. applying problem-solving theories and skills; decision philosophies; current events in business.

BL 487 Var.
Internship.

BL 495 Var.
Independent Study.

BL 500 03(3-0-0)
Production Concepts.
S. Prerequisite: BQ 270. BN 500. Credit not allowed toward any degree in business. Design. operation. and control of production systems.

BL 540 03(3-0-0)
Modern Production Technology.
F. Prerequisite: BL 300 or BL 500. Automation in production/operations management and research and development functions.

BL 565/BD 565 03(2-3-0)
Computer-Integrated Manufacturing Systems.
F. Prerequisite: BL 300 or BL 500. Credit not allowed for both BL 565 and BD 565. Global and competitiveness reasons for CIMs. CIM architecture. CAD/CAM. database considerations. MRP 11. JIT. TOC. TQM, MAP/TOP.

BL 600 03(3-0-0)
Production Administration.
S. Prerequisite: BF 500. BK 500, BL 500. Problem-solving process emphasizing administrative operations in manufacturing firm.

BL 695 Var.
Independent Study.

BUSINESS MANAGEMENT COURSES

Management Department College of Business

BN 300 03(3-0-0)
Management Fundamentals.
F.S. SS. Credit not allowed for both BN 300 and BN 320. Managerial process of planning. directing. and controlling inputs of an organization. Analysis. decision making. and survey of research literature.

BN 320 03(3-0-0)
Organization Management.
F.S. SS. Prerequisite: BA 210. BG 260. BQ 270. Credit not allowed for both BN 320 and BN 300. Fundamentals of management and organizational behavior in the work environment.

BN 330 03(3-0-0)
Organizational Theory.
F.S. Prerequisite: BN 320 or BN 300. Design. structure. and change of organizations.

BN 410 03(3-0-0)
Organizational Behavior.
F.S. Prerequisite: BN 320. Behavior of people and groups as members of organizations.

BN 475 03(3-0-0)
International Business Management.
F.S. Prerequisite: BF 300. BK 300. BN 320. Multinational corporations: their scope. activities. managerial problems and decisions.

BN 487 Var.
Internship.

BN 495 Var.
Independent Study.

BN 496 Var.
Group Study.

BN 500 03(3-0-0)
Management Concepts.
F. Prerequisite: EC 102. Credit not allowed toward any degree in business. Management thought and organization theory.

BN 610 03(3-0-0)
Human Relations Concepts.
F. Prerequisite: BN 500 or BN 320. Personnel relations and evaluation of their influence on managerial policy.

BN 611 03(3-0-0)
Management of Organization Development.
S. Prerequisite: BN 500 or BN 320. Methods for managing organizational change.

BN 620 03(3-0-0)
Management.
F, S. Prerequisite: BN 500. Practices. policies. philosophies. and behavior.

BN 621 03(3-0-0)
Managerial Planning and Control.
S. Prerequisite: BN 500. Fundamentals. methods, and tools.

BN 695 Var.
Independent Study.

BN 696 Var.
Group Study.

BN 699 Var.
Thesis.

BUSINESS INDUSTRIAL RELATIONS COURSES

Management Department College of Business

BP 310 03(3-0-0)
Human Resource Management.
F.S. Principles and practices related to human resource management in organizations.

BP 350 03(3-0-0)
Employment Law and Policy.
F. Legal principle and policy issues arising from the employment relationship.

BP 420 03(3-0-0)
Compensation Management.
F. Prerequisite: BP 310. Concepts and practices related to pay. benefits. and incentives.

BP 451 03(3-0-0)
Human Resource Planning and Development.
S. Prerequisite: BP 310. Human resource planning. recruitment. selection. training. and development.

BP 471 03(3-0-0)
Labor Relations and Collective Bargaining.
F,S. Managerial decision making and action in labor-management relations as affected by labor legislation and administrative practices.

BP 487 Var.
Internship.

BP 495 Var.
Independent Study.

BP 600 03(3-0-0)
Personnel Administration.
S. Prerequisite: BP 310. Designing personnel programs.

BP 67 1 03(3-0-0)
Labor Management Relations.
S. Prerequisite: BN 500. Collective bargaining process. administration of contract, and impact of public policy on industrial relations.

BP 695 Var.
Independent Study.

BUSINESS MANAGEMENT SCIENCE COURSES

Computer Information Systems Department College of Business

BQ 270 03(22-0)
Basic Business Statistics.
F.S. SS. Prerequisite: ST 204. Statistical tools applied to business conditions and functions.

BQ 375 03(2-2-0)
Models and Applications in Management Science.
F.S. Prerequisite: BQ 270. Introduction and application of operations research techniques to business decision problems.

BQ 570 03(3-0-0)
Statistical Decision Making.
F. SS. Prerequisite: BQ 270. Criteria-based classical and Bayesian statistical techniques.

BQ 575 03(3-0-0)
Quality and Productivity Improvement.
S. Prerequisite: BQ 270. TQM concepts including hoshin planning. quality function deployment. ISO 9000; selected management. planning. quality control tools; quality awards.

BQ 625 03(2-2-0)
Management Science.
F. Prerequisite: BQ 375. Management science/operations research concepts and techniques.

BIOLOGICAL SCIENCE COURSES

College of Natural Sciences

BY 102 04(3-2-0)
Attributes of Living Systems.
F.S. Prerequisite: Intended for students requiring additional courses in biology or areas related to biological science. High school chemistry or concurrent registration in C 101. Levels of organization. stability. and change in living systems.

BY 103A-B.
Biology of Organisms.
F.*S.* Prerequisite: BY 102. Diversity of animals and plants; their structural and functional characteristics. A) Animal; 2 credits. B) Plant; 2 credits.

BY 220 03(3-0-0)
Ecology.
F.S. Prerequisite: One course in biology. Interrelationships among organisms and their environments.

BY 310 04(3-3-0)
Cell Biology.
F.S. Prerequisite: One semester of organic chemistry or concurrent registration; BY 103A and B; or B 120 and Z 110. Structure and function of cells emphasizing molecular aspects.

BY 31104(3-3-0)
Developmental Biology.
F.S. SS. Prerequisite: BY 310 or written consent of instructor. Developmental aspects of growth and differentiation stressed in higher plants and animals.

CHEMISTRY COURSES

Chemistry Department College of Natural Sciences

C 101 02(2-0-0)
Preparation for Chemistry.
F. SS. Maximum of 3 credits allowed for' both C 101 and C 103. Basic concepts and mathematics of chemistry. Only lot students with no prior chemistry who plan to take C 107. C 109, or C 111.

C 103 03(3-0-0)
Chemistry and Society.
F.S. SS. For non-science majors needing only one semester of chemistry. Maximum of 3 credits allowed for both C 101 and C 103. Chemistry as it relates to physical world. the environment. and society.

C 104 01(0-3-0).
Chemistry and Society Laboratory.
F, S. SS. Prerequisite: C 103 or concurrent registration. Laboratory applications of principles covered in C 103.

C 107 04(4-0-0)
Fundamental Chemistry.
F.S. SS. Prerequisite: High school chemistry or C I 01; one year of high school algebra and a minimum mathematics score of 425 (SAT) or 17 (ACT) or 3 credits of college mathematics. Credit allowed for only one of the following: C 107. C 109. C 111. One-semester general chemistry emphasizing stoichiometry. periodicity. bonding. chemical equilibrium. and properties of solutions.

C 108 01(0-2-0)
Fundamental Chemistry Laboratory.
F.S. SS. Corequisite: C 107. Credit not allowed for both C 108 and C 112. Laboratory experiments using basic chemical equipment and techniques including environmental aspects of chemistry.

C 109 04(4-0-0)
General Chemistry for Engineers.
F. Pre-requisite: High school chemistry or C 101 with minimum grade of C; M 124. Credit allowed for only one of the following: C 107. C 109. C 111. One-semester general chemist/emphasizing gases. ionic equilibria. oxidation-reduction. chemical thermodynamics.

C 110 01(0-3-0)
General Chemistry Laboratory for Engineers.
F.S. Corequisite: C 109. Laboratory applications of principles covered in C 109.

C 111 04(3-0-1)
General Chemistry 1.
F.S. SS. Prerequisite: High school chemistry or C 101 with mini mum grade of C; M 121. Credit allowed for only one of the following: C 107. C 109. C 111. For students who need more than one year of chemistry. Structure. bonding. stoichiometry. thermochemistry. states of matter. equilibria.

C 112 01(0-3-0)
General Chemistry Laboratory 1.
F.S. SS. Corequisite: C 111. Credit not allowed for both C 108 and C 112. Laboratory applications of principles covered in C 111.

C 113 03(3-0-0)
General Chemistry II.
F.S. SS. Prerequisite: C 111, M 124. Acid-base reactions and equilibria. kinetics. coordination compounds. and oxidation-reduction chemistry.

C 114 01(0-3-0)
General Chemistry Laboratory II.
F.S. SS. Corequisite: C 113. Laboratory applications of principles covered in C 113.

C 245 04(4-0-0)
Organic and Biological Chemistry.
F.S. SS. Prerequisite: C 107 or C 113. Credit not allowed for both C 245 and C 341. For students who need only one semester of organic chemistry. Nomenclature. reactions. and chemical aspects of compounds of biological interest.

#C 246 01(0-3-0)
Organic and Biological Chemistry Laboratory.
F.S. SS. Prerequisite: C 108 or C 112; concurrent registration in C 245. Credit not allowed for both C 246 and C 344. Experiments involving organic compounds including compounds of biological interest.

C 261 03(3-0-0)
Basic Inorganic Chemistry.
S. Prerequisite: C 113. Basic inorganic chemistry of elements; structures. properties. and reactions of their compounds.

C 331 03(3-0-0).
Quantitative Analysis.
F.S. SS. Prerequisite: C113. Chemical equilibria applied to gravimetric and volumetric methods of analysis; chemical separations; instrumental methods of analysis.

#C 332 02(0-6-0)
Quantitative Analysis Laboratory.
F.S. SS. Prerequisite: C 114; C 331 or concurrent registration. Applications of principles of C 331.

#C 334 01(0-3-0)
Quantitative Analysis Laboratory.
F.S. SS. Prerequisite: C 114; C 331 or concurrent registration. Applications of principles of C 331.

C 341 03(3-0-0)
Organic Chemistry 1.
F.S. Prerequisite:C 113. For students who need two semesters of organic chemistry. Credit not allowed for both C 245 and C 341. Structure. dynamics. spectroscopy. and reactions of organic and biological molecules.

C 343 03(3-0-0)
Organic Chemistry II.
F, S. Prerequisite: C 341. Reactions and mechanisms of organic and biological molecules.

#C 344 02(0-6-0)
Organic Chemistry Laboratory.
F, S. Prerequisite: C 114; concurrent registration in C *343.* Credit not allowed for both C 344 and C 246. Spectroscopy. synthesis. mechanisms. and structure of organic compounds.

C 384 Var (1-5)
Supervised College Teaching.
F.S. SS. Prerequisite: Twenty credits in chemistry. written consent of department head. Maximum of 10 credits allowed in course.

C 431 04(3-3-0)
Instrumental Analysis.
F. Prerequisite: C 331; C 332 or C 334; C 471 or C 475 or concurrent registration. Modern methods of chemical analysis.

***C 433 03(2-3-0)**
Clinical Chemistry.
S. Prerequisite: C 245 or C 332 or C 334; one semester of biochemistry. Principles and methodology of clinical chemistry. Laboratory experience in methodology and method development.

#C 440 02(0-6-0)
Advanced Organic Laboratory.

F. Prerequisite: C 343, C 344. Design and performance of projects involving organic synthesis, mechanisms. and structure determination.

C 461 03(3-0-0)
Inorganic Chemistry.
S. Prerequisite: C 261; C 473 or C 477 or concurrent registration. Chemistry of representative and transition group elements.

C 462 02(0-4-0)
Inorganic Chemistry Laboratory.
S. Prerequisite: C 461 or concurrent registration. Synthetic techniques and instrumental methods in inorganic chemist/.

C 471 03(3-0-0)
Physical Chemistry-Biological Orientation 1.
F. Prerequisite: C 113; M 161 or M 255; PH 142. Credit not allowed for both C 471 and C 475. Thermodynamics; electrolyte solutions; transport phenomena; kinetics.

C 473 03(3-0-0)
Physical Chemistry-Biological Orientation II.
S. Prerequisite: C 471. Credit not allowed for both C 473 and C 477. Quantum mechanics; molecular structure; spectroscopy; highly ordered states; statistical thermodynamics.

C 475 03(3-0-0)
Physical Chemistry I.
F, SS. Prerequisite: C 113. M 261. PH 142. Credit not allowed for both C 471 and C 475. Thermodynamics; phases of matter; electrochemistry; kinetics; transport phenomena.

C 477 03(3-0-0)
Physical Chemistry II.
S. Prerequisite: C 475. Credit not allowed for both C 473 and C 477. Quantum chemist/; applications to bonding. molecular structure and spectroscopy; statistical mechanics.

C 478 02(0-6-0)
Physical Chemistry Laboratory.
F.S. Prerequisite: C 471 or C 475; and C 332 or C 334 or CH 306. Physicochemical experimentation; planning and execution of experiments; interpretation and reporting of experimental data.

C 493 01(0-0-1)
Seminar.
Prerequisite: C 471 or C 475.

C 495 Var. (1-3)
Independent Study.
Prerequisite: Twenty credits in chemistry. written consent of instructor.

C 498 Var (1-3)
Research.
Supervised laboratory research problem in one of the branches of chemist/; a written report is required.

C 5141 CH 514 03(3-0-0)
Polymer Science and Engineering.
F. Prerequisite: C 343, C 475. Credit not allowed for both C 514 and CH 514. Fundamentals of polymer science: synthesis. characterization. processing of polymers. Physical properties of polymers; rheology of melts and solutions.

C 531 03(3-0-0)
Advanced Chemical Analysis I.F.
Prerequisite: C 431 or concurrent registration. Chemical equilibria. electrochemistry. analytical separations. introduction to molecular spectroscopy.

C 532 03(3-0-0)

Advanced Chemical Analysis II.
S. Prerequisite: C 431. Advanced optics; instrumentation and methodology for analytical spectroscopy; computer applications.

C 533 02(2-0-0)
Analytical Separations.
F. Prerequisite: C 431. Modern techniques emphasizing gas. column. and ion exchange chromatography.

C 535 04(2-6-0)
Electronics for Scientific Instrumentation.
S. Prerequisite: PH 142. Basic design. construction, and trouble-shooting of electronic circuits found in scientific instrumentation.

***C 537 03(3-0-0)**
Electrochemical Methods.
S. Prerequisite: C 531. Theory and methods of electrochemistry; applications of modern electrochemical techniques.

C 541 03(3-0-0)
Organic Spectroscopy.
SS. Prerequisite: C 440. Organic structure determination by spectroscopic methods.

C 543 03(3-0-0)
Structure/Mechanisms in Organic Chemistry.
F. Prerequisite: C 343. Structure. reactivity. and mechanisms in organic chemistry.

C 545 03(3-0-0)
Synthetic Organic Chemistry.
S. Prerequisite: C 543. Reactions and synthesis in organic chemistry.

C 547 03(3-0-0)
Physical Organic Chemistry.
S. Prerequisite: C 343. Theory and techniques in physical organic chemistry.

C 551 03(3-0-0)
Organometallic Chemistry.
F.S. Prerequisite: C 343. Descriptive and mechanistic organometallic chemistry applied 10 homogeneous catalysis and organic synthesis.

C 560/AG 560 03(3-0-0)
Chemical Equilibria in Soils.
F. Prerequisite: AG 240 or nine credits of chemistry. Credit not allowed 1 or both C 560 and AG 560. Chemical reactions, solubility relationships, speciation in solution, mineral weathering. redox reactions, metal chelation. Fixation of nutrients.

C 561 03(3-0-0)
Advanced Inorganic Chemistry.
F. Prerequisite: Written consent of instructor. Chemistry of compounds of representative elements and transition metals.

C 563 03(3-0-0)
Physical Methods in Inorganic Chemistry.
S. Prerequisite: C 561. Modern experimental methods in inorganic chemistry.

***C 565 03(3-0-0)**
Inorganic Mechanisms.
F. Prerequisite: C 477 or written consent of instructor. Oxidation-reduction and substitution mechanisms as deduced from experimental evidence.

°C 569 03(3-0-0)
Chemical Crystallography.
S. Prerequisite:C 477. Theory and practice of determination of crystal and molecular structure by single crystal X-ray and neutron diffraction.

C 571 03(3-0-0)
Advanced Physical Chemistry.
F. Prerequisite: C 477. Quantum chemistry: simple systems. symmetry. approximation methods. molecular structure. Statistical mechanics: molecular thermodynamics. absolute rate theory.

C 575 03(3-0-11)
Chemical Thermodynamics.
F. Prerequisite: C 471. Nonelectrolyte and electrolyte solutions. phase transitions. critical phenomena. solids. electric and magnetic field effects.

C 576/PH 576 0313-11-01.
Statistical Mechanics.
S. Prerequisite: PH 451, PH 462; or C 475. C 477. Credit not allowed for both C 576 and PH 576. Principles of statistical mechanics. applications to chemical and physical problems.

***C 577 03(3-0-0)**
Surface Chemistry.
S. Prerequisite: C 471. Capillarity; interfacial thermodynamics, electrical aspects of surface chemistry. adsorbed layers.

':C 579 03(3-0-0)
Chemical Kinetics.
S. Prerequisite: C 475. Elementary reactions. unimolecular reactions. reactions in solution, gas phase ion chemistry. photochemistry. and kinetic modeling.

C 651A-D Var (1-4)
Social Topics in Chemistry.
F, S. Prerequisite: Written consent of instructor.
A) Analytical chemistry.
B) Inorganic chemistry.
C)Organic chemistry.
D) Physical chemistry.

C 695 Var (1-3)
Independent Study.

C 699 Var (1-15).
Thesis.

***C 701 0313-0-0)**
Selected Topics in Statistical Mechanics.
S. Prerequisite: C 576/PH 576. Selected topics in theory and application of statistical mechanics *in* physical and chemical problems.

***C 731 02(2-0-0).**
Spectroscopic Analysis I-Molecular.
S. Prerequisite: C 473 or C 477. Theory. applications. and instrumentation for molecular spectroscopy.

C 732 02(2-0-0)
Spectroscopic Analysis II-Atomic.
S. Prerequisite: C 473 or C 477. Methods and applications.

C 771 03(3-0-1).
Quantum Mechanics I-Chemical Bonding.
S. Prerequisite: C 571. Principles; Hartree-Fock approach; Roothaan's equations: molecular orbital methods; approximation techniques.

***C 773 03(3-0-0)**
Quantum Mechanics 11-Spectroscopy.
S. Prerequisite: C 571. Time-dependent perturbation. theory; selection rules; vibrational. rotational. and electronic spectroscopy; magnetic resonance.

C 784 Var (1-2)
Supervised College Teaching.

F. S, SS. C 793 01 (0-0-1)
Seminar.

C 795A-D Var (1-5).
Independent Study.
A) Inorganic chemistry. B) Analytical chemistry. C) Biological chemistry. D) Physical chemistry.

C 799 Var (1-15).
Dissertation.

COMMUNICATION DISORDERS COURSES

Communication Disorders Department College of Applied Human Sciences

CD 100 03(3-0-0).
Introduction to Communication Disorders.
F,S. Clinical and behavioral issues in speech-language pathology and audiology.

CD 300 04(4-0-0).
Normal Language-Speech-Hearing Development.
F, S. Prerequisite: PY 100. Normal language. speech. and hearing behaviors from infancy to preadolescence including introduction to psycholinguistic and sociolinguistic theories.

CD 302 04(4-0-0)
Speech and Heating Science.
F. Prerequisite: CD 100 Physiological, acoustical characteristics of speech, hearing mechanisms; instrumentation for speech, hearing analyses; application to clinical process.

CD 305 04(4-0-0)
Auditory Disorders and Hearing Measurement.
S. Prerequisite: CD 100. Principles, methods, and perspectives in contemporary audiology.

CD 312 03(3-0-0)
Phonetics and Phonology.
S. Prerequisite: CD 302. Sounds of speech; their formation, classification, and phonemic transcription.

***CD* 314 03(3-0-0)**
Articulatory-Phonological Disorders.
S. Prerequisite: CD 300, CD 312. Nature. causes. and diagnostic and therapeutic principles of articulation disorders.

CD 318 04(4-0-0)
Child and Adult Communication Disorders.
S. Prerequisite: CD 100. Introduction to taxonomies. assessments. and treatments of communication disorders in children and adults.

CD 408 02(2-0-0)
Introduction to Aural Rehabilitation.
S. Prerequisite: CD 305. Therapeutic procedures for children and adults with impaired hearing.

CD 406 01(0-2-0)
Aural Rehabilitation Laboratory.
S. Corequisite: CD 405. Beginning sign language instruction.

CD 441 02(2-0-0)
Education and Psychology of the Deaf.
S. Prerequisite: CD 305 or PY 100. Psychology of the deaf and principles of educating deaf children; emphasizes academic and psychosocial implications.

CD 492 Var (2-3).
Seminar-Speech and Language Pathology.
Prerequisite: CD 300.

CD 495A-B Var.
Independent Study.
A) Speech and language pathology. B) Audiology.

CD 406A-B Var.
Group Study.
A) Speech and language pathology. B) Audiology.

CD 603 03(3-0-0)

Pediatric Audiology.
F. Prerequisite: CD 305. Evaluation of impaired hearing in young children.

CD 605 02(1-0-0)
Auditory-Vestibular Science.
F. Prerequisite: CD 305. Anatomy. physiology. and electrophysiological evaluation of auditory and vestibular mechanism.

CD 610 03(3-0-0)
Language Disorders In Children.
F. Prerequisite: CD 318. Principles. methods. and techniques of the evaluation and treatment of language disorders in children.

CD 620 03(3-0-0)
Advanced Study of Articulation Disorders.
F. Prerequisite: CD 314. Principles. methods. and techniques of the evaluation and treatment of articulation disorders.

CD 625 04(3-2-0)
Clinical Audiology.
F. Prerequisite: CD 305. Current audiological concepts and practices; philosophical and practical considerations of diagnosis. instrumentation. and research.

CD 627 02(2-0-0)
Noise and Hearing Conservation.
S. Prerequisite: CD 405. Physical. physiological. and psychological effects of noise and hearing conservation techniques.

CD 629 02(2-0-0)
Hearing Disorders.
S. Prerequisite: CD 405. Pathological relationships among outer, middle. and inner ear structures in normal and abnormal auditory system.

CD 630 03(3-0-0)
Advanced Study of Stuttering.
S. Prerequisite: CD 300. Principles, methods, and techniques of the evaluation and treatment of stuttering.

CD 633 03(34-0)
Aural Rehabilitation and Amplification.
F. Prerequisite: CD 405. Theoretical and practical methods, procedures, and devices utilized in management of hearing impaired.

CD 640 04(4-0-0)
Neurological Communication Disorders.
F. Prerequisite: AY 445. CD 318. Principles. methods. and techniques of the evaluation and treatment of speech and language disorders related to adult aphasia. cerebral palsy. and dysarthria.

CD 642 02(2-0-0)
Language and Learning Disabilities.
S. Prerequisite: Written consent of instructor. Principles of treatment and roles of speech pathologists and audiologists in managing auditory and visual perceptual problems and learning disabilities.

CD 652 02(2-0-0)
Research Principles.
S. Prerequisite: ST 201. Research methods in speech-language pathology and audiology; problem development and design considerations.

CD 662 03(3-0-0)
Voice Disorders.
S. Prerequisite: CD 312. CD 318. Clinical management of functional and organic voice disorders with emphasis on diagnostic and therapeutic procedures.

CD 672 02(2-0-0)
Communication Disorders Associated with Aging.
F. Prerequisite: CD 300. CD 305. Speech-language and audiological factors associated with the aging process; amplification and augmentative communication devices.

CD 686A-B Var.
Practicum.
Prerequisite: CD 496A and B. A) Speech and language pathology. B) Audiology.

CD 687A-B Var.
Internship.
Prerequisite: CD 686A-B. Supervised work experiences in approved clinical and public school locations. A) Speech and language pathology. B) Audiology.

CD 692A-C 03(0-0-3)
Seminar.
A) Speech pathology. B) Language pathology. C) Audiology.

CD 695A-11 Var.
Independent Study.
A) Speech and language pathology. B) Audiology.

CD 696A-C Var (1-3)
Group Study.
A) Speech pathology. B) Language pathology. C) Audiology.

CD 698A-C Var. (1-3)
Research.
A) Speech pathology. B) Language pathology. C) Audiology.

CD 699A-B Var.
Thesis.
A) Speech and language pathology. B) Audiology.

CIVIL ENGINEERING COURSES

Civil Engineering Department College of Engineering

CE 101 03(2-3-0)
Civil Engineering Principles I.
Civil engineering profession. computer applications and programming related to civil engineering; introduction to surveying.

CE 102 03(2-2-0)
Civil Engineering Principles II.
S. Prerequisite: CE 101. Civil engineering problem solving and design including use of engineering graphics and digital computing. Team project.

CE 256 03(3-0-0)
Statics for Nonengineers.
F, S. Prerequisite: M 160;or M 126. M 141. Forces and their components using scalar notation; static equilibrium of rigid bodies; friction. centroids, and moment of inertia,

CE 260 03(3-0-0)
Engineering Mechanics-Statics.
F, S. Prerequisite: M 160. PH 141. Forces using vector notation; static equilibrium of rigid bodies; friction. virtual work. centroids, and moments of inertia.

CE 261 03(3-0-0)
Engineering Mechanics-Dynamics.
F.S. Prerequisite: CE 260. AC 101 or CE 101 or CS 151 or ME 101. Kinematics and kinetics of particles and rigid bodies; concepts of work-energy and impulse-momentum; computer applications; vector notation.

CE 262 04(3-2-0)
Engineering Mechanics.
F. Prerequisite: M 161. PH 141. Forces. static equilibrium. mass center, moments of inertia. kinematics and kinetics of particles and rigid bodies.

CE 300 04(3-3-0)
Fluid Mechanics.
F.S. Prerequisite: CE 261 or CE 262. ME 237. Fluid properties; statics. kinematics, and dynamics of fluid motion including viscous and gravitational effects.

CE 301 04(3-2-0)
Hydraulic Engineering.
S. Prerequisite: CE 300. Basic principles of fluid mechanics applied to practical problems in hydraulic engineering.

CE 350 13(2-3-0)
Soil Engineering for Nonengineers.
F. Prerequisite: CE 358. Concepts of soil mechanics and soil behavior. elementary application to compaction. seepage. earth pressure. Foundations. and slopes.

CE 358 03(3-0-0)
Mechanics of Materials for Nonengineers.
F. Prerequisite: CE 256. Elementary analysis of stresses and deformations in structural members and machine elements. combined stresses.

CE 360 03(3-0-0)
Mechanics of Solids.
F.S. Prerequisite: CE 260 or CE 262. Stresses and deformations in structural members and machine elements, combined stresses. stress transformation.

CE 362 02(1-2-0)
Properties of Materials.

F, S. Prerequisite: CE 360. Credit not allowed for both CE 362 and CE 363. Behavior of materials including metals. woods. plastics. and bituminous and Portland cement concretes; testing techniques and material standards.

CE 363 01(0-3-0)
Material Properties.
F.S. Prerequisite: CE 360. Credit not allowed for both CE 363 and CE 362. Mechanical properties of metals. woods. and plastics; testing techniques and standards.

CE 364 02(1-2-0)
Properties of Construction Materials.
F.S. Prerequisite: CE 358. Properties and mix design of concrete; use of material standards; testing and measurement techniques.

CE 367 04(3-2-0)
Structural Analysis.
F. Prerequisite: CE 360. Determination of actions in and deformations of determinate and indeterminate structures.

CE 370 04(3-3-0)
Elementary Structural Design.
S. Prerequisite: CE 358 or CE 360. Behavior and design of steel and reinforced concrete members and structures.

CE 384 Var. (1-5)
Supervised College Teaching.
F, S. SS. Maximum of 10 credits allowed in course.

CE 413 03(3-0-0)
Environmental River Mechanics.
S. Prerequisite: CE 300. Fluvial geomorphology. sediment transport. river response with special emphasis on environmental aspects.

CE 422 03(3-0-0)
Basic Hydrology.
F.S. Prerequisite: CE 300. ST 301 or ST 3(19; or written consent of instructor. Study of hydrologic cycle. precipitation processes. soil moisture. infiltration. groundwater. rainfall-runoff processes. utilization of water resources.

CE 423 03(3-0-0)
Groundwater Engineering.
S. Prerequisite: CE 300. M 340. Development of groundwater resources; origin. movement. distribution of water below ground surface.

CE 438 04(4-0-0)
Water Supply and Wastewater Removal.
F. S. Prerequisite: C 109 or C 113. CE 300. Planning and design of storage and distribution components. water supply systems, and sewerage systems.

CE 439/CH 439 03(2-3-0)
Environmental Engineering Chemical Concepts.
F. Prerequisite: C 471 or C 475. Credit not allowed for both CE 439 and CH 439. Application of chemical principles to environmental engineering problems.

CE 440 02(2-0-0)
Environmental Health Engineering.
S. Prerequisite: C 113. Water purification and wastewater treatment and disposal; solid waste management; air pollution control; and environmental radiation.

CE 445 03(3-0-0)
Civil Engineering Systems Analysis.
F. Prerequisite: M 261. Systems analysis applied to civil engineering problems; goals. objectives, optimization. and measures of effectiveness.

CE 450 04(3-3-0)
Introduction to Geotechnical Engineering.
S. Prerequisite: CE 360. Soil behavior. stress-strain and strength properties. application to earth pressure. slope and foundation problems.

CE 466 03(2-3-0)
Design and Behavior of Steel Structures.
S. Prerequisite: CE 367. Loads acting on a structure; behavior and design of steel members. connections. and systems.

CE 467 03(2-3-0)
Design of Reinforced Concrete Structures.
F. Prerequisite: CE 367. Design and behavior of reinforced concrete structural members.

CE 469 01(1-0-0)
Design Practice I.
F. Prerequisite: CE 367. Design of civil engineering systems. consideration of non-engineering factors in the design process. development of design project proposals.

CE 470 02(1-2-0)
Design Practice II.
S. Prerequisite: CE 469. Class project in design of civil engineering systems; development of final project design .red project reports.

CE 474 03(3-0-0)
Engineering Planning and Management.
S. Prerequisite: CE 360. Planning, organizing. and managing engineering projects. including engineering estimating. engineering economy. and CPM scheduling.

CE 478 03(3-0-0)
Transportation Engineering.
F. Prerequisite: CE 300. ST 309. Transportation planning, design. and operation emphasizing systems approach to urban transportation problems.

CE 479 02(1-2-0)
Applied Transportation Engineering.
S. Prerequisite: CE 478. Students select projects of interest and conduct intensive investigations for development of engineering reports and presentations.

CE 495 Var. (1-3).
Independent Study.

CE 496 Var.
Group Study.

CE 502 04(4-0-0)
Introduction to Fluid Mechanics.
F. Prerequisite: CE 300. Fundamental physical concepts of fluid mechanics; ideal and viscous fluid flows; boundary-layer concepts.

CE 504 03(2-3-0)
Wind Engineering.
F. Prerequisite: AT 440 or CE 300. Influence of wind on humanity. Applications to structures, air pollution, wind energy. agricultural aerodynamics, snow movement. human comfort.

***CE 510 03(3-0-0)**
Operation of Hydraulic Systems.
F. Prerequisite: CE 301. Operational management systems, data collection, real-time control, management modeling, rehabilitation and retrofit, maintenance.

CE 514 03(3-0-0)
Hydraulic Structures/Systems.
F. Prerequisite:'CE 301. Analysis and design of hydraulic structures which make up components of water resource systems.

°CE 515 03(3-0-0)
Hydropower.
F. Prerequisite: CE 301. CE 422. Operation of hydrogenerating and pump storage stations. characteristics of systems loads. hydrology. storage of water. optimum power production.

CE 520 03(3-0-0)
Physical Hydrology.
F. Prerequisite: CE 422. Hydrologic. atmospheric processes in the water cycle; linear systems. hydrologic response; geomorphologic description of hydrologic processes. response.

CE 521 03(2-3-0)
Hydrametry.
SS. Prerequisite: CE 422. Principles. methods. instruments. and equipment for measuring water quantity and water quality variables in nature.

CE 522 03(3-0-0)
Engineering Hydrology.
S. Prerequisite: CE 520. Hydrologic design under uncertainty; conventional and remote sensing; design flows and storms; river routing; reservoir design; watershed models.

***CE 524/ER 524 04(3-0-1)**
Modeling Watershed Hydrology.
S. Prerequisite: CE 422 or ER 416. CS 150, ST 304 or ST 309. Credit not allowed for both CE 524 and ER 524. Development and application of watershed models: structure. calibration. evaluation, sensitivity analysis. simulation.

CE 537 03(3-0-0)
Residuals Management.
S. Prerequisite: CE 300. Planning and design for processing and disposal of residuals including solid wastes. sludges. hazardous wastes.

CE 538 03(3-0-0)
Aqueous Chemistry.
S. Prerequisite: C 107. M 340. Principles of solution chemistry applied to aquatic systems.

°CE 539 03(2-3-0)
Water and Wastewater Analysis.
F. Prerequisite: C 109. Chemical and biological methods of assessing water quality; significance of chemicals in aquatic systems.

CE 540 03(3-0-0)
Unit Operations of Environmental Engineering.
F. Prerequisite: M 340, CE 438. Water and wastewater treatment processes; screening, gravity. settling, flotation, coagulation, filtration, carbon adsorption.

CE 54104(3-3-0)
Unit Processes of Environmental Engineering.
S. Prerequisite: CE 540, C 471 or C 475. Water and wastewater treatment processes; disinfection, aeration, activated sludge, trickling filters, anaerobic digestion, ponds.

CE 543 03(3-0-0)
Industrial Wastes Management.
F. Corequisite: CE 540. Management of industrial wastes. Analysis of waste sources within industrial processes. minimization. treatment. and disposal standards; case studies.

CE 544 03(3-0-0)
Water Resources Planning.
F. Prerequisite: CE 422. Planning concepts; economic and financial analysis; multiobjective planning; multisectoral planning; related topics.

CE 546 03(3-0-0)
Water Resource Systems Analysis.
S. Prerequisite: CE 422. EG 510. or concurrent registration in each. Applications of systems analysis and optimization techniques in water resources planning and management.

***CE 548/AE 548 03(2-0-1)**
Water Quality Management.
F. Prerequisite: CE 422. Credit not allowed for both CE 548 and AE 548. Legal and administrative procedures used to guide technical control of water quality.

CE 549/AE 549 03(3-0-0)
Design of Water Quality Monitoring Systems.
F. Prerequisite: CE 422 or ER 418. Credit not allowed for both CE 549 and AE 549. Information expectations. design criteria. network design. operating plans and procedures. and reporting formats and schedules.

CE 550 03(3-0-0)
Foundation Engineering.
F. Prerequisite: CE 450. Mechanics and methodology of foundation engineering; selection and design of foundation systems on soft. Firm. and expansive soils; special problems.

***CE 553 03(3-0-0)**
Earth and Earth-Retaining Structures.
S. Prerequisite: CE 450. Load on conduits; retaining walls; braced cuts; sheet pilewalls; slope stability; embankments.

CE 560 03(3-0-0)
Advanced Mechanics of Materials.
F. Prerequisite: CE 360. Analysis of stress and strain failure theory; selected topics in solid mechanics, plate analysis; introduction to elastic stability.

CE 562 03(3-0-0)
Fundamentals of Vibrations.
S. Prerequisite: CE 261. CE 360. Free and forced vibrations of single. two. and multiple degree of freedom systems. Closed-form and numerical solutions.

CE 563 03(3-0-0)
Computational Methods.
F. Prerequisite: M 340. Practical computer methods for solution of problems related to civil engineering.

CE 566 03(3-0-0)
Intermediate Structural Analysis.
F. Prerequisite: CE 367. Work and energy concepts, curved members and arches, matrix analysis of linear systems, numerical techniques.

CE 567 03(3-0-0)
Advanced Concrete Design.
S. Prerequisite: CE 467. Behavior of reinforced and prestressed concrete members. Development of design methods. Behavior and design of slabs, shearwalls. and buildings.

CE 569/F *569* 03(3-0-0)
Intermediate Design of Wood Structures.
F. Prerequisite: CE 367. F432. Credit not allowed for both CE 569 and F 569. Characteristics of structural products and their consideration in design; behavior of glulam members. wood trusses. and other wood structural systems.

CE 575 03(2-2-0)
Expert System Applications In Engineering.
F. Prerequisite: M 340. Construction of expert systems and decision aids for practical applications in typical engineering domains.

CE 577 03(3-0-0)
Urban Water Management
S. Prerequisite: CE 422, *CE* 438. Modern techniques for analysis, management. and control of water supply. wastewater and urban drainage, and flood control systems.

CE 578 03(3-0-0)
Infrastructure Engineering and Management.

S. Prerequisite: Ten credits of engineering, economics. public administration, or planning courses. Infrastructure program planning, management, and engineering. Problems, tools of analysis. solution strategies, Use of decision support systems.

CE 504 Var.
Supervised College Teaching.
F, S,

SS. CE 592A-L 01(0-0-1)
Seminar.
A) Fluid mechanics and wind engineering. E) Geotechnical engineering. G) Environmental engineering. L) Space engineering.

***CE 603 03(3-0-0)**
Wind Effects on Structures.
S. Prerequisite: CE 504. Analysis of wind effects on buildings and structures; deterministic and probabilistic methods; aerodynamic loading and response; codes and standards.

°CE 604 03(3-0-0)
Scalar Transport Phenomena.
S. Prerequisite: CE 502 or CE 504. Engineering concepts for transport of pollutants. toxic and flammable species. sand. and snow. Fluid modeling. numerical and analytical approaches.

CE 605 03(2-3-0)
Experimental Fluid Mechanics and Hydraulics.
S. Prerequisite: CE 502. Design of experiments; instrumentation and experimental techniques for flow situations; data acquisition and processing.

***CE 607 03(3-0-0)**
Computational Fluid Dynamics.
S. Prerequisite: CE 502 or AT 601. CE 563 or M 350. Unique fluid mechanics aspects of advection. boundary conditions. and turbulence models. Solution of elliptic, parabolic. and hyperbolic problems.

CE 612 04(4-0-0)
Open Channel Flow.
S. Prerequisite: CE 614 or concurrent registration. Steady. uniform. and non-uniform flow; backwater curves; flow through bridge piers. transitions. and culverts; spatially varied and unsteady flow.

CE 614 03(3-0-0)
Hydraulics of Closed Conduits.
S. Prerequisite: CE 502. CS 150. Pipe transmission and distribution systems design including flow control. Flow measurement. energy dissipation. pump selection. transients. cavitation.

CE 622 03(3-0-0)
Risk Analysis in Water Resources.
F. Prerequisite: CE 422. ST 309. Principles of risk and uncertainty applied to hydrologic, hydraulic. environmental. and other water-related problems.

CE 623 03(3-0-0)
Water Quality Hydrology.
S. Prerequisite: CE 422. Effects and dispersion of natural. municipal. industrial. toxic. and other water pollutants on natural and impounded waters.

°CE 624 03(3-0-0)
Control of Floods and Droughts.
S. Prerequisite: CE 522. Flood and drought characteristics. impacts; structural. non-structural flood control measures: drought prediction. drought control. drought response.

CE 631 03(3-0-0)
Solutions to Groundwater Problems.
S. Prerequisite: AE 538. M 340. Numerical flow models; finite difference and finite element methods; parameter identification, stochastic modeling and advanced analytical solutions.

CE 633 03(3-0-0)
Groundwater Contaminant Transport Modeling.
F. Prerequisite: CE 300. M 340; concurrent registration in CE 423 or AE 538. Numerical modeling. transport. control and cleanup. applied to complex groundwater contamination problems found in the field.

CE 635 03(3-0-0)
Quantitative Hydrogeology.
F. Prerequisite: CE 300, M 340. concurrent registration in CE 423 or AE 538. Geostatistics; modeling fracture flow; saltwater intrusion. heat transfer; conjunctive use. optimal groundwater management; solution nonlinear problems.

***CE 639/S 639 03(3-0-0)**
Technology Assessment and Social Forecasting.
F. Prerequisite: CE 544. Credit not allowed for both CE 639 and S 639. Interrelationship between technology and society emphasizing procedures for evaluating impacts and forecasting alternatives.

CE 645 03(2-2-0)
Computer-Aided Water Management and Control.
F. Prerequisite: CE 546 or CE 577. Real-time management and control of water resource systems; applications of computer control concepts to improve system performance.

CE 655 04(3-3-0)
Advanced Soil Mechanics.
F. Prerequisite: CE 450. Soil behavior; principles of mechanics of soils; effective stress principle; shear strength and consolidation of soils.

***CE 656 03(3-0-0)**
Design of Dams.
S. Prerequisite: CE 450. Design of earth and concrete gravity dams; hydrologic, structural. soil mechanics. seepage. earthquake. wind waves. and site selection considerations.

CE 662 03(3-0-0).
Foundations of Solid Mechanics.
F. Prerequisite: CE 560. M 531. Analysis of stress and strain in solids emphasizing linear elasticity and plasticity; introductions to creep. viscoelasticity. and finite deformations.

CE 665 03(3-0-0)
Finite Element Method.
S. Prerequisite: M 340. Theory and application in elasticity. porous flow, heat conduction. and other engineering problems.

CE 667 03(3-0-0)
Advanced Structural Analysis.
S. Prerequisite: CE 566. Analysis program development. application of finite element analysis. computer-assisted analysis. introduction to nonlinear analysis.

***CE 669 03(3-0-0)**
Advanced Design of Metal Structures.
S. Prerequisite: CE 466. Behavior of steel. aluminum. and cold formed members. Development of elastic and inelastic code provisions. LRFD design methods. building systems.

***CE 675/ME 675 03(3-0-0)**
Solar and Alternative Energies.
F. Prerequisite: M 340. Credit not allowed for both CE 675 and ME 675. Solar radiation, flat-plate and concentrating collectors. energy storage. space heating and cooling. power generation. agricultural applications.

***CE 676/ME 676 03(2-2-0)**
Building Energy Design.

S. Prerequisite: CE 675/ME 675. Credit not allowed for both CE 676 and ME 676. Design of space heating and cooling systems. Solar thermal electric power systems. industrial and agricultural process heat.

CE 684 Var.
Supervised College Teaching.
F.S.

SS. CE 695A-I Var.
Independent Study.
A) Fluid mechanics and wind engineering. B) Hydraulics. C) Hydrology and water resources. D) Mechanics. E) Geotechnical engineering. F) Structures. G) Environmental engineering. H) Water resource planning and management. I) Groundwater.

CE 696A-I Var.
Group Study.
A) Fluid mechanics and wind engineering. B) Hydraulics. C) Hydrology and water resources. D) Mechanics. E) Geotechnical engineering. F) Structures. G) Environmental engineering. H) Water resource planning and management. I) Groundwater.

CE 699A-I Var.
Thesis.
A) Fluid mechanics and wind engineering. B) Hydraulics. C) Hydrology and water resources. D) Mechanics. E) Geotechnical engineering. F) Structures. G) Environmental engineering. H) Water resource planning and management. I) Groundwater.

°CE 700 03(3-0-0)
Aero- and Hydrodynamics.
F. Prerequisite: CE 502. Kinematic relationships. conservation laws; dynamics of irrotational motion. rotational flows: applications to hydraulics, meteorology, oceanography.

CE 701 03(3-0-0)
Advanced Mechanics of Viscous Fluids.
S. Prerequisite: CE 700. Formulation of momentum and energy conservation, approximations for small and large Reynolds numbers. hydrodynamic stability. turbulent flow.

***CE 702 03(3-0-0)**
Turbulence.
F. Prerequisite: CE 502. Random processes in fluid mechanics; statistical theory of turbulence; homogeneous isotropic. nonisotropic. Free. and wall turbulence.

°CE 714 03(3-0-0)
Hydromachinery.
S. Prerequisite: CE 614. Normal and emergency operations of turbines, pumps, pump-turbines, synchronous bypass valves, surge tanks. and associated appurtenances.

CE 716 03(3-0-0)
Erosion and Sedimentation.
F. Prerequisite: CE 502. Sediment properties; resistance to flow: incipient motion and bedforms; sediment transport, reservoir sedimentation.

***CE 717 03(3-0-0)**
River Mechanics.
S. Prerequisite: CE 716. Characteristics of rivers, mechanics of sediment and water discharge emphasizing alluvial systems, channel stabilization, control, response.

***CE 721 03(3-0-0)**
Stochastic Analysis In Water Resources.
S. Prerequisite: CE 622. Stochastic processes applied to various water resources problems. Synthetic data generation, forecasting, Kalman filtering. kriging.

°CE 722 03(3-0-0)
Large Scale Hydrology.

F. Prerequisite: CE 520. Global and regional scale hydrologic processes; land/atmosphere interaction: scaling in hydrology, geomorphoclimatic structure of hydrologic response.

°CE 751 03(3-0-0)
Soll Dynamics.
S. Prerequisite: CE 450. Soil behavior under dynamic loading; stress wave propagation; foundation response to vibratory and transient loading; elements of earthquake effects.

***CE 754 03(3-0-0)**
Special Topics In Geotechnical Engineering.
S. Prerequisite: CE 655, written consent of instructor. Advanced topics in geotechnical engineering including cold regions problems, expansive/collapsing soils, computer applications.

***CE 766 03(3-0-0)**
Plate, Shell, and Bridge Structures.
F. Prerequisite: CE 560. CE 563. CE 665. Classical plate, shell, and membrane theory.
Finite difference. element. and strip methods. Application to layered systems, domes, and bridges.

°CE 767 03(3-0-0)
Structural Dynamics and Earthquake Engineering.
F. Prerequisite: CE 562, CE 667. Analysis, behavior. and design of structural systems subjected to dynamic loads, including earthquakes, wind. and ocean waves.

CE 799A-1 Var.
Dissertation.
A) Fluid mechanics and wind engineering. B) Hydraulics. C) Hydrology and water resources.
D) Mechanics. E) Geotechnical engineering. F) Structures. G) Environmental engineering.
H) Water resource planning and management. I) Groundwater.

CHEMICAL ENGINEERING COURSES

Agricultural and Chemical Engineering Department College of Engineering

CH 202 03(3-0-0)
Chemical Process Analysis.
S. Prerequisite: AC 201. Process analysis using steady-state and transient material and energy balances. Measurement techniques and data analysis.

CH 310 03(3-0-0)
Chemical Engineering Thermodynamic Fundamentals.
S. Prerequisite: C 475; CH 202, or CH 201 and ME 237. Chemical engineering applications of physical and chemical equilibria.

CH 406 03(3-0-0)
Rate Phenomena.
F. Prerequisite: AC 305, C 475. Unified treatment of rates for transport processes and chemical reactions; measurement and correlation of rate data; use of correlations in design.

CH 420 03(3-0-0)
Chemical Reactor Design.
F. Prerequisite: CH 310, M 340. Mechanisms and rates of chemical reactions; design of homogeneous and heterogeneous reactors; enzyme reactions.

CH 430 03(2-0-1)
Process Control and Instrumentation
S. Prerequisite: AC 305. CH 420. Measurement and control of process variables; transient behavior of chemical processes; feedback, feedforward. and computer control concepts.

CH 439/CE 439 03(2-3-0)
Environmental Engineering Chemical Concepts.
F. Prerequisite: C 471 or C 475. Credit not allowed for both CH 439 and CE 439. Application of chemical principles to environmental engineering problems.

CH 440 02(2-0-0)
Semiconductor Physics and Processing.
F. Prerequisite: Concurrent registration in C 475; M 340, PH 142. Physics of p-n junctions and simple devices; chemistry of integrated circuit processing.

CH 471 04(3-2-0)
Chemical Engineering Design.
S. Prerequisite: CH 406, CH 420. Projects requiring students to complete process design and cost estimation; technical progress and final reports.

CH 493 01(0-0-1)
Seminar.

CH 495 Var.
Independent Study.

CH 496 Var.
Group Study.

CH 504 03(3-0-0)
Fundamentals of Biochemical Engineering.
F. Prerequisite: BC 351, MB 300; BH 306 or AC 305. Heat and mass transfer applied to fermentation, enzyme kinetics, growth dynamics, cell harvesting and rupture; nutritional effects of food processing.

CH 505 03(3-0-0)
Advanced Reactor Design.

S. Prerequisite: CH 420. Nonideal flow and tracers, reactions and diffusion. evaluation of complex kinetics, stability of reactors. Biochemical reactor examples.

CH 510 03(3-0-0)
Chemical Engineering Thermodynamics.
F. Prerequisite: CH 310. Definition, correlation, and estimation of thermodynamic properties; nonideal chemical and physical equilibria.

CH 514/C 514 03(3-0-0)
Polymer Science and Engineering.
F. Prerequisite: C 343, C 475. Credit not allowed for both CH 514 and C 514. Fundamentals of polymer science: synthesis, characterization, processing of polymers. Physical properties of polymers; rheology of melts and solutions.

CH 551 03(3-0-0)
Mathematical Modeling for Chemical Engineers.
F. Prerequisite: AC 305, CH 420. and computer programming course. Application of mathematical models to analysis and design of chemical reactors and separation processes.

CH 553 03(3-0-0)
Separation Processes.
S. Prerequisite: AC 305. Equilibrium processes, multistage separations. contacting devices, energy requirements.

CH 560 03(3-0-0)
Environmental Biotechnology.
S. Prerequisite: MB 300; CH 420 or CH 504 or CE 439/CH 439. Use of microorganisms for pollution control. Biodegradation kinetics, bioreactor design, and in situ biorestoration.

CH 630 03(3-0:0)
Advanced Process Control.
F. Prerequisite: CH 430. Application of modern control theory to chemical processes. Computer control aspects emphasized.

CH 654 03(3-0-0)
Advanced Mass Transfer.
S. Prerequisite: AC 305, CH 406. CH 551. Molecular and turbulent diffusion and interphase mass transport. Applications to continuous contact separation processes.

CH 693 01(0-04)
Seminar I.

CH 695 Var.
Independent Study.

CH 696 Var.
Group Study.

CH 699 Var.
Thesis.

CH 704 03(3-0-0)
Advanced Fermentation Technology.
S. Prerequisite: CH 504. Media and air sterilization; scale-up; continuous culture; mixed cultures; fermentor design and instrumentation; recovery of fermentation products.

CH 705 03(3-0-0)
Enzyme Technology.
S. Prerequisite: CH 504. Enzyme kinetics and preparation. soluble and immobilized enzyme technology.

CH 753 03(2-2-0)
Bioseparation Processes.
S. Prerequisite: CH 560. Analysis of processes used to recover and purify fermentation products.

CH 704 Var.
Supervised College Teaching.
F, S, SS.

CH 793 01(0-0-1)
Seminar II.

CH 795 Var (1-15)
Independent Study.

CH 799 Var (1-15)
Dissertation.

CELL AND MOLECULAR COURSES

Office of the Graduate School

CM 501 04(4-0-0)
Advanced Cell Biology.
F. Prerequisite: BY 310 or written consent of instructor. Cell structure and organelle function.

CM 595 Var.
Independent Study.

CM 699 Var.
Thesis.

CM 701A-I.
Topics In cell and Molecular Biology.
F.S. Prerequisite: A-E, H-I) BC 403, CM 501, M 255. F-G) C 344.
A) Microbial cell walls 01(1-0-0)
B) Microbial membranes 01(1-0-0)
C) Animal hormones-secretion and action 01 (1-0-0)
D) Radiation cytogenetics 01 (1-0-0)
E) Animal development and aging 01 (1-0-0)
F) Gene expression at the level of translation 01(1-0-0)
G) Steroid hormone mechanism of action 01(1-0-0)
H) Gene control during animal development 01(1-0-0)
I) Planning research and grant proposals 02(2-0-0).

CM 702A-G.
Methods in Cell and Molecular Biology.
F, S. Prerequisite: BC 403. CM 501, M 255.
A) Principles of light and electron microscopy 01(0-3-0)
B) Mammalian cell culture techniques 01 (0-3-0)
C) Immunochemical techniques 01(0-3-0)
D) Radiation cytogenetics 01(0-3-0)
E) Flow cytometry and cell sorting 02(0-4-0)
F) Synthesis of peptidyl compounds 01 (0- 3-0)
G) Protein sequencing 01 (0-3 -0).

CM 710/PD 710 03(0-4-1)
Techniques in Molecular Biology and Genetics.
S. Prerequisite: AG 330 or B 350/Z 350 or BC 463 or MB 450 or Z 346. Credit not allowed for both CM 710 and PD 710. Genetic manipulation of.bacteria. bacteriophage. and yeast including experiments in molecular cloning and gene expression.

CM 792 01(1-0-0)
Cell and Molecular Biology Seminar.
F.S. Prerequisite: CM 501 or concurrent registration. Preparation and presentation of cell and molecular biology seminars.

CM 793 01(0-0-1)
Seminar.

CM 795 Var.
Independent Study.

CM 796 Var.
Group Study.

CM 799 Var.
Dissertation.

COMPOSITION COURSES

English Department College of Liberal Arts

CO 150 03(3-0-0)
College Composition.
F.S. SS. Prerequisite: Composition Placement Examination. Expository and argumentative writing emphasizing purpose and audience; writing and reading processes; development of ideas; coherence; effective style.

CO 301A-C 03(3-0-0)
Intermediate Composition.
F, S. SS. Prerequisite: CO 150. Developing fluency, clarity. strategy. and style. A) Expository writing in the humanities. B) Expository writing in the sciences. C) Expository writing in the social sciences.

CO 401 03(3-0-0)
Advanced Composition.
F.S. Prerequisite: CO 301A or B or C. Advanced expository and persuasive writing emphasizing modes, strategies. and styles for a variety of audiences and purposes.

COMPUTER SCIENCE COURSES

Computer Science Department College of Natural Sciences

CS 101/EE 101 03(2-2-0)
Engineering Computing.
F. Prerequisite: High school algebra and geometry. Credit allowed for only one of the following: CS 101, CS 151, EE 101. Programming emphasizing Pascal with applications to engineering problems.

CS 110 04(3-3-0)
Personal Computing I.
F, S, SS. Personal computing: hardware/software concepts, operating system commands. word processing, spreadsheets. programming.

CS 150 03(3-0-0)
Introduction to FORTRAN Programming.
F. S, SS. Prerequisite: Two years of high school mathematics or University mathematics requirement. Credit not allowed for both CS 150 and ME 101. Computer programming using FORTRAN; applications in science and nonscience areas; practical programming exercises.

CS 151 04(3-0-1)
Introduction to Pascal Programming.
F, S. SS. Prerequisite: M 121. Credit allowed for only one of the following: CS 101, CS 151, EE 101. Structured programming using Pascal: language syntax, problem solving. basic data structures. searching. sorting. recursion.

CS 152 02(2-0-0)
FORTRAN Programming Module.
F, S. SS. Prerequisite: CS 151. Credit not allowed for both CS 152 and CS 150. Not intended as a first course in programming. Constants. variables. expressions. statements, program and data structures. I/O. libraries.

CS 155 04(3-0-1)
Computer Organization.
F.S. Prerequisite: CS 151. M 124. Digital logic. digital systems. representation of data. memory system organization and architecture. assembly language programming.

CS 200 04(3-0-1)
Algorithm and Data Structures.
F.S. Prerequisite: *CS* 151. concurrent registration in CS 201 or M 201. Data structures: abstract data types, complexity analysis; sorting. searching; examples from file systems. databases. graphics.

CS 201/M 20104(4-0-0)
Discrete Structures.
F.S. Prerequisite: CS 151. M 160. Credit not allowed for both CS 201 and M 201. Machine logic. data structures. spanning trees. machines and languages. Boolean algebra. algebraic structures, recursive algorithms.

CS 210 0413-2-0)
Personal Computing II.
S. Prerequisite: CS 110. Intermediate personal computing: pc operating systems. word processing, computer programming concepts; introduction to data base.

CS 252 02(2-0-0)
C Programming Module.
F.S. SS. Prerequisite: CS 200. Not intended as a first course in programming. Data types. expressions. program structures and idioms. I/O. libraries.

CS 253 04(3-0-1).
Computer Programming Languages.

F.S. Prerequisite: CS 155. CS 200. CS 201 TM 201. Virtual machines, data types. sequence control. programming paradigms. storage management. grammars and translation. semantics.

CS 301 04(3-3-0)
Foundations of Computer Science.
F.S. Prerequisite: CS 200. CS 201/M 201. M 229. Formal languages, automata; algorithm design, complexity classes; computability; process coordination; search strategies; correctness efficiency.

CS 314 04(3-3-0)
Software Development Methods.
S. Prerequisite: CS 253. Methods used to develop large-scale software projects in industry emphasizing design. implementation, and testing.

CS 370 04(3-3-0)
System Architecture and Software.
F.S. Prerequisite: CS 155. CS 200. Memory organization; 110 control; alternative architectures; multitasking; process control, security. networking. distributed computing.

CS 410 04(3-2-0)
Introduction to Computer Graphics.
F.S. Prerequisite: CS 314. M 229. Graphics hardware and software; drawing simple objects; coordinate transformations in *2D* and 3D; modeling and viewing complex 2D and 3D objects.

CS 415 02(0-6-0)
Software Development Project 1.
F. Prerequisite: CS 314. Group software development project in realistic setting. Requirement specification. planning. design documentation, integration. and system test plan.

CS 416 02(0-6-0)
Software Development Project II.
S. Prerequisite: *CS* 415. Implementation, unit test plan. test execution, delivery.

CS 420 04(3-3-0)
Formal Languages and Automata.
F. Prerequisite: CS 301. Advanced concepts in formal languages. grammars. automata; deterministic, nondeterministic machines; computability, decidability; complexity classes.

CS 430 04(3-2-0)
Database Systems.
S. Prerequisite: CS 314. Database analysis. design, administration. implementation, hierarchical. network relational models; data sublanguages; query facilities.

CS 440 04(3-2-0)
Introduction to Artificial Intelligence.
F. Prerequisite: CS 253. CS 301. Symbolic computation through programming languages LISP and PROLOG; applications of symbolic computing in artificial intelligence.

CS 45104(3-3-0)
Operating Systems.
F.S. Prerequisite: CS 370. Operating system design and implementation. File systems. distributed operating systems. case studies.

CS 453 04(3-3-0)
Introduction to Compiler Construction.
F. Prerequisite: CS 253. CS 301. Functional components of a compiler: modules. interfaces. lexical and syntax analysis. error recovery. resource allocation. code generation.

CS 457 04(3-2-0)
Data Communications.
F. Prerequisite: CS 370. Principles of communications. basic components. codes and error control. line sharing techniques. common carrier services. link protocols. simple networks.

CS 460 04(3-2-0)
Numeric Digital Computing.

F. Prerequisite: CS 150 or CS 152; M 350. Floating point arithmetic; structured numeric software; job control languages; linear and nonlinear equations; approximation; integration.

CS 470 04(3-2-0)
Computer Architecture.
F.S. Prerequisite: CS 370. Instruction set;control:hardwired, microprogramming; memory; arithmetic; 1/0 and buses: performance evaluation; pipelining; RISC.

CS 475 04(3-3-0)
Parallel Prugramming.
F. Prerequisite: CS 370. Parallel programming techniques for shared-memory and mes-sage-passing systems; process synchronization. communication; example languages.

CS 486 Var (1-4)
Practicum.
Maximum of 12 credits allowed for any combination of CS 486. CS 495. Supervised work experience in approved computer science setting with periodic consultation of faculty.
CS 495 Var. Independent Study. Maximum of *12* credits allowed for any combination of CS 486. CS 495.

CS 510 04(3-3-0)
Computer Graphics.
S. Prerequisite:CS 410. Displaying 3D objects with realistic shading and lighting calculations. Hidden surface removal. Gourand and Phong shading. and ray tracing.

CS 514 04(3-3-0)
Software Engineering Methods.
F. Prerequisite: CS 314. Software development process. software project management. software metrics. Formal methods. testing and verification. software tools. design methods.

CS 515 02(0-6-0)
Software Engineering Project 1.
F. Prerequisite: CS 514 or concurrent registration. Advanced technical issues from practical management perspective. Supervisory. planning. estimation. specification. and evaluation techniques.

CS 516 02(0-6-0)
Software Engineering Project II.
S. Prerequisite: CS 515. Status reports. schedule updates. coding documents, maintenance considerations.

CS 520 04(3-3-0)
Analysis of Algorithms.
S. Prerequisite: CS 420. Orders of magnitude. asymptotic complexity. lower bounds, recurrence equations; P. NP completeness; intractable problems. parallel algorithms.

CS 540 04(3-3-0)
Artificial Intelligence.
S. Prerequisite: CS 440. Knowledge representation, automated reasoning, natural language understanding. vision processing, expert systems and machine learning; AI programming.

CS 551 04(3-3-0)
Principles of Operating Systems.
Prerequisite: CS 451. Advanced topics in concurrency. deadlock protection, multi-processor scheduling, computer system modeling. and virtual memory management.

CS 553 04(3-3-0)
Algorithmic Language Compilers.
S. Prerequisite: CS 420. CS 453. Compiler construction; lexical analysis. parsing. semantics. code generation, and error detection.

CS 554 04(3-3-0)
Computer System Design.

F.S. Prerequisite: CS 470. Array devices, register-level design. cascading/slicing, RALU, control options. microprogramming, buses. system design.

CS 557 04(3-3-0)
Distributed Systems.
S. Prerequisite: CS 451. Development of concurrent programs. analysis of distributed programs and operating systems.

CS 570 04(3-3-0)
Advanced Computer Architecture.
F. Prerequisite: CS 470. Pipelined CPU design; vector processors; cache memory design and evaluation; advanced computer arithmetic; VLIW; superscaler. parallel architectures.

CS 575 04(3-3-0)
Parallel Algorithms.
S. Prerequisite: CS 475. Parallel computation models. algorithms. complexity analysis. numerical algorithms.

CS 612 04(3-2-0)
Topics in Computer Graphics.
F. Prerequisite: CS 510. Computer graphics research topics.

CS 614A-F Var (1-4)
Advanced Topics in Software Engineering.
S. Prerequisite: CS 514. Research topics in software engineering. A) Specification and design. B) Testing and verification. C) Software environments and tools. D) Software measurement, analysis and evaluation. E) Software process. F) Software reliability and fault tolerance.

CS 620A-E Var (1-4)
Topics in Computing Theory.
F. Prerequisite: CS 520 or written consent of instructor. A) Algorithms. B) Information theory. C) Logic in computing. D) Formal languages and automata theory. E) Mathematical foundations.

CS 630 04(3-2-0)
Fault-Tolerant Computing.
S. Prerequisite: CS 370. Test generation; fault modeling; random. compact testing; error detection. correction; reliability analysis; fault-tolerant, testable design techniques.

CS 640 02(2-0-0)
Advanced Artificial Intelligence I.F. Prerequisite: CS 540.
Research topics in artificial intelligence: genetic algorithms. neural networks. connectionist models; machine learning; planning, automated reasoning.

CS 641 02(2-0-0)
Advanced Artificial Intelligence ILS.
Prerequisite: CS 640. Advanced research topics in artificial intelligence.

CS 65104(3-3-0)
Topics in Operating Systems.
S. Prerequisite: CS 551. Topics in distributed operating systems, system reliability. performance evaluation and modeling.

CS 653A-B Var (1-4)
Advanced Topics in Programming Languages.
F.S. Prerequisite: Written consent of instructor. A) Language design and definition. B) Language implementation.

CS 670A-F/EE 670A-F Var (1-4)
Topics in Architecture/ Systems.
F.S. Prerequisite: CS 570 or EE 554 or written consent of instructor. Credit not allowed for both CS 670A-F and EE 670A-F. A) Data flow. B) Performance evaluation and modeling.
C) Distributed systems. D) Architecture of advanced systems. E) Computer arithmetic.
F) Microarchitecture.

CS 692 Var.
Seminar.

CS 695 Var.
Independent Study.

CS 696 Var.
Group Study.

CS 699 Var.
Thesis.

CS 799 Var.
Dissertation.

DANCE COURSES

Music, Theatre, and Dance Department College of Liberal Arts

D 110 03(2-0-1)
Understanding Dance.
F.S. SS. For non-dance majors. Previous dance experience not necessary.
Broad examination of dance.

D 120A-C 02(0-4-0)
Dance Techniques I.F.S.
A) Modern. B) Ballet. C) Jazz.

D 121 A-C 02(0-4-0)
Dance Techniques II.
F.S. Prerequisite: D 120A-C. A) Modern. B) Ballet. C) Jazz.

D 220A-C 02(0-4-0)
Dance Techniques III.
F. Prerequisite: D 121A-C. A) Modern. B) Ballet. C) Jazz.

D 221A-C 02(0-4-0)
Dance Techniques IV.
S. Prerequisite: D 220A-C. A) Modern. B) Ballet. C) Jazz.

D 226 02(1-2-0)
Dance Choreography I.V.
Prerequisite: D 121A or B or C. Elements of dance composition including space. levels. rhythm. dynamics. qualities of movement. Form. style.

D 227 03(2-2-0)
Creative Movement and Dance.
F.S. Theory and teaching methods and materials for teaching creative movement, folk. square. and social dance activities. K-12.

D 320A-C 02(0-4-0)
Dance Techniques V.
Prerequisite: D 221A-C. A) Modern. B) Ballet. C) Jazz.

D 321A-C 02(0-4-0)
Dance Techniques VI.
S. Prerequisite: D 320A-C. Al Modern. B) Ballet. C) Jazz.

D 325 03(2-2-0)
Dance Production.
F. Production aspects of dance performance including: management. publicity. budgeting, programming. sound. lighting, costuming. and makeup.

D 326 02(1-2-0)
Dance Choreography II.
S. Prerequisite: D 221A or B or C. Compositional studies of period styles. primitive Greek. Roman, medieval. Renaissance. 16th. 17th. 18th, 19th centuries.

D 330 Var (1-3).
Dance Repertory.
F.S. SS. Prerequisite: Written consent of dance faculty. Experience in choreographic styles and choreography of national, international choreographers; opportunity to develop individual repertoire of dance.

D 420A-C 02(0-4-0)
Dance Techniques VII.
F. Prerequisite: D 321A-C. A) Modern. B) Ballet. C) Jazz.

D 421 A-C 02(0-4-0)
Dunce Techniques VIII.
S. Prerequisite: D 420A-C. A) Modern. B) Ballet. C) Jazz.

D 426 02(1-2-0)
Dance Choreography III.
F, S. Prerequisite: D 321A or B or C. Studies in 20th-century dance composition forms.

D 427 03(3-0-0)
Dance History I.
F. History of classical ballet to modern times from its origins in folk dance of Middle Ages and social dance of Renaissance.

D 428 03(3-0-0)
Dance History II.
S. Personalities. events. trends influencing development of dance in 18th. 19th. 20th centuries.

D 430 03(3-0-0)
Labanoration.
S. Prerequisite: D 120A or B or C. Translating movement into written symbols and ability to read the notation.

D 432 03(2-2-0)
Dance Therapy.
SS. Prerequisite: D 227. EX 125. Use of dance forms in therapy for mentally and physically handicapped.

D 486 Var. (1-3).
Practicum.

D 491 Var (1-3)
Workshop.

D 495 Var.
Independent Study.

D 496 Var.
Group Study.

D 527 02(0-4-0)
Contemporary Dunce.
S. Techniques of dance movement and choreography.

DESIGN, MERCHANDISING, AND CONSUMER SCIENCES COURSES

Design, Merchandising. and Consumer Sciences Department College of Applied Human Sciences

#DM 487A-F
Internship.
Prerequisite: A) AM 371. AM 377. BK 360. DM 492. B) AM 377, AM 440. AM 446. DM 492. C) AM 314. AM 377. DM 492. D) DM 492. ID 376. E-F) Written consent of instructor. Special fee. $5 per credit per subtopic. A) Merchandising. Var (12-16) B) Apparel design. Var (12-16)
C) Apparel production. Var(12-16) D)Interior design. Var (3-16) E) Consumer sciences. Var (3-16) F) General. Var (3-16)

DM 492 01(04-1)
Preinternship Seminar.
Background information necessary to apply for and complete an internship experience.

DM 592 Var (1-3)
Seminar.

DM 650 03(3-0-0)
Research Methods.
S. Prerequisite: Written consent of instructor. Design and methods of research applicable to design. merchandising, and consumer sciences.

ENGLISH COURSES

English Department College of Liberal Arts

E140 03(3-0-0)
Introduction to Literature.
F, S. SS. Analysis of structural patterns underlying literature. emphasizing fiction and drama.

E 145 03(3-0-0)
Introduction to Drama.
F.S. SS. Basic elements of drama. its literary history and major dramatic writers.

E160 03(3-0-0)
Mythical and Biblical Backgrounds.
F, S, SS. Central myths and stories of classical and Biblical traditions necessary to understanding Western culture.

E179 03(3-0-0)
Western American Literature.
F. S, SS. Trans-Mississippi West in fiction and other literary forms.

E 210 03(3-0-0)
Beginning Creative Writing.
F.S. Prerequisite: E 140. Basic techniques of writing fiction and poetry; may include some elements of drama.

E232 03(3-0-0)
Introduction to Humanities.
F, S, SS. Great literature of Western cultural tradition from ancient times to present.

E233 03(3-0-0)
Introduction to Humanities.
F, S. Interrelationships of literature, art, music, and society.

E 234 03(3-0-0)
Native American Literature.
S. SS. Native American writings and their significance in American culture.

E 235 03(34-0)
Introduction to Folklore.
F. Folklore and its relationship to anthropology and literature.

E 236 03(3-0-0)
Literature of Social Protest.
F.S. Social problems and alienation of the individual as viewed by modern writers.

E 237 03(3-0-0)
Introduction to Science Fiction.
F.S. Historical development and major themes of science fiction. featuring writers such as Wells. Huxley. Bradbury. and LeGuin.

E 238 03(34-0)
20th-Century Fiction.
F.S. SS. 20th-century fiction chosen for its interest and relevance emphasizing contemporary authors.

E 240 03(3-0-0)
Introduction to Poetry.
F.S. SS. Development of critical skills necessary to understand and enjoy poetry.

E 242 03(3-0-0)
Introduction to Shakespeare.

F.S. Readings and discussion of selected plays and sonnets by Shakespeare for enjoyment and understanding.

E 247 03(3-0-0)
Vietnam War in Fiction.
F. Novels selected by internal chronology to show origins. development. and effects of Vietnam War.

E 270 03(3-0-0)
Introduction to American Literature.
F.S. SS. American literature from its beginnings to 1914.

E 275 03(3-0-0)
Introduction to British Literature.
F.S. SS. Selected major works of British literature from the beginning to the present.

E 31 IA-C 03(3-0-0)
Intermediate Creative Writing.
F. Prerequisite: A-B) E 210. C) CO 150; E 210 or IT 210. Group discussion of student writing. literary models. and theory; emphasis on developing individual style. A) Fiction. B) Poetry. C) Nonfiction.

E 320A-D03(34-0)
Introduction to the Study of Language.
F. S, SS. A) General linguistics. B) Language and literature. C) Language and society. D) Language and basic and applied sciences.

E 322 03(3-0-0)
English Language for Teachers I.
F. Foundations of language structure. emphasizing grammar. sounds. spelling. word structure. linguistic variation, usage. acquisition. and pedagogy.

E 323 03(3-0-0)
English Language for Teachers II.
S. Prerequisite: E 322. Advanced grammar; language history;meaning; applications to teaching composition. reading, and literature.

E 326 03(3-0-0)
Development of the English Language.
S. Chronological study of four historical stages of English (Old. Middle. Early Modern. Modern) with emphasis on grammar. vocabulary. and phonology.

E 330 03(3-0-0)
Images of Women in Literature.
F. Selected world literature ranging from ancient world to present. considered in light of various complexities of gender relations.

E 332 03(3-0-0)
Modern Women Writers.
F. Selected 20th-century women writers in variety of genres emphasizing relationships between gender. writing. and reading.

E 333 03(3-0-0)
Literature and Social Sensitivity.
F.S. SS. Contemporary American literature of special relevance to social issues.

E 335 03(3-0-0)
American Folklore.
S. Regional. ethnic. and urban folklore in America.

E 337 03(3-0-0)
Western Mythology.
S. Major themes in western myth: classical. Biblical. and Germanic.

E 341 03(3-0-0)
Principles of Literary Criticism.
F, S. Prerequisite: One course in literature. Theory' and practice of modern literary analysis and evaluation; writing about literature.

E 342 03(3-0-0)
Shakespeare I.
F, SS. Shakespeare's development as a poet and dramatist from the early plays through Hamlet.

E 343 03(3-0-0)
Shakespeare II.
S. SS. Shakespeare's development as a poet and dramatist after *Hamlet.*

E 345 03(3-0-0)
American Drama.
F. Development of indigenous. native drama.emphasizing O'Neill. Miller, Williams. and Albee.

E 347/HY .147 03(3-0-0)
Modern Mideast Through Literature.
S. Credit not allowed for both E 347 and HY 347. Modern history and culture of Middle East peoples through their literature in English translation.

E 353 03(3-0-0)
Russian and Soviet Literature in Translation.
S. Prerequisite: One course in literature or HY 235. Russian and Soviet literature from Pushkin to present.

E 356 03(3-0-0)
Asian Literature.
F. Masterpieces of classical and contemporary literature of China. India, and Japan.

E 360 03(3-0-0)
Chaucer.
F. *Canterbury Tales* in medieval context.

E 363 03(3-0-0)
Milton.
F. Prerequisite: E 160. Milton's poetry' and prose emphasizing *Paradise Lost.*

E 371 03(3-0-0)
American Authors to 1870.
F. Prerequisite: One course in literature. In-depth study of selected American authors before 1870.

E 372 03(3-0-0)
American Authors Since 1870.
S. Prerequisite: One course in literature. In-depth study of selected American authors since 1870.

E 384A-B Var (1-3).
Supervised College Teaching.
F.S. Prerequisite: Written consent of department chair. Supervised assistance in instruction. A) Classroom. B) Writing Center.

E 402 03(3-0-0)
Teaching Composition.
F.*S.* SS. Prerequisite: CO 301A or B or C. Theory, and practice of the analysis and the teaching of writing.

E 403 03(3-0-0)
Nature Writing.
F. Prerequisite: CO 150. American and English writers who interpret nature and the landscape; critical analysis and application of their techniques to current interpretive problems.

E 405 03(3-0-0)
Adolescent Literature.

F.*S.* SS. Survey of literature for adolescents emphasizing development of critical ability. appreciation. and taste.

E 412A-C Var (1-3)
Creative Writing Workshop.
S. Prerequisite: A) Grade of B or better in E 311 A. B) Grade of B or better in E 311 B. C) Grade of B or better in E 311 A or E 311 C. Maxi mum of 8 credits allowed per subtopic.
Individual projects with group discussion and analysis. A) Fiction. B) Poetry. C) Nonfiction.

E 430 03(3-0-0)
18th-Century English Fiction.
F. Prerequisite: One course in literature. English fiction from Defoe to Austen stressing Richardson. Fielding. Smollett. and Sterne.

E 431 03(3-0-0)
19th-Century English Fiction.
S. Prerequisite: One course in literature. English fiction in Victorian and Edwardian eras emphasizing Dickens. the Brontes. Thackeray. George Eliot. and Hardy.

E 432 03(3-0-0)
20th-Century British Fiction.
F. Prerequisite: One course in literature. British fiction from Conrad to the present emphasizing Joyce. Lawrence, Forster. Woolf. and Beckett.

E 434 03(3-0-0)
American Fiction, 1865-1914.
F. Prerequisite: One course in literature. Form. content. and context of American fiction. 1865 1914: James. Twain. Crane. Wharton. Norris. and others.

E 435 03(3-0-0)
American Fiction, 1914-1945.
F. Prerequisite: One course in literature. Form. content. and context of American fiction, 1914-1945: Hemingway, Faulkner. Fitzgerald. Cather, Dos Passos. and others.

E 436 03(3-0-0)
American Fiction. 1945-Present.
S. Prerequisite: One course in literature. Form. content. and context of American fiction from 1945 to present: Kesey. Updike, Heller, Pynchon. Barthelme. Vonnegut. and others.

E 437 03(3-0-0)
Heritage of the West.
S. Prerequisite: One course in American history. Western American literature. primarily fiction. Focusing on the basic foundations of Western American society and attitudes.

E 438 03(3-0-0)
Contemporary Native American Literature.
F. Contemporary fiction. poetry of Native Americans emphasized as distinctive tradition in American literature and cultural expression of indigenous peoples.

E 439 03 (3-0-0)
Novel in the American West.
F. Prerequisite: E 179 or E 270. History and development of American Western novels, including thematic and stylistic considerations. Writers will include Wister. Cather, and Stegner.

***E 444 03(3-0-0)**
Restoration and 18th-Century Drama.
S. Major plays and dramatic issues from 1660 to 1780 including Dryden, Etherege. Congreve. Sheridan. and others.

E 445 03(3-0-0)
Modern British and European Drama.
S. Realism and anti-realism in modern British and European drama.

E 452 03(3-0-0)

Masterpieces of European Literature.
F. Prerequisite: One course in literature. Selected works of European literature through the 19th century.

E 455 03(3-0-0)
20th-Century European Literature.
S. Prerequisite: Two courses in literature. 20th-century fiction and poetry of continental Europe in translation.

E 465 03(3-0-0)
Topics in Literature and Language.
S. Selected issues in literature and language.

E 475 03(3-0-0)
American Poetry.
F. Prerequisite: E 240. Major American poets through the 19th century including Whitman, Dickinson, and Frost.

E 476 ***03(3-0-0)***
English Poetry 1.
S. Prerequisite: E 240. Major English poets of Renaissance and neoclassical periods including Spenser. Donne. Jonson. Milton. Dryden. and Pope.

E 477 03(3-0-0)
English Poetry II.
S. Prerequisite: E 240. Major English poets of the 19th century including Blake. Wordsworth. Byron. Keats, and Browning.

E 470 03(3-0-0)
Modern Poetry.
F. SS. Prerequisite: E 240. Major British and American poets from late 19th century to Second World War.

E 487 Var (1-3)
Internship.
Prerequisite: 2.5 GPA; written consent of adviser. Maximum of 3 credits allowed in course. Supervised work experience in jobs requiring extensive use of reading and writing skills.

E 495 Var (1-3)
Independent Study.
Individually guided studies in literature. writing. English language. and linguistics.

E 501 03(3-0-0)
Theories in Composition.
F.S. Prerequisite: E 402. Theoretical approaches to the nature of the composing process.

E 502 03(3-0-0)
Language, Literacy, and Learning.
S. Prerequisite: Teaching experience or 3 credits in upper-division English or education courses. Theoretical and practical perspectives on language and learning skills necessary for basic academic reading and writing.

E 504 03 (3-0-0)
Descriptive Linguistics.
F. Descriptive study of English syntax and morphosyntax in their relations to language acquisition and teaching.

E 505A-C 03(3-0-0)
Major Authors.
F.S. SS. Prerequisite: Six credits of literature. Intensive study of the works of one or two major authors. A) English. B) American. C) World.

E 506A-C 03(3-0-0)
Literature Survey.

F.S. SS. Prerequisite: Six credits of literature. Synthesis of literary attitudes. modes. genres of an age. A) English. B) American. C) Comparative.

E 507 03(3-0-0)
Special Topics In Linguistics.
F.S. SS. Prerequisite: Written consent of instructor.

E 513A-C 03(3-0-0)
Form and Technique In Modern Literature.
F. Prerequisite: Written consent of instructor. Selected readings in and discussions of modern literature and criticism from the writer's point of view with emphasis on form and technique. A) Fiction. B) Poetry. C) Essay.

E 520 03(3-0-0)
English Phonetics and Phonology.
S. Articulatory phonetics. phonological theory and analysis with principal applications to American English and to pedagogy.

E 521 03(3-0-0)
Advanced Syntax.
S. Prerequisite: E 504. Recent generatire theories of language structure and research in second language acquisition and pedagogy.

E 522 03(3-0-0)
Semantics. Pragmatics, and Discourse.
F. Linguistic study of literal and nonliteral meaning. including role of textual and situational context.

E 526 03(3-0-0)
Teaching English as Foreign/Second Language.
F. Principles of teaching English as a foreign/second language. Development of a coherent method. including activities. materials. and course design.

E 527 03(3-0-0)
Theories of Foreign/Second Language Learning.
F. Prerequisite: E 526. Theories of second language learning/acquisition; emphasis on psycholinguistic processes of language learning.

E 590 Var (1-3).
Workshop In TESOL.
F.S. SS. Prerequisite: E 526. Methodology/linguistic theory designed to solve practical problems in teaching. testing. and materials development.

E 600 03(3-0-0)
Research Methods and Theory.
F. Materials and methods of literary scholarship: bibliography. documentation. textual criticism. editing. and literary criticism.

E 601 Var (2-3)
Research In Teaching English as Second Language.
F. Prerequisite: E 526. Evaluation and design of research in language acquisition.

E 602 03(3-0-0)
Teaching Writing for the Professions.
F.S. SS. Prerequisite: Written consent of instructor. Prepare leachers to teach writing to individuals entering professional fields.

E 603 03(3-0-0)
Computers and Composition.
F.S. SS. Prerequisite: Written consent of instructor. Relationship of computer-assisted instruction to rhetoric and composition.

E 605 03(3-0-0)
Reading/Writing Connection.

F.S. SS. Theoretical understanding of reading and writing processes: practical implications for professional writers and teachers of writing.

E 615 03(3-0-0)
Reading Literature-Recent Theories.
F.S. Recent developments in structuralist/post structuralist theories of discourse.

E 630A-D 03(3-0-0)
Special Topics in Literature.
F.S. A) Area studies. B) Genre studies. C) Theory and technique studies. D) Gender studies.

E 631 03(3-0-0)
Crossing Boundaries.
F.S. SS. Cross-topical studies of literature.

E 632 03(3-0-0)
Professional Concerns in English.
F.S. SS. Professional concerns of public school teachers of English.

E 640A-C Var. (1-5)
Graduate Writing Workshop.
Prerequisite: Written consent of instructor. Maximum of I 1 credits allowed per subtopic. Individual projects with group discussion and analysis. A) Fiction. F, S. B) Poetry. F, S. SS.
C) Essay. F.S.

SS. E 684A-E Var (1-5)
Supervised College Teaching.
F.S. SS. A) Composition. B) ESL. C) Creative writing. D) Literature. E) Computer-assisted instruction.

E 687A-G Var (1-5)
Internship.
A) Teaching college English. B) Composition administration. Prerequisite: E 501. E 684A.
C) Literary editing. D) Composition. E) Teaching ESL. K-12. F) Communication development.
G) Teaching creative writing.

E 695 Var.
Independent Study.

E 699 Var.
Thesis.

AGRICULTURAL AND RESOURCE ECONOMICS COURSES

Agricultural and Resource Economics Department College of Agricultural Sciences

EA 102 03(3-0-0)
Agricultural/Natural Resource Economics.
F.S. Credit not allowed for both EA 102 and EC 102. Economic principles applied to agriculture. natural resources; price determination. resource allocation. government policies. other contemporary problems.

EA 205 03(2-2-0)
Farm and Ranch Management.
F.S. Prerequisite: EA 102 or EC 102. Application of economic concepts and management functions to production. Financial. and marketing decisions involved in farm or ranch business.

EA 228 03(3-0-0)
Agricultural Business Management 1.
F, S. Prerequisite: EA 102 or EC 102. Principles of management and marketing applied to agribusiness with emphasis on cooperatives.

EA 2441/EC 240 03(3-0-0).
Issues in Environmental Economics.
F, S. Credit not allowed for both EA 240 and EC 240. Discussion and economic analysis of current environmental issues with special emphasis on the impact of economic growth.

EA 300/EC 300 03(3-0-0)
Managerial Economics.
F.S. Prerequisite: EA 102 or EC 102. Credit allowed for only one of the following: BG 305, EA 300. EC 300. Applied microeconomics emphasizing use of empirical demand. production. ,red cost functions in business decisions under alternate market structures.

EA 305 03(2-2-0)
Farm and Ranch Records and Analysis.
F. S. Prerequisite: EA 102 or EC 102. Utilization of records in farm management: analytical methods, budgets. and planning techniques for improved decision making.

+EA 308 03(3-0-0)
Agricultural Finance.
F. Prerequisite: EA 102 or EC 102. Special fee. $5. Monetary affairs of farming and ranching emphasizing agricultural credit. Facilities. procurement. extension. and management.

EA 3111 13(3-0-0).
Agricultural Marketing.
F. S, SS. Prerequisite: EA 102 or EC 102. Market structure, behavior. and performance including futures market and market games theory.

EA 335/EC 335 0313-(1-0)
Introduction to Econometrics.
F, S. Prerequisite: *EC* 100; 101 102 or EA 102; ST 301. Credit not allowed for both EA 335 ,'red EC 335. Estimating statistical regression models of economic relationships; treatment of special problems that may arise in analysis of economic data.

EA 340/EC 340 113(3-0-11)
Introduction to Economics of Natural Resources.
F. Prerequisite: EA 102 or EC 102. Credit not allowed for both EA 340 and EC 340. Concepts. theories, institutions; analytical methods for economic evaluation of:alternative resource use patterns and land use plans.

EA 342 03(3-0-0)
Economic Analysis-Water Resource Development.
S. Prerequisite: EA 102 or EC 102. Water resource evaluation; concepts. issues, and problems; techniques employed in analyzing and evaluating water use in alternative situations.

***EA 344/EC 344 (13(3-0-0)**
Economics of Energy Resources.
S. Prerequisite: I.A 102 or EC 102. Credit not allowed for both EA 344 and EC 344. Supply, consumption trends and projected demand for alternative energy resources in domestic and world perspective; economics of public energy policies.

EA 346/EC 346 03(3-0-0)
Economics of Outdoor Recreation.
F. Prerequisite: EA 102 or EC 102. Credit not allowed for both EA 346 and EC 346. Benefit cost framework in public planning for outdoor recreation, pricing problems, projecting demand, and regional economic development.

EA 348/EC M 803(3-0-0)
Economics of Urban and Regional Land Use.
F. Prerequisite: EA 102 or EC 102. Credit not allowed for both EA 348 and EC 348. General theory of land values and uses in cities and regions; dynamics of urban/regional growth; selected case studies and current land use issues.'

EA 375 03(3-0-0)
Agricultural Law.
F.S. Laws, regulations, case decisions affecting ranching and farming in the Rocky Mountain area.

EA 405 03(2-2-0)
Agricultural Production Management.
F. Prerequisite: EA 102 or EC 102. Economic principles of agricultural production decisions. Linear programming analysis of production levels, least cost rations, and farm planning.

+EA 409 03(3-0-0)
Farm and Ranch Appraisal.
S. Prerequisite: EA 205 or EA 305. Special fee, $5. Principles and procedures for appraising farms. ranches, and other rural property; case studies applying various approaches to valuing rural property.

EA 412 03(2-2-0)
Agricultural Commodities Marketing.
S. Prerequisite: EA 102 or EC 102. Special fee. $10. Agricultural marketing and agribusiness principles applied to current marketing problems relating to livestock and field and horticultural crops.

EA 415 03(3-0-0)
International Agricultural Trade.
F. Prerequisite: EC 100: EA 102 or EC 102. Agricultural trade patterns and institutions; trade theory with applications to agriculture. Current issues in agricultural trade.

EA 428 03(3-0-0)
Agricultural Business Management II.
S. Prerequisite: EA 102 or EC 102. Economic analysis. organization, and management practices of agriculture and food industries.

EA 430 03(3-0-0)
Agricultural Prices and Commodity Trading.
F. Prerequisite: EA 335 or EC 335. Price discovery under imperfect competition in agriculture; influence of government programs; techniques of price analysis related to commodity trading.

EA 460 03(3-0-0)
Economics of World Agriculture.
F. Prerequisite: EA 102 or EC 102. Relationships between developed and developing nations affecting agricultural growth and productivity.

***EA 462 03(3-0-0)**
Issues in Development Economics.
S. Prerequisite: EC 100; EA 102 or EC *102.* Analysis of current problems confronting developing countries: unemployment. international trade; development financing; and inflation.

EA 478 03(3-0-0)
Agricultural Policy.
S. Prerequisite: EC 100 EA 102 or EC 102. Formation and administration of public policies affecting United States agricultural industry and rural areas.

EA 484 Var. (1-5).
Supervised College Teaching.
F.S. Maximum of 10 credits allowed in course.

EA 487 Var.
Internship.

EA 492 01(0-0-1)
Seminar.
F. Outcomes assessment; exposure to and preparation for employment in agricultural and resource economics.

EA 495 Var.
Independent Study.

EA 496 Var.
Group Study.

EA 505 03(3-0-0)
Agricultural Production Economics.
S. Prerequisite: M 141; EA 405 or EC 306. Empirical applications of production economic theory for use of inputs and allocation of resources in agricultural. natural resource sectors.

EA 508 03(3-0-0)
Financial Management in Agriculture.
S. Prerequisite: EA 308. Systematic approach to understanding and applying financial management in farm businesses.

EA 510 03(3-0-0)
Agricultural Product Marketing.
F. Prerequisite: EA 310. Marketing techniques. industrial organization/competition for agricultural products in U.S. domestic. international trade. and developing country markets.

EA 530 03(3-0-0)
Agricultural Price Analysis.
S. Prerequisite: EA 430. Agricultural commodity prices related to neoclassical economics; current literature emphasizing management problems.

EA 535/EC 535 03(3-0-0)
Applied Econometrics.
F.S. Prerequisite: EA 335/EC 335. EC 304. EC 306. M 315. Credit not allowed for both EA 535 and EC 535. Econometric techniques applied to testing and quantification of theoretical economic relationships drawn from both microeconomics. macroeconomics.

EA 540/EC 540 03(3-0-0)
Economics of Natural Resources.
F. Prerequisite: EA 340/EC 340. M 141. Credit not allowed for both EA 540 and EC 540. Public natural resources policy. effect on resource use in private sector. optimal pricing of minerals. timber and fisheries. public project analysis.

EA 541/EC 541 03(3-0-0)
Environmental Economies.
S. Prerequisite: EC 306. Credit not allowed for both EA 541 and EC 541. Economics of environmental policy; partial equilibrium and general equilibrium model; pollution; natural environments; population and economic growth.

EA 542 03(3-0-0)
Economies of Water Resource Planning.

S. Prerequisite: EC 306. M 141. Benefit-cost analysis of public water development programs; economic analysis of selected water allocation issues; ground-water. pollution. pricing.

EA 543 03(3-0-0)
Methods of Regional Economic Analysis.
F. Prerequisite: EA 102 or EC 102. EC 306. concurrent registration in M315. Analytical methods for regional economic measurement and forecasting. non-market benefits estimation. and regional vs. national optimization.

°EA 566/S 566 0313-0-0)
Contemporary Issues of Developing Countries.
S. Prerequisite: Two or more courses in economics and/or sociology. Credit not allowed for both EA 566 and S 566. Social. economic. and technological factors in developing counties.

EA 570/EC 530 03(3-0-0)
Methodology of Economic Research.
S. SS. Prerequisite: EC 304. EC 306. Credit not allowed for both EA 570 and EC 530. Philosophical foundations of science and research. Concepts and skills for planning. performing. reporting. and evaluating economic research.

EA 575 03(3-0-0).
Water Law.
F.S. Prerequisite: EA 375 or written consent of instructor. Law as it governs acquisition of water rights under riparian and appropriations .systems; interstate waters and agencies of distribution.

***EA 624 0313-0-0)**
Agribusiness Economics I.
S. Prerequisite: EC 306. U.S. and developing food and fiber systems are compared. Economic contribution of food and input-output analysis shows economic contribution of sector; food security.

°EA 625 03(3-0-0)
Agribusiness Economies II.
S. Prerequisite: EC 306. Economic and business analyses of domestic and international food industries including projections with explanations of food price margins.

EA 660 03(3-0-0)
Economics of Agricultural Development.
S. Prerequisite: EA 460. Developments in agriculture related to food supply and economic growth in developing countries.

EA 662/ME 610 03(3-0.-0)
Planning for Development.
S. Prerequisite: EC 460 or ME 410. Credit not allowed for both EA 662 and ME 610. Theory of central planning and quantitative methods for execution; experiences of selected underdeveloped nations.

EA 678 03(3-0-0)
Agricultural Policy.
F. Prerequisite: EA 478. Public policy in agriculture emphasizing economic criteria for policy; considerations of welfare and economic efficiency.

EA 695 Var.
Independent Study.

EA 699 Var.
Thesis.

°EA 715 03(3-0-0)
Mathematical Optimization.
F. Prerequisite: EA 505 or EC 506. M 315. Mathematical optimization problems arising in application of economic theory to agricultural and natural resources.

***EA 725/EC 725 03(3-0-0)**
Capital Theory, Risk and Uncertainty.

F. Prerequisite: Written consent of instructor. Credit not allowed for both EA 725 and EC 725. Problems of intertemporal optimality.

EA 765 03(3-0-0)
Agricultural Development-Planning and Policy.
F. Prerequisite: EA 460 or EC 460, EC 504, EC 506, concurrent registration in M 315. Principles and concepts for agricultural development planning and policy analysis with case studies.

EA 784 Var (1-3).
Supervised College Teaching.
F. S,

SS. EA 792A-C Var.
Seminar.
A) Agricultural. B) International. C) Resources.

EA 795 Var.
Independent Study.

EA 799 Var.
Dissertation.

ECONOMICS COURSES

Economics Department College of Libera I Arts

EC 100 03(2-0-1)
Principles of Macroeconomics.
F, S. SS. Prerequisite: M 120. Determinants of national output. employment. and price level; inflation and unemployment; government stabilization policies.

EC 102 03(2-0-1)
Principles of Microeconomics.
F.S. SS. Prerequisite: M 120. Credit not allowed for both EC 102 and EA 102. Output pricing and resources allocation; contemporary problems such as pollution. antitrust policy. and international trade.

EC 105 03. Survey of Economic Issues.
F.S. SS. This course cannot substitute or fulfill the requirements for EC 100 or EC 102. Offered as telecourse only. Macroeconomics and microeconomics. using contemporary and historical case studies.

EC 240/EA 240 03(3-0-0)
Issues In Environmental Economics.
F.S. Credit not allowed for both EC 240 and EA 240. Discussion and economic analysis of current environmental issues with special emphasis on the impact of economic growth.

EC 300/EA 300 03(3-0-0)
Managerial Economics.
F.S. Prerequisite: EA 102 or EC 102. Credit allowed for only one of the following: BG 305. EA 300. EC 300. Applied microeconomics emphasizing use of empirical demand. production. and cost functions in business decisions under alternate market structures.

EC 301 03(3-0-0)
Economic Fluctuations.
F.S. Prerequisite: EC 100;EC 102 or EA 102. Business cycles; economic conditions and indicators; external and macroeconomic factors affecting the firm; interpreting measures of economic activity.

EC 304 03(3-0-0)
Intermediate Macroeconomies.
F.S. SS. Prerequisite: EC 100. EC 102 or EA 102. M 141. Also offered as correspondence course. Theory of national income. its measurement and determinants; analysis of inflation. growth. debt. and public policy.

EC 306 03(3-0-0)
Intermediate Microeconomics.
F.S. SS. Prerequisite: EC 100. EC 102 or EA 102. M 141. Analysis of competitive and noncompetitive markets in terms of efficiency of resource utilization.

°EC 310 03(3-0-0)
Poverty and the Welfare State.
S. Prerequisite: EC 100 EC 102 or EA 102. Description and analysis of U.S. poverty; the "underclass"; feminization of poverty; working poor; the welfare state.

EC 315 03(3-0-0)
Money and Banking.
F. S, SS. Prerequisite: EC 100. Monetary theory and policy; description of financial institutions and markets.

EC 3211 03(3-0-0).
Economics of Public Finance.
F.S. SS. Prerequisite: EC 100; EC 102 or EA 102. Impact of taxes. government expenditures on allocation of resources. distribution of income; evaluation of government expenditure program; tax policies.

EC 335/EA 335 03(3-0-0)
Introduction to Econometrics.
F.S. Prerequisite: EC 100; EC 102 or EA 102; ST 301. Credit not allowed for both EC 335 and EA 335. Estimating statistical regression models of economic relationships; treatment of special problems that may arise in analysis of economic data.

EC 340/EA 340 03(3-0-0)
Introduction to Economics of Natural Resources.
F. Prerequisite: EA 102 or EC 102. Credit not allowed for both EC 340 and EA 340. Concepts. theories, institutions; analytical methods for economic evaluation of alternative resource use patterns and land use plans.

***EC 344/EA 344 03(3-0-0)**
Economics of Energy Resources.
S. Prerequisite: EA 102 or EC 102. Credit not allowed for both EC 344 and EA 344. Supply, consumption trends and projected demand for alternative energy resources in domestic and world perspective; economics of public energy policies.

***EC* 346/EA 346 03(3-0-0)**
Economics of Outdoor Recreation.
F. Prerequisite: EA 102 or EC 102. Credit not allowed for both EC 346 and EA 346. Benefit cost framework in public planning for outdoor recreation, pricing problems, projecting demand, and regional economic development.

EC 348 TEA 348 03(3-0-0)
Economics of Urban and Regional Land Use.
F. Prerequisite: EA 102 or EC 102. Credit not allowed for both EC 348 and EA 348. General theory of land values and uses in cities and regions; dynamics of urban/regional growth; selected case studies and current land use issues.

***EC 350 03(3-0-0)**
Industrial Organization Economics.
F. Prerequisite: EC 100; EC 102 or EA 102. Structure, conduct, and performance of industries in competitive versus noncompetitive markets. Antitrust laws and policies.

EC 370 03(3-0-0)
Comparative Economic Systems.
F. Prerequisite: EC 100 or EC 102 or EA 102. Place of the economy in different societies; nature and evolution of capitalism; crisis of command economies and capitalist restoration.

EC 372 03(3-0-0)
History of Economic Institutions and Thought.
S. Prerequisite: EC 100; EC 102 or EA 102. Origins and development of capitalist institutions including contemporary. issues of alienation, loss of community. and changing values.

EC 376 03(3-0-0)
Marxist Economic Thought.
S. Prerequisite: EC 100: EC 102 or EA 1(12. Marxist critique of capitalism and orthodox economics in both its original 19th-century and contemporary settings.

EC 379/HY 379 03(3-0-0)
Economic History of the United States.
F. Prerequisite: EC 100; EC 102 or EA 102; or two courses in United States history. Credit not allowed for both EC 379 and HY 379. Economic analysis of growth and welfare from beginning of industrialization to present.

EC 404 03(3-0-0).
Macroeconomic Policy.
S. Prerequisite: EC 304. Alternative macroeconomic policies. policy coordination; application to current macroeconomic problems. policies, proposals.

***EC 410 (13(3-0-0).**
Labor Economics.

F. Prerequisite: EC 306. Capital/labor relationship; supply. demand of labor; wage determination; role of unions; unemployment and instability; structure of modem working class.

EC 430 03(3-0-0)
Research Methods in Economics.
S. Prerequisite: EC 304. EC 306. Application of scientific method to economic problem solving.

***EC 435 03(3-0-0).**
Economic Forecasting.
S. Prerequisite: EC 100; EC 102 or EA 102; EC 335 or ST 304 or BQ 270. Theory, and techniques used in economic forecasting as practiced by economists in industry. government. and academic life.

EC 440 03(3-0-0)
International Economics I.
F. Prerequisite: EC 306. Theory. of international trade; payments. commercial policies, and economic integration.

EC 442 03(3-0-0)
International Economics II.
S. Prerequisite: EC 304. Balance of payments. adjustment mechanisms, and international monetary systems.

EC 451 03(3-0-0)
Economics of Regulation.
S. Prerequisite: EC 306. U.S. regulatory history. institutions. and environment; economic justifications for and effects of regulation: evaluation of deregulation movement.

EC 460 (13(3-0-0)
Economic Development.
F. Prerequisite: EC 304. Economic problems of underdeveloped nations.

EC 474 03(3-0-0)
Recent Economic Thought.
S. Prerequisite: EC 304. EC 306. Nontraditional schools of economic thought. such as institutionalism and neo-Marxism. that critique neoclassical economic theory.

EC 484 Var (1-3).
Supervised College Teaching.
F.S. SS. Prerequisite: EC 304. EC 306. written consent of instructor. Assistance in teaching introductory economics courses.

EC 495 Var.
Independent Study.

EC 504 03(3-0-0)
Macroeconomic Analysis I.
F.S. Prerequisite: EC 304. Analysis of national income. employment. price levels. growth, and policies to achieve national economic goals.

EC 506 03(3-0-0)
Microeconomic Analysis I.
F.S. Prerequisite: EC 306. M 315. Price theory: analyses of demand. production. and costs; analysis of various market structures: factor markets; general equilibrium. welfare economics.

°EC 510 03(3-11-0)
Labor Market Analysis.
S. Prerequisite: EC 304. EC 306. Determination of wages and employment. Focus on theoretical and applied controversies.

EC 520 03(3-0-0).
Public Finance.
S. Prerequisite: EC 320. Analysis and evaluation of public expenditures and tax policy in terms of efficiency and equity.

EC 530/EA 570 03(3-0-0)
Methodology of Economic Research.
S. SS. Prerequisite: EC 304. EC 306. Credit not allowed for both EC 530 and EA 570. Philosophical foundations of science and research. Concepts and skills for planning. performing. reporting. and evaluating economic research.

EC 535/EA 535 03(3-0-0)
Applied Econometrics.
F.S. Prerequisite: EC 335/EA 335. EC 304. EC 306. M 315. Credit not allowed for both EC 535 and EA 535. Econometric techniques applied to testing and quantification of theoretical economic relationships drawn from both microeconomics. macroeconomics.

EC 540/EA 540 03(3-0-0)
Economics of Natural Resources.
F. Prerequisite: EC 340/EA 340. M 141. Credit not allowed for both EC 540 and EA 540. Public natural resources policy, effect on resource use in private sector. optimal pricing of minerals. timber and fisheries. public project analysis.

EC 541/EA 541 03(3-0-0)
Environmental Economics.
S. Prerequisite: EC 306. Credit not allowed for both EC 541 and EA 541. Economics of environmental policy; partial equilibrium and general equilibrium model;pollution; natural environments; population and economic growth.

°EC 550 03(3-0-0)
Market Structure Analysis.
S. Prerequisite: EC 306. Neoclassical and institutional evaluation of structure-conduct-performance in markets and industries. Use of economic theory in antitrust.

***EC 570 03(3-0-0)**
Evolution of Economic Thought.
F. Prerequisite: EC 304. EC 306. From Plato and Aristotle to the modern period.

***EC 572 03(3-0-0)**
Capitalism and the State.
S. Prerequisite: EC 320 or EC 370 or PO 341 or S 360. Political economy of the state in capitalist society. especially its corporate form; libertarian. liberal. and radical theories. case studies.

°EC 574 03(3-0-0)
Institutional Economics.
F. Prerequisite: EC 376 or EC 474 or EC 570. Contributions on method. theory. and policy of scholars in the institutionalist tradition. especially Veblen. Ayres. Polanyi. and Galbraith.

EC 579 03(3-0-0)
U.S. Economic History.
F. Prerequisite: EC 379/HY 379; or EC 304. EC 306. History and economic analysis of growth. transformation. and institutional change.

EC 640 03(3-0-0)
International Trade Theory.
F. Prerequisite: EC 306 or EC 506. Theory of international trade including comparative advantage, factor growth. market distortions. and commercial policy.

EC 695 Var.
Independent Study.

EC 699 Var.
Thesis.

EC 704 03(3-0-0)
Macroeconomic Analysis II.
S. Prerequisite: EC 504. M 315. Theoretical framework for analyzing flows of aggregate income and expenditure;relationship between these flows and other dimensions of economic activity.

EC 706 03(3-0-0)
Microeconomic Analysis II.
F. Prerequisite: EC 506. M 315. Price theory including analysis of demand. production. costs. output. and pricing under competitive and imperfectly competitive conditions.

EC 707 03(3-0-0)
General Equilibrium and Welfare Economics.
F. Prerequisite: EC 506. M 315. Analytical tools for evaluation of normative significance of economic events; and policy implications in general equilibrium framework.

EC 715 03(3-0-0)
Monetary Economics.
F. Prerequisite: EC 504. Principle issues of monetary theory: money supply and demand. interest rates. and current problems of monetary policy.

***EC 725/EA 725 03(3-0-0)**
Capital Theory, Risk and Uncertainty.
F. Prerequisite: Written consent of instructor. Credit not allowed for both EC 725 and EA 725. Problems of intertemporal optimality.

EC 735 03(3-0-0)
Econometric Theory.
S. Prerequisite: EC 535, M 315. Model building. estimation and testing. using both microanalytic models and aggregate models of the economy.

EC 742 03(3-0-0)
International Production and Monetary Theory.
S. Prerequisite: EC 304 or EC 504. Factor movements, theory of international production (multinationalism) balance of payments, and international monetary system.

***EC 760 03(3-0-0)**
Theories of Economic Development.
S. Prerequisite: EC 460 or written consent of instructor. Analysis of fundamentals of economic development (processes. problems. and strategies) with special reference to developing nations.

°EC 770 03(3-0-0)
Economic Thought and Systems.
S. Prerequisite: EC 570 or EC 572. Aspects of modern economic thought and comparative economics selected according to backgrounds and interests of the class.

EC 784 Var.
Supervised College Teaching.
F.S.

SS. EC 792A-E Var.
Seminar.
A) Theory. B) International. C) Social and political. D) Quantitative analysis. E) Development.

EC 795 Var.
Independent Study.

EC 799 Var.
Dissertation.

EDUCATION COURSES

Occupational and Educational Studies School College of Applied Human Sciences

ED 210 02(0-0-2)
Advanced Reading and Comprehension.
F, S. Advanced reading and comprehension skills for variety of academic and problem-solving tasks.

ED 255 02(2-0-0)
Introduction to Education.
F, S, SS. Overview of teaching profession emphasizing teaching opportunities, certification, and University professional program.

ED 256 03(3-0-0)
Education of the Hispanic.
S. Prerequisite: PY 100. Educational. social. and emotional development of Hispanic students with emphasis on the school setting.

ED 286 Var.
Practicum.

ED 296 Var.
Group Study.

ED 305 02(0-2-0
Microcomputers In Education.
F.S. SS. Prerequisite: CS 110 or BD 140 and IID 141 or written consent of instructor; ED 255 or VE 300 or concurrent registration. Educational applications of word processing. database. spread-sheet. graphics. telecommunications. and instructional software on microcomputers.

ED 355 03(0-0-3)
Educational Psychology.
F.S. SS. Prerequisite: ED 255 or VE 300 or concurrent registration. Also offered as correspondence course. Psychological conditions of classroom learning and teaching including understanding needs of exceptional children in the classroom.

ED 386 Var (1-3)
Practicum.
Prerequisite: ED 355 or concurrent registration. admission to teacher certification program.

ED 400 03(3-0-0)
Literacy.
F.S. SS. Prerequisite: PY 100 or S 100; concurrent registration in ED 4861. Methods and materials for increasing literacy skills.

ED 401A-B.
Teaching Classroom Reading/Literacy Skills.
F. S, SS. Prerequisite: ED 355. admission to teacher certification program. A) Methods tot meeting students' classroom reading/literacy needs. 02(0-0-2) B) Methods for meeting students' classroom reading/literacy needs including practical experience with school-age children. 03(0-2-2).

ED 410 020-2-0)
Audiovisual Methods and Materials.
F.S. Use of audiovisual equipment and production of media materials emphasizing laboratory work and practice.

ED 428 03(0-2-2)
Exceptionality, Diversity, and Human Relations.
F, S. SS. Prerequisite: ED 355. admission to teacher certification program. Also offered as correspondence course. Understanding and planning for educational needs of culturally different and exceptional students.

ED 429 03(0-0-3)
Multicultural Education and Diversity.
S. Prerequisite: PY 100. Understand needs and develop competence to work with diverse populations in school system.

ED 450 04(0-0-4)
Methods and Evaluation of Instruction.
F. S. Prerequisite: ED 355. admission to teacher certification program. Strategies for teaching: planning. evaluation. classroom management. legal responsibilities.

ED 451 01 (0-3-0)
Microteaching Laboratory.
F.S. Corequisite: ED 450. Microteaching and audiovisual laboratory to apply teaching skills.

ED 460 04(0-2-3)
Methods and Materials in Teaching Science.
F.S. Prerequisite: ED 355. admission to teacher certification program. Current trends in science education. K- 12; techniques of experimentation demonstrations; study of equipment. Facilities. and resource materials.

ED 462 04(0-0-4)
Methods and Materials in Teaching Languages.
F. Prerequisite: ED 355;admission to teacher certification program; thirty-two 300-400 level credits in one language including phonetics and L 401: foreign language proficiency test.
Current trends in teaching foreign languages including use of language laboratory.

ED 463 04(0-0-4)
Methods in Teaching Language Arts.
F.S. Prerequisite: ED 355. admission to teacher certification program. Objectives. content. and methods of teaching English. speech. and journalism in secondary schools.

ED 464 04(0-0-4)
Methods and Materials In Teaching Mathematics.
S. Prerequisite: ED 355; 18 credits in mathematics; admission to teacher certification program. Problems and techniques of teaching secondary mathematics; evaluation of student achievement and teacher effectiveness.

ED 465 04(4-0-0)
Methods and Materials in Social Studies.
S. Prerequisite: ED 355. admission to teacher certification program. Methods of teaching social studies; sources of information and teaching materials and literature for social studies teachers.

ED 466 04(4-0-0)
Methods in Elementary and Secondary School Art.
F. Prerequisite: ED 355. admission to teacher certification program. Objectives. methods. and resource materials for teaching art in elementary and secondary schools.

ED 470 03(0-0-3)
Methods in Elementary Physical Education Curricula.
F. Prerequisite: ED 355. admission to teacher certification program. Methods and materials in construction of a physical education curriculum and lot teaching of physical education in elementary schools.

ED 471 04(0-0-4)
Methods in Secondary Physical Education Curricula.
F.S. Prerequisite: ED 355. admission to teacher certification program. Methods and organization in construction of a physical education curriculum and for teaching of physical education in secondary schools.

ED 475 04(2-6-0)
Elementary School Music Methods.

F. Prerequisite: ED 355. MU 217, admission to teacher certification program. Materials and teaching techniques for grades K-6; musical concepts and skills. individual and group activities. evaluation of pupil progress.

ED 476 020-3-0)
Choral Methods for Secondary Schools.
F. Prerequisite: ED 355. MU 217. admission to teacher certification program. General music classes. choral techniques and literature; current practices and trends.

ED 477 02 (1-3-0)
Instrumental Methods for Secondary Schools.
F. Prerequisite: ED 355. MU 217. admission 10 teacher certification program. Organization and administration of instrumental music, grades 5-12.

ED 485A-B. Var (5-15)
Student Teaching.
F.S. Prerequisite: ED 450 and appropriate special methods courses. A) Elementary. B) Secondary.

ED 486A-1 Var.
Practicum.
Prerequisite: Admission to teacher certification program. A) K-12 classroom* B) Reading*
C) Exceptionality and diversity. D) Mathematics. E) Elementary physical education.
F) Secondary physical education. G) Industrial sciences and technology education.
H) Music education* I) Literacy.

ED 493 Var. (1-3).
Seminar in Professional Relations.
Corequisite: ED 485A or B.

ED 494 Var.
Independent Field Studies.
Specialized field study in the public schools under direction and supervision of faculty.

ED 495 Var.
Independent Study.

ED 496 Var.
Group Study.

ED 501 03(2-2-0)
Reading in the Content Areas.
SS. Prerequisite: ED 355. Specific methods. materials, and techniques for helping students become more efficient in reading content area material.

ED 502 03(3-0-0)
Human Relations in Education.
F.S. SS. Prerequisite: Bachelor's degree or VE 300. Human relations in an individual's educational. organizational, and social activities as applied to various educational settings.

ED 521 02(0-0-2)
Issues In Education.
SS. Prerequisite: ED 255. Issues of concern through "historical precedents" of contemporary action in education.

ED 525 02(2-0-0)
Current Classroom Techniques.
SS. Prerequisite: ED 485A or B. Development and use of innovative classroom teaching strategies.

ED 550 03(3-0-0)
Guidance-Organization and Supervision.
F. SS. Prerequisite: ED 485A or B. Administrative. supervisory process in relationship to guidance program; law. ethics: program development; other aspects of pupil-personnel services.

ED 55103(3-0-0)
Multicultural and Special Populations.
F. S, SS. Prerequisite: ED 485A or B. Also offered as telecourse. Special concerns for working with people of various cultural. ethnic. exceptional. and special interest groups.

ED 590A-C Var.
Workshop.
A) Cultural and linguistic differences. B) Guidance and counseling. C) Rural education.

ED 591A-C Var.
Workshop.
A) Curriculum. B) Instruction. C) Supervision.

ED 600 03(3-0-0)
Introduction to Research Methods.
F.S. SS. Methods of research. scientific methods. problem identification. research design. preparation and evaluation of research repons.

ED 605 03(0-0-3)
School-Community Relations.
S. SS. Prerequisite: ED 485A or B. Techniques and practices of administrators and teachers designed to improve the communities' understanding and participation in the schooling process.

ED 606 03(3-0-0)
Measurement Concepts.
F.S. SS. Prerequisite: ED 600. Concepts of measurement and descriptive data analysis.

ED 615 03(0-0-3)
Elementary School Administration.
SS. Prerequisite: VE 611. Procedures in administration of elementary schools.

ED 616 03(0-0-3)
Secondary School Administration.
S. SS. Prerequisite: VE 611. Procedures in administration of secondary schools.

ED 619 03(0-0-3)
Curriculum Development.
S. SS. Prerequisite: ED 485A or B. Principles and procedures for school personnel in planning the public school curriculum.

ED 620 02(0-0-2)
Philosophy of Education.
S. Prerequisite: Written consent of department head. Contemporary philosophies as related to principles and practices in education.

ED 622 03(3-0-0)
Innovative Social Studies Teaching.
SS. Prerequisite: ED 485A or B. Current trends in secondary school social studies teaching and curriculum techniques and materials for value formulation. decision-making skills. concepts. generalizations. and attitudes.

ED 623 03(0-2-2)
Innovarive Science Teaching.
SS. Prerequisite: ED 485A or B. For K-I 2 science teachers. Innovative trends in curriculum and methodology of science teaching.

ED 628 0310-0-3)
Advances in Instruction I.
F. Prerequisite: ED 355. Also offered as telecourse. Exploration of pedagogical topics and skill development related to instructional approaches.

ED 629 03(0-0-3)
Advances in Instruction II.

S. Prerequisite: ED 628. Also offered as telecourse. Exploration of pedagogical topics and growth experiences related to classroom management and presentation skills.

ED 631 03(0-0-3)
Community Education.
F. SS. Prerequisite: Written consent of department head. Overview of community education movement. concept. programs. leadership. and financing.

ED 632 02(0-0-2)
School District Management.
SS. Prerequisite: VE 611. Superintendent of schools relationships with staff, community. and board of education.

ED 633 02(0-0-2)
School District Personnel Administration.
SS. Prerequisite: VE 611. Planning and implementing school district personnel practices.

ED 634 02(0-0-2)
Educational Leadership.
SS. Prerequisite: VE 611. Management. leadership principles relating to role of public school superintendency.

ED 635 03(0-0-3)
Educators, Systems and Change.
F. Prerequisite: ED 485A or B. Also offered as telecourse. Process of change in education, focusing on teacher's role as leader and facilitator.

ED 640 03(0-0-3)
Administering School Services.
S. SS. Prerequisite: VE 611. Basic services of the guidance. health. lunch. and transportation programs including relationships with administrators. staff. parents. and community.

ED 650 ***03(0-0-3)***
Individual Guidance and Counseling.
F. SS. Prerequisite: ED 502. Theory and techniques of individual guidance and counseling.

ED 651 03(0-0-3)
Group Guidance and Counseling.
S. SS. Prerequisite: ED 650 or ED 502. Theory and techniques of group guidance and counseling.

ED 660 03(3-0-0)
Career Development Counseling.
S. SS. Prerequisite: AD 520 or ED 485A or B or HE 670. Career development programs and processes over the life span with particular attention to career choice.

ED 684 Var.
Supervised College Teaching.
F.S.

SS. ED 686A-E Var.
Practicum.
A) Administration. B) Student personnel. C) Curriculum. D) Guidance and counseling.
E) Special needs.

ED 687A-G Var.
Internship.
A) Administration. B) Curriculum. C) Guidance and counseling. E) Elementary administration.
F) Secondary administration. G) Superintendent.

ED 693A-E Var.
Seminar.
A) Administration. B) Curriculum. C) Supervision. D) Guidance and counseling.
E) Instruction.

ED 694A-D Var.
Independent Field Studies.
A) Administration. B) Curriculum. C) Guidance and counseling. D) School law.

ED 695A-E Var.
Independent Study.
A) Administration. B) Curriculum. C) Guidance and counseling. D) Developmental reading. E) Rural education.

ED 696 Var.
Group Study.

ED 698 Var.
Research.

ED 699
Var. Thesis.

ELECTRICAL ENGINEERING COURSES

Electrical Engineering Department College of Engineering

EE 101 CS 101 03(2-2-0)
Engineering Computing.
F. Prerequisite: High school algebra and geometry. Credit allowed for only one of the following: CS 101. CS 151. EE 101. Programming emphasizing Pascal with applications to engineering problems.

EE 102 04(3-3-0)
Digital Circuit Logic.
S. Boolean algebra; Karnaugh maps; multiplexers, decoders. ROMS. PLAS. Flip-flops. counters; sequential networks; state tables.

EE 201 03(2-2-0)
Circuit Theory.
F.S. Corequisite: M 161. PH 142. Basic circuit analysis techniques and applications to engineering design problems.

EE 202 04(3-3-0)
Circuit Theory Applications.
S. Prerequisite: EE 201. Step and sinusoidal response of networks; modeling of active devices.

EE 204 03(3-0-0)
Introduction to Electrical Engineering.
S. Prerequisite: M 161. PH 142. Basic analog and digital circuits and systems; introduction to electromechanical devices.

EE 25104(3-3-0)
Introduction to Microprocessors.
S. Prerequisite: EE 102. Microprocessor organization. assembly language. I/O techniques. real-time interfaces. applications. hardware/software.

EE 303I ST 303 02(2-0-0)
Introduction to Communications Principles.
F. Prerequisite: M 261. Credit not allowed for both EE 303 and ST 303. Basic concepts in design and analysis of communication systems.

EE 311 03(3-0-0)
Linear System Analysis 1.
F.S. Prerequisite: EE 202. M 340. Continuous and discrete time signals .red systems representations in time and frequency domain; time convolution.

EE 312 03(3-0-0)
Linear System Analysis II.
S. SS. Prerequisite: EE 311. Laplace and Z transforms. applications to modulation. Filtering and sampling. state space representation.

EE 331 04(3-3-0)
Electronics Principles I.
F. Prerequisite: EE 202. M 340. Discrete component semiconductor devices, characteristics and applications. Rectifier circuits. single-stage and multi-stage amplifiers.

EE 332 04(3-3-0)
Electronics Principles II.
S. Prerequisite: EE 331. Discrete and integrated-circuit amplifiers-frequency response. negative feedback; digital logic circuits.

EE 341 03(3-0-0)
Electromagnetic Fields and' Devices I.
F. Prerequisite: M 340. Basic concepts of electrostatic and magnetostatic fields.

EE 342 03(3-0-0)
Electromagnetic Fields and Devices II.
S. Prerequisite: EE 341. Basic concepts of time varying electromagnetic fields and transmission lines.

EE 362 03(3-0-0)
Electromechanical Devices.
S. Prerequisite: EE 311. EE 331. EE 341. Operating principles and analysis of electromechanical devices including transformers. motors. and generators.

EE 372 03(3-0-0)
Physical Electronics.
S. Prerequisite: EE 341. PH 142. Electrical, optical. magnetic, and thermal properties of materials used in electrical engineering devices.

EE 395 Var.
Independent Study.

EE 401 030-4-0)
Senior Design Project I.
F. Prerequisite: EE 312. EE 332. EE 342. Advanced project. Formal report. and oral presentation.

EE 402 030-4-0)
Senior Design Project II.
S. SS. Prerequisite: EE 401. Advanced project, formal report. and oral presentation.

EE 404 020-3-0)
Experiments in Optical Electronics.
F. Corequisite: EE 441. Experiments in optical electronics and lasers.

EE 411 03(3-0-0)
Control Systems.
F. Prerequisite: EE 312. Feedback and forward loop control design; frequency and time domain methods: performance and stability requirements.

EE 412 03(3-0-0)
Digital Control and Digital Filters.
S. Prerequisite: EE 411. FIR and FIR digital filter design. analog and digital invariance and direct digital control algorithms. hybrid systems analysis.

EE421 03(3-0-0)
Communication Systems.
S. Prerequisite: EE 303/ST 303. EE 312. Modulation techniques: random signals and noise. digital communication; matched filters; channel capacity.

EE 441 03(3-0-0)
Optical Electronics.
F. Prerequisite: EE 342. Concepts of modern physics. optical properties of atoms. light sources. lasers, optical detectors. optical cavities. and optical fiber transmission.

EE 444 03(3-0-0)
Antennas and Radiation.
F. Prerequisite: EE 342. Retarded potential theory. antenna arrays. long wire antennas. dipoles. aperture antennas. receiving antennas.

EE 451 03(3-0-0)
Digital System Design.
F. Prerequisite: EE 251. EE 332. State machines with PLAs as controllers and small computers: timing and race elimination considerations: state and micro-programming implementation.

EE 457 03(3-0-0)
Optical Information Processing.
F. Prerequisite: EE 312. El:, 342. Introduction to optical systems for signal and information processing with emphasis on Fourier optics.

EE 461 03(3-0-0)
Power Systems 1.
F. Prerequisite: EE 342. EE 362. Design. analysis. and operation of power equipment including ac and dc machinery. transformers. and circuit breakers: power semiconductor devices.

EE 462 03(3-0-0)
Power Systems II.
S. Prerequisite: EE 461. Power system modeling; load flow and economic dispatch; symmetrical components and fault studies; power system stability.

EE 47104(4-0-0)
Semiconductor Devices.
F. Prerequisite: EE 332. EE 342. EE 372. Semiconductor physics. device fabrication technology. analysis of PN junctions. and bipolar and field-effect transistors.

EE 472 03(3-0-0)
MOS Integrated Circuits.
S. Prerequisite: EE 471. MOSFET device physics. inverters. logic/shift register/memory circuits. Integrated circuit design rules and layout. NMOS and CMOS.

EE 495 Var.
Independent Study.

EE 501 01 (0-2-0)
Analog Circuits Laboratory I.
F. Corequisite: EE 532. Operational amplifier circuits are built and tested.

EE 502 01 (0-2-0)
Analog Circuits Laboratory II.
S. Corequisite: EE 533. Active analog filters are built and tested.

EE 512 03(3-0-0)
Digital Signal Processing.
F. Prerequisite: EE 312 or written consent of instructor. Discrete time signals and systems. digital filter design and implementation. Fast algorithms. quantization effects.

EE 514 03(3-0-0)
Applications of Random Processes.
F. Prerequisite: EE 303/ST 303, EE 312. Bit-error rates. signal-to-noise power ration. signal detection. signal estimation. Wiener filter. application.

EE 521 03(3-0-0)
Detection and Estimation in Telecommunications.
F. Prerequisite: EE 421. Detection and estimation theory. random processes. matched filters. robustness techniques. communication systems applications.

EE 532 03(3-0-0)
Passive and Active Filters.
F. Prerequisite: EE 312, EE 332. Passive. active transfer functions; maximally flat and equal ripple designs; terminated LC ladder design; parameter sensitivity; operational amplifier models.

EE 533 03(3-0-0)
Operational Amplifier Circuits.
S. Prerequisite: EE 532. Active filter implementations with operational amplifiers; nonideal amplifier; cascade. multiple feedback. leapfrog implementations; switched capacitor filters.

EE 543 03(3-0-0)
VLSI Plasma Processing.
F. Prerequisite: EE 332. EE 342. Fundamental processes in gas discharges; elementary gas phase chemistry. basic surface physics; transport of materials between surface and gas phase.

EE 546 03(3-0-0)
Laser Fundamentals and Devices.

S. Prerequisite: EE 441. Amplification of light. laser excitation mechanisms. laser devices, characteristics and design.

EE 547 03(3-0-0)
Microwave Nondestructive Evaluation.
S. Prerequisite: EE 548 or concurrent registration. Fundamental physical and theoretical principles of microwave nondestructive/testing/evaluation methods and their applications.

EE 548 03(3-0-0)
Microwave Theory and Component Design.
F. Prerequisite: EE 342. Fundamentals of microwave engineering. components. devices and measurements.

EE 549 03(3-0-0)
Radar Systems and Design.
S. Prerequisite: EE 444 or written consent of instructor.
Fundamental ideas of radar operation and basic design of various radar types including current topics.

EE 550A-B.
Microprocessors Based Systems.
F. Prerequisite: EE 451. High-performance microprocessors. e.g., 68000 family; intelligent I/O processors. Asynchronous bus. virtual memory. micro-processor in control and multi-user systems. A) 04(3-2-0) B) 03(3-0-0) SURGE students only.

EE 554 03(3-0-0)
Computer Architecture.
F. Prerequisite: EE 251 or EE 550A. Current machine architectures such as SIMD. MIMD. and stack machine; overlap pipeline. parallel. and associative processing.

EE 557 03(3-0-0)
Digital Optical Computing.
S. Prerequisite: EE 441 or EE 451 or EE 554 or written consent of instructor. Optical devices; optical disks. holographic memories; inter-connection networks. Optical systems for numerical and nonnumerical data processing.

EE 561 03(3-0-0)
Digital Systems Testing 1.
F. Prerequisite: EE 451 or written consent of instructor. Fault modeling. tests generation algorithms. Fault simulation. Functional testing. design for testability. built-in self-testing.

EE 562 03(3-0-0)
Digital Systems Testing II.
S. Prerequisite: EE 561 or written consent of instructor. Fault modeling for CMOS. test generation for static and dynamic CMOS. design for robust testability. self-checking circuits.

EE 571 03(3-0-0)
VLSI System Design.
F. Prerequisite:EE 472. Design of integrated circuits at the system level including cell design. digital systems. parallel architecture. systolic arrays.

EE 572 03(3-0-0)
Polarimetry.
F.S. Prerequisite: EE 342. Polarization in optical and high frequency systems.

***EE 574 03(3-0-0)**
Optical Materials and Devices.
S. Prerequisite: EE 441 or EE 471. Semiconductor light emitters and detectors. dielectrics. and light reflection from. and progation through. anisotropic dielectrics.

EE 576 03(3-0-0)
VLSI Processing-Science and Technology I.
S. Prerequisite: EE 472. Physics. chemistry of VLSI processing including plasma. thermal techniques of oxidation. deposition; photolithography; etching; cleaning. process modeling.

EE 578 03(3-0-0)
VLSI Processing-Science and Technology II.
S. Prerequisite: EE 576. Advanced VLSI processes for microelectronic fabrication.

°EE 614 03(3-0-0)
Principles of Digital Communications.
S. Prerequisite: EE 514. Information theory. optimal receiver design. waveform coding. error correcting coding.

EE641 03(3-0-0)
Electromagnetics.
F. Prerequisite: EE 342. M 532. Electrostatics. magnetostatics. boundary value problems. EM induction. quasi-statics. Maxwell's equations.

EE 642 03(3-0-0)
Time Harmonic Electromagnetics.
S. Prerequisite: EE 641. Maxwell's equations. radiation, boundary value problem. dyadic Green's functions. scattering theory.

EE 652 03(3-0-0)
Estimation and Filtering Theory.
S. Prerequisite: EE 411 or EE 421; ST 525. Optimal Kalman filter estimators; smoothing and prediction; applications to communications and controls.

EE 653 03(3-0-0)
Digital Image Processing.
F. Prerequisite: EE 512. Image enhancement. restoration and encoding techniques. segmentation and texture analysis. Pattern classification. decision functions. learning systems.

EE 654 03(3-0-0)
Design Automation.
F. Prerequisite: EE 472 or EE 571. Advanced logic design methods; digital system modelling. simulation. and testing; design for testability; CAD systems.

EE 655 03(3-0-0)
Multidimensional Digital Signal Processing.
S. Prerequisite: EE 512 or written consent of instructor. Multidimensional signals and systems. 2-D transforms. stability methods. design and implementations. spectral factorization. and image modeling.

EE 656 03(3-0-0)
Neural Networks and Adaptive Systems.
F. Prerequisite: EE 512. Various adaptation rules. neural network paradigms, learning. stability and convergence. applications in signal/image processing and control.

EE 657 03(3-0-0)
Advanced Computer Networks.
F. Prerequisite: EE 421 or CS 457 or ST 420. Computer network architectures. protocols. random access. performance models. priority mechanisms. circuit switching. integrated traffic. ISDN.

EE 670A-F/CS 670A-F Var (1-4)
Topics in Architecture/ Systems.
F.S. Prerequisite: EE 554 or CS 570 or written consent of instructor. Credit not allowed for both EE 670A-F and CS 670A-F. A) Data flow. B) Performance evaluation and modeling.
C) Distributed systems. D) Architecture of advanced systems. E) Computer arithmetic.
F) Microarchitecture.

EE 671 03(3-0-0)
Thin Film Physical Vapor Deposition.
F. Prerequisite: EE 471. Thermodynamic and kinetic foundations; principles of high vacuum; evaporation; sputtering; thin film morphology.

EE 672/PH 672 03(3-0-0)
Principles of Semiconductors.

S. Prerequisite: EE 471 or PH 431. Credit not allowed for both EE 672 and PH 672. Electronic properties of semiconductors: band structure. statistics. transport properties. photoelectronic properties. potential barriers. interfaces.

***EE 673 03(3-0-0)**
Thin Film Growth.
F. Prerequisite: EE 471. Microstructures of physically vapor-deposited films; growth velocity and step coverage; MBE growth mechanisms; surface electron diffraction.

EE 676 03(3-0-0)
III-V Semiconductor Materials and Devices I.
F. Prerequisite: EE 672/PH 672. Basic materials properties and fabrication technologies of III-V semiconductors.

EE 677 03(3-0-0)
III-V Semiconductor Materials and Devices II.
S. Prerequisite: EE 676. Transistors, microwave diodes, photonic devices. analog and digital circuits using III-V semiconductors.

EE 695 Var.
Independent Study.

EE 699 Var.
Thesis.

°EE 712 03(3-0-0)
Topics in Control Theory.
S. Prerequisite: EE411. Adaptive control of deterministic systems. stochastic control. system identification. and nonlinear systems.

***EE 721 03(3-0-0)**
Topics in Communication Theory.
S. Prerequisite: EE 521. Detection and estimation theory; radar-sonar problems; nonlinear modulation; information theory; communication systems.

°EE 742 03(3-0-0)
Topics in Electromagnetics.
S. Prerequisite: EE 641. Applications of wave propagation and scattering to microwave radar. Doppler radar. meteorological radar applications.

°EE 744 03(3-0-0)
Topics in Plasma Dynamics.
S. Prerequisite: EE 543. Kinetic equations. nonlinear theory of waves and instabilities; plasma fluctuation and radiations; plasma diagnostics and plasma heating.

***EE.751 03(3-0-0)**
Topics in Digital System Design.
F. Prerequisite: EE 451. Special computer architectures; distributed processing systems; memory structure for efficient machine operation.

EE 773 03(3-0-0)
Topics in Solid State Electronics.
F. Prerequisite: EE 672/PH 672 or EE 471. Advanced principles of microwave devices. solar cells. theory of solids. or transport in materials.

EE 795 Var.
Independent Study.

EE 799 Var.
Dissertation.

ENGINEERING COURSES

COLLEGE OF ENGINEERING

EG 192 01(0-0-0)
Seminar.
Engineering/society/humanities relationships. Combined program requirements and opportunities.

EG 350 03(2-2-0)
Computer-Aided Design.
F.S. Prerequisite: M 340. CE 261. EE 202; or concurrent registration in CH 304. Two- and three-dimensional computer-aided design. Design examples from all engineering disciplines.

EG 384 Var (1-5)
Supervised College Teaching.
F.S. SS. Prerequisite: Written consent of instructor.

EG 410 03(3-0-0)
Systems Engineering and Optimization.
F. Prerequisite: M 255 or M 261. Methodologies. philosophies. and applications of systems engineering approach.

EG 510/M 510 03(3-0-0)
Linear Programming and Network Flows.
F.S. SS. Prerequisite: M 261 or M 315 and some knowledge of FORTRAN. Credit not allowed for both EG 510 and M 510. Optimization methods;linear programming. simplex algorithm. duality. sensitivity analysis. minimal cost network flows. transportation problem.

***EG 511 03(3-0-0)**
Dynamic Programming.
F. Prerequisite: M 261 or M 315 and some knowledge of FORTRAN. Theory. applications of dynamic programming. hierarchical optimization; sequential decision problems. resource allocation. general networks. decomposition.

EG 517 03(3-0-0)
Linear Multivariable Systems.
F. Prerequisite: EE 411 or EE 421 or ME 417. Analysis of linear continuous and discrete time multivariable systems: modern methods for design of linear multivariable control systems.

EG 518 03(3-0-0)
Optimal Control.
S. Prerequisite: EG 517. Theory and application of optimal control and optimal estimation theory; continuous and discrete time systems; Pontryagin maximum principle.

EG.520/M 520 03(3-0-0)
Nonlinear Programming.
S. Prerequisite: EG 510/M 510. Credit not allowed for both EG 520 and M 520. Theoretical. computational. practical aspects of nonlinear programming (NLP); unconstrained. constrained NLP; quadratic programming; large-scale NLF.

°EG 521 03(3-0-0)
Integer Programming.
S. Prerequisite: EG 510/M 510.
Computational approaches for solving integer programming problems; efficiency sensitivity analysis. special problem structure. and simulation approaches.

***EG 618 03(3-0-0)**
Stochastic Control.
F. Prerequisite: EG 518. EE 652; or written consent of instructor. Investigation of optimal control of dynamic systems under uncertainty.

ENVIRONMENTAL HEALTH COURSES

Environmental Health Department College of Veterinary Medicine and Biomedical Sciences

EH 220 03(3-0-0)
Environmental Health.
F.S. Environmental problems that threaten human health; activities of official and voluntary agencies concerned.

EH 307/ST 307 03(3-0-0)
Introduction to Biostatistics.
F.S. Prerequisite: M 121. Credit allowed for only one of the following: EH 307/ST 307. ST 301. ST 309. ST 311. Biostatistical methods: confidence intervals. hypothesis tests. simple correlation and regression. one-way analysis of variance.

EH 312 05(5-0-0)
Environmental Sanitation I.
F. Prerequisite: C 113. EH 220. Environmental protection and health hazard assessment of water. waste water. hazardous waste. land use.

EH 313 04(4-0-0)
Environmental Sanitation II.
S. Prerequisite: EH 312. Monitoring and control measures including industrial hygiene and occupational safety; food protection: public health programs and policy.

EH 332 03(2-0-1)
Principles of Epidemiology.
S. Prerequisite: EH 307/ST 307; MB 149 or MB 300. Use of epidemiological methods in studying distribution of infectious and noninfectious disease in populations.

EH 446 03(3-0-0)
Environmental Toxicology.
F. Prerequisite: C 245 or C 343. Health and ecological aspects of chemicals in the environment.

EH 487 Var (10-15)
Internship-Environmental Health.
Off-campus experience in a department of public health.

EH 492 01(0-0-1)
Environmental Health Seminar.
F.

EH 494 Var.
Independent Study in Environmental Health.
Prerequisite: EH 220.

EH 500 04(4-0-0)
Toxicology.
S. Prerequisite: AY 300/PS 300: C 245 or C 343. Basic principles, concepts, and methods for study of effects of toxins and toxicants on biological systems.

EH 520 03(3-0-0)
Advanced Environmental Health.
F. Prerequisite: MB 300. C 343. Sources. effects, and control of environmental health problems.

EH 526 03(3-0-0)
Industrial Hygiene.
F. Prerequisite: C 245 or C 341; PH 110 or PH 121; EH 520 or concurrent registration. Theory and application of industrial hygiene principles to management of the occupational environment.

EH 527 01(0-2-0)
Industrial Hygiene Laboratory.

S. Prerequisite: EH 526. Workplace environmental monitoring and hazard evaluation.

EH 532 0..1(2-0-1)
Epidemiologic Methods.
F. Prerequisite: EH 307/ST 307. Method of epidemiologic investigation and study design. Applications 10 disease control with literature examples.

EH 533/MB 533 03(2-0-0)
Epidemiology of Infectious Diseases/Zoonoses.
S. Prerequisite: MB 300. Credit not allowed for both EH 533 and MB 533. Epidemiologic aspect of major infectious diseases and zoo-noses. Modes of transmission/prevention/treatment measures.

EH 536 03(3-0-0)
Advanced Occupational Health.
S. Prerequisite: EH 446 or EH 526. Recognition. evaluation. and control of occupational health problems.

EH 542 03(3-0-0)
Biostatistical Methods for Qualitative Data.
F. Prerequisite: ST 301. Statistical analysis of cross-classified categorical data as obtained in epidemiology. toxicology. and occupational health.

EH 544/ST 544 03(3-0-0)
Biostatistical Methods for Quantitative Data.
S. Prerequisite: EH 307/ST 307 or ST 301. Credit not allowed for both EH 544 and ST 544. Methods for analyzing results of studies with quantitative response variable including epidemiologic and toxicologic studies.

EH 547 02(0-4-0)
Equipment and Instrumentation.
S. Prerequisite: EH 446 or concurrent registration. Theory and application of equipment and instrumentation for analysis and confirmation of toxic substances.

EH 550 03(3-0-0)
Principles of Ergonomics.
F. Theory and practice of ergonomics.

EH 55103(3-0-0)
Ergonomics in Product and Process Design.
S. Prerequisite: EH 550 or written consent of instructor. Application of ergonomics to design of products and processes with respect to health, safety. Function, and quality.

***EH 592 01(0-0-0**
Seminar in Toxicology.
S. Prerequisite: EH 500. Selected topics in toxicology.

EH 636 03(3-0-0)
Industrial Hygiene Control Methods.
F. Prerequisite: EH 526; EH 536 or concurrent registration. Industrial hygiene control methods for worker exposures to air contaminants and hazardous noise.

EH 638 03(3-0-0)
Public Health Administration.
SS. Administration of public programs for community and personal health.

°EH 64803(3-0-0)
Environmental Health Risk Assessment.
S. Prerequisite: EH 500 or EH 446; EH 520. Environmental contamination and health effects of chemicals using risk assessment. management. and communication approaches.

EH 656 03(3-0-0)
Occupational Noise Control.
F. Prerequisite: EH 527. Industrial hygiene procedures for occupational noise measurement and control methodologies.

EH 658 03(2-0-0
Environmental/Occupational Epidemiology.
S. Prerequisite: EH 532. Epidemiologic analyses of effects of exposure to environmental and occupational health hazards.

EH 662/VS 662 03(2-0-0
Applied Research-Planning/Design/Analysis.
S. Prerequisite: EH 307/ST 307. Credit not allowed for both EH 662 and VS 662. Guidelines for conducting applied research through use of epidemiologic methods.

EH 670 Var (1-3)
Directed Readings.
F.S. SS. Prerequisite: EH 520. Supervised readings on specialized topics in environmental health.

EH 684 Var (1-3)
Supervised College Teaching.
F.S.

SS. EH 687 Var. (1-6)
Internship.
Advanced environmental health studies and research in an industry. government agency. or research laboratory.

EH 692 01(0-0-0)
Seminar.

EH 695 Var.
Independent Study.

EH 696 Var. (1-3)
Group Study.
Prerequisite: EH 520. Group discussion. Field work. or laboratory on special topics in environmental health.

EH 699 Var.
Thesis.

EH 726 03(3-0-0)
Aerosols and Occupational Health.
S. Prerequisite: EH 636 or written consent of instructor. Properties and behavior of industrial aerosols. emphasizing measurement and control of dust related to disease.

EH 784 Var (1-3)
Supervised College Teaching.
F.S.

SS. EH 787 Var. (1-6)
Internship.
Advanced environmental health studies and research in an industry. government agency. or research laboratory.

EH 792 01(0-0-0
Seminar.

EH 795 Var.
Independent Study.

EH 799 Var.
Dissertation.

ENTOMOLOGY COURSES

Entomology Department College of Agricultural Sciences

EN 102 03(3-0-0)
Insects, Science, and Society.
F.S. Basic insect biology. their diversity, and relationship to human welfare.

EN 103 01(0-2-0)
Insects, Science, and Society Laboratory..
F. S. Prerequisite: EN 102 or concurrent registration. Recognition and classification of insects; demonstrations.

EN 302 02(2-0-0)
Applied and General Entomology.
F.S. Biology and management of insects.

EN 383A-C. Entomology
Laboratory.
F.S. Prerequisite: EN 302 or concurrent registration. Biology and recognition of insects. A) General 02(0-4-0) B) Horticultural 01(0-2-0) C) Agricultural 01(0-2-0).

EN 306 03(2-2-0)
Range and Livestock Insects.
F. Prerequisite: BY 103A or Z 110. Biology and control of arthropod pests attacking range land and range livestock in intermountain West.

EN 320 03(2-2-0)
Beekeeping.
S. Prerequisite: One course in biology. Bee biology. seasonal management. harvesting-processing honey, pollen, and wax. Disease and pesticide importance.

EN 365/PD 365 04(3-0-0)
Integrated Forest Pest Management.
F. Prerequisite: B 120 or BY 102. Credit not allowed for both EN 365 and PD 365. Special fee, $8. Insects and diseases in forest and urban ecosystems. Effects, diagnosis, prevention, and interactions.

EN 384 Var (1-3)
Supervised College Teaching.
F.S.

SS. *EN 423 04(2-4-0)
Evolution and Classification of Insects.
S. Prerequisite: EN 302. EN 303A or B or C. Major groups of insects, living and fossil; major evolutionary trends in structure and behavior.

***EN 424/Z 424 03(3-0-0)**
Principles of Systematic Zoology.
F. Prerequisite: BY 102. BY 103A; or Z 110. Credit not allowed for both EN 424 and Z 424. Principles and methods of classification, zoological nomenclature. taxonomic decisions regarding species and higher categories.

EN 445 04(2-4-0)
Aquatic Insects.
F. Prerequisite: BY 102. BY 103A, orZ 110. Biology and recognition of major orders and families of aquatic insects, a collection is required.

EN 451 04(3-2-0)
Insect Pest Management.
S. Prerequisite: EN 302, EN 303A or B or C. Selection and use of insect-control actions that will ensure favorable economic. ecological, and sociological consequences.

EN 452 03(3-0-0)
Agricultural Pesticides.
F. Prerequisite: Z 110, B 120 or BY 102, BY 103A and B; C 245 or C 341. Principles of use and examples of agricultural pesticides, their toxicity, hazards. and future prospects.

EN 453 03(3-0-0)
Population Ecology.
S. Prerequisite: M 155. one previous course in ecology. General principles of theoretical and applied population ecology.

EN 492 Var (1-3).
Seminar.

EN 495 Var.
Independent Study.

EN 496 Var.
Group Study.

EN 507 03(3-0-0)
Insect Behavior.
S. Prerequisite: One course in biology. Behavior of insects and related arthropods with special attention to social behavior.

***EN 510/PD 510 03(3-0-0)**
Insect-Plant Disease Relationships.
F. Prerequisite: One entomology or plant disease course. Credit not allowed for both EN 510 and PD 510. Relationships between insects and various plant pathogens as they affect survival and transmissions of pathogens.

***EN 51 I/PD 511 01 (0-2-0)**
Insect-Plant Disease Relationships Laboratory.
F. Prerequisite: EN 510/PD 510 or concurrent registration. Credit not allowed for both EN 511 and PD 511. Detailed studies of insect-plant interactions.

°EN 525 03(3-0-0)
Insect Physiology.
S. Prerequisite: EN 302. Principles of insect function.

°EN 540 03(2-0-0
Insecticide Toxicology/Resistance Management.
S. Prerequisite: BY 103A or Z 110; C 245. Chemistry and mode of action of insecticides and related poisons; metabolism; hazards to other life forms; environmental relationships. Formulations.

***EN 543/PD 543 03(3-0-0)**
International Crop Protection.
S. Prerequisite: Crop protection course and/or written consent of instructors. Credit not allowed for both EN 543 and PD 543. Insects. disease. and weed management strategies for developing countries. Emphasizes appropriate control measures for limited resource farmers.

°EN 551 030-4-0)
Immature Insects.
S. Prerequisite: EN 302, EN 303A or B or C. Characteristics of immature forms of orders and families of insects emphasizing those important to man.

EN 556/PD 556 03(3-0-0)
Biological Control of Plant Pests.
F. Prerequisite: Ten credits of biology. Credit not allowed for both EN 556 and PD 556. Management of insect pests of plants. plant pathogens. and weeds using biological control agents such as insects. bacteria. viruses. and fungi.

EN 570 03(3-0-0)
Chemical Ecology.

F. Prerequisite: C 245 or C 341. Chemical interactions among animals. plants. fungi. and microorganisms.

EN 584 Var (1-3).
Supervised College Teaching.
F.S.

SS. EN 587 Var.
Internship.

EN 594 Var.
Independent Study.

EN 596 Var.
Group Study.

EN 611A-J 01(0-2-0)
Skill Module.
F.S. SS. A) Museum methods. B) Field methods. C) Population analysis. D) Illustration methods. E) Behavioral analysis. F) Extension methods. G) Techniques in chemical ecology. H) Audiovisual techniques. I) Survey methods. J) Modeling methods.

EN 692 Var (1-3)
Seminar.

EN 698 Var.
Research.

EN 699 Var.
Thesis.

EN 784 Var (1-3)
Supervised College Teaching.
F.S. SS.

EN 787 Var.
Internship.

EN 794 Var.
Independent Study.

EN 796 Var.
Group Study.

EN 798 Var.
Research.

EN 799 Var.
Dissertation.

EARTH RESOURCES COURSES

Earth Resources Department College of Natural Resources

ER 130 03(3-0-0)
Geologic Environment and Society.
F.S. Credit allowed for only one of the following: ER 130. ER 140. ER 150. Interaction of humans and their surroundings. particularly relationships between geological processes. earth resources. and society.

ER 136 03. The Earth Explored.
F, S. SS. Offered as telecourse only. Physical geology emphasizing environmental applications.

+ER 140 04(3-3-0)
Physical Geology.
F.S. Credit allowed for only one of the following: ER 130. ER 140. ER 150. Special fee. $4. Earth materials. history. structure. surface features. soils formation. and geological processes involved in their development.

+ER 150 04(3-3-0)
Physical Geology for Scientists and Engineers.
F. Credit allowed for only one of the following: ER 130. ER 140. ER 150. *Special* fee. $12. Earth materials. structures. and surface processes. Geologic analysis using field data. topographic and geologic maps. and aerial photos.

+ER 154 04(3-3-0)
Historical and Analytical Geology.
S. Prerequisite: ER 130 or ER 140. Special fee. $7.50. Physical and organic history of the earth; introduction to field and laboratory measurements. and associated computer applications.

ER 232 04(3-3-0)
Crystallography and Mineralogy.
F. Prerequisite: ER 154. Crystallographic lattices. symmetry. and morphology; crystal chemistry: models and natural crystals.

+ER 234 04(3-3-0)
Mineralogy and Mineral Equilibrium.
S. Prerequisite: ER 232. Special fee. $15. Identification. genesis, occurrence. association of minerals; physics. chemistry of minerals; phase equilibrium; optical mineralogy.

ER 272 03(3-0-0)
Oceanography I.
F. General survey of the geology and physics of the oceans and their basins.

ER 274 03(3-0-0)
Oceanography II.
S. General survey of the chemistry, sedimentation. biology, and pollution of the oceans.

ER 304 03(3-0-0)
Principles of Watershed Management.
F.S. Land use hydrology and management practices to maintain and improve utility of water.

+ER 342 03(2-3-0)
Paleontology.
F. Prerequisite: ER 154. Special fee, $6. Description of invertebrates. vertebrates. and plants and their distribution in earth history.

+ER 344 04(3-3-0)
Stratigraphy and Sedimentation.
S, Prerequisite: ER 234, ER 372. Special fee, $15. Description, classification, and interpretation of sedimentary deposits and layered rock sequences.

+ER 304 04(3-3-0)

Petrology.
F. Prerequisite: ER 234, Special fee, $10. Identification, classification, petrogenesis of igneous and metamorphic rocks: thin section methods.

ER 365 04(3-3-0)
Eolian and Fluvial Transport Processes.
F. Prerequisite: PH 141 or written consent of instructor. Fundamental physical principles of eolian and fluvial transport. processes.

+ER 372 04(3-3-0)
Structural Geology.
F. Prerequisite: ER 154. M 125. concurrent registration in PH 142. Special fee. *$15.* Stress and strain in rocks, geometry of deformed rocks, and tectonic principles.

+ER 376 030-2-I)
Geologic Field Methods.
S. Prerequisite: ER 344. ER 372. Special fee. $40. Megascopic description of rocks; geologic mapping in field and map construction: repons and interpretations of field data.

+ER 400 03(2-3-0)
Quaternary Geology.
F. Prerequisite: ER 154. ER 454. Special fee. $10. Quaternary geologic processes as analogs for future and more distant past.

+ER 406 03(2-3-0)
Seasonal Snow Environments.
S. Prerequisite: Written consent of instructor. Special fee. $7.50. Evaluation of the physical environment: characteristics of snow: methods of studying snow: snow safety.

ER 416 03(3-0-0)
Land Use Hydrology.
F. Prerequisite: ER 304 or CE 422, ST 201. Analysis of hydrologic processes, erosion. and slope stability. and effect of land use management activities: watershed restoration.

+ER 417 ***020-2-0)***
Watershed Measurements.
F. Corequisite: ER 416. Special fee. $13. Instrument and field techniques in watershed science. Project design and data analysis.

ER 418 03(3-0-0)
Land Use and Water Quality.
S. Prerequisite: C 107, ER 416. Physical. chemical, biological water quality parameters affecting land use: land management to maintain water quality; water quality standards, legislation.

ER 419 02(0.4-0)
Water Quality Laboratory for Wildland Managers.
S. Corequisite: ER 418. Sampling and determination of water quality parameters.

ER 424 03(3-0-0)
Bioclimatology.
S. Prerequisite.' BY 220. Interaction of physical, biological environments of earth: problem environments, pollution and environmental modification. interpretations.

+ER 434 03(3-0-0)
Geology of National Parks and Monuments. V.
Prerequisite: ER 130 or ER 140. Special fee, $20. Geology of outdoor museums with consideration of environmental problems.

+ER 436 06(0-18-0)
Geology Summer Field Course.
SS. Prerequisite: ER 344, ER 364, ER 372, ER 376. Special fee, $500; plus $100 equipment loss fee may be assessed by department. Geologic mapping. measuring sections, interpreting geologic history in Colorado. Required comprehensive *reports,* geologic maps, and cross sections.

ER 440 03(2-2-0)
Watershed Problem Analysis.
S. Prerequisite: CE 422, ER 416. Hydrologic analysis and problem solving in watershed management.

°ER 446 03(3-0-0)
Environmental Geology.
S. Prerequisite: ER 454 or concurrent registration. Geology applied to environmental problems.

+°ER 447 03(2-3-0)
Mineral Deposits.
F. Prerequisite: ER 234. ER 372. Special fee. $15. Occurrence, origin. and exploration of economic metallic mineral deposits.

+*ER 448 03(2-3-0)
Industrial Rocks tad MInerals.
F. Prerequisite: ER 234, ER 372. Special fee, $15. Occurrence. evaluation, development of nonmetallic rocks and minerals.

ER 450 03(3-0-0)
Marine Geology.
S. Prerequisite: ER 130 or ER 140 or ER 272. Geology of oceans including structure, geomorphology. sedi-mentation.

+ER 452 03(2-3-0)
Hydrogeology.
F. Prerequisite: ER 140. Special fee, $5. Interaction of water and geologic materials; surface and ground-water; quantitative analysis and geologic effects on quality and flow of groundwater.

+ER 454 04(3-2-0)
Geomorphology.
S. Prerequisite: ER 140. Special fee, $10. Origin of landforms; morphology and processes.

ER 460 04(3-3-0)
Advanced Geochemistry and Petrology.
F. Prerequisite: ER 364. Geochemistry: crystal chemistry; thermodynamics; magma generation, crystallization. and fractionation; crystal evolution; metamorphic facies.

ER 486A-B Var.
Practicum.
Practical experience in an approved location with classroom consultation. A) Geology field study. B) Watershed field study.

+ER 492 Var.
Seminar.
Special variable ($30-$60) fee determined by department.

ER 494A-H Var.
Independent Study.
A) Environmental-engineering geology. B) Geomorphology. C) Mineralogy-petrology.
E) Paleontology-stratigraphy. F) Sedimentology. G) Structural geology. H) Oceanography.

ER 495 Var.
Independent Study in Watershed Sciences.

ER 504/RR 504 02(2-0-0)
Water-Based Recreation.
S, Prerequisite: Written consent of instructor. Credit not allowed for both ER 504 and RR 504. Identify issues and management strategies for recreation utilization of water resources.

ER 510 02(2-0-0)
Watershed Management In Developing Countries.
F. Prerequisite: CE 422 or ER 304. Watershed management problems. approaches. and solutions in developing countries.

***ER 516 03(2-0-0**
Analysis of Cumulative Watershed Effects.
S. Prerequisite: ER 416. ER 417. Definition. legal basis. and casual processes for cumulative watershed effects; modeling and evaluation techniques.

ER 520 02(2-0-0)
Evapotranspiration.
S. Prerequisite: PH 122. Theory. estimation. measurement. simulation. and application of evapotranspiration processes in hydrology.

***ER 524/CE 524 04(3-0-0**
Modeling Watershed Hydrology.
S. Prerequisite: CE 422 or ER 416. CS 150. ST 304 or ST 309. Credit not allowed for both ER 524 and CE 524. Development and application of watershed models: structure. calibration, evaluation. sensitivity analysis. simulation.

°ER 537 030-6-0)
Ore Microscopy.
F. Prerequisite: ER 364. ER 447. Identification and description of opaque minerals in ores and rocks.

+ER 544 03(2-3-0)
Engineering Geology.
F. Prerequisite: ER 140. Special fee. $10. Geology and geologic methods applied to civil engineering problems.

+ER 546 04(3-3-0)
Sedimentary Basin Analysis.
S. Prerequisite: ER 344 or written consent of instructor. Special fee, $15. Sedimentologic data base. correlation, mapping. Facies models. classification. and evolution of sedimentary basins. Applications to petroleum exploration.

+°ER 547 03(3-0-0)
Mineral Deposits.
S. Prerequisite: ER 447. Special fee. $60. Tectonic setting and parameters in minerals exploration.

***ER 549 03(3-0-0)**
History of Geology.
F. Prerequisite: ER 140. ER 154. Historical development of geological ideas.

ER 552 Var (2-3)
Advanced Topics in Hydrogeology.
S. Prerequisite: ER 542 or written consent of instructor. Current literature. new techniques. legislative and political developments in hydrogeology. and appropriate case histories.

ER 555 03(2-2-0)
Air Resource Management.
S. Prerequisite: AT 440; NR 260 or CS 150. Technical and practical applications of air quality management for federal/state land managers.

ER 560 04(3-3-0)
Clay Mineralogy.
F. Prerequisite: ER 364 or written consent of instructor. Crystallography and chemistry of clay minerals. Applications to geology. engineering. and soil sciences. X-ray analysis of clays.

°ER 562 03(3-0-0)
Statistical Data Analysis in Earth Resources.
F. Prerequisite: ST 302. ST 304. Statistical parameters, sequential data. map analysis. and multi-variate data.

ER 564 03(2-3-0)
X-Ray Mineralogy.
S. Prerequisite: ER 362. written consent of instructor. Identification. analysis. interpretation of minerals and rocks using X-ray techniques.

ER 570 030-0-2)
Tectonics.
S. Prerequisite: ER 372. ER 364. Evidence. environments. and consequences of tectonic theories.

+°ER 574 03(3-0-0)
Snow Hydrology.
F. Prerequisite: CE 422. ER 406, Special fee, $50. Evaluation of hydrologic water balance in snow dominated environments. including methods. measurements, and models.

ER 586 02(0-2-0
Practicum in Air Resources Management.
SS. Prerequisite: ER 555. Experience in monitoring and modeling for air resources management.

ER 589 04(3-3-0)
Watershed Planning for Developing Countries.
SS. Prerequisite: Hydrology course or professional experience in watershed and soil conservation. Offered only through Division of Continuing Education. Basic training in watershed and soil conservation survey. planning. monitoring. and evaluation. emphasizing microcomputer technology.

+ER 601 020-0-0
Earth Resources Analysis.
F. Prerequisite: ER 372 or ER 416. Special fee. $30. Analytical techniques and their applications in the geology and watershed programs.

°ER 616 030-0-2)
Hillslope Hydrology and Runoff Processes.
S. Prerequisite: CE 423. ER 416. Hillslope hydrology and runoff processes in different environments; implications for management and modeling.

+*ER 647 03(2-3-0)
Hydrothermal Alteration.
S. Prerequisite: ER 364. ER 447. Special fee. $30. Mineralogy and petrology of hydrothermally altered rocks related to emplacement of ore bodies.

+ER 652 03(3-0-0)
Fluvial Geomorphology.
F. Prerequisite: ER 140. Special fee. $12. Geomorphology of channels, slopes. and drainage systems.

+ER 672 03(2-3-0)
Advanced Structural Geology.
S. Prerequisite: ER 436. ER 364. Special fee. $12. Rheology. deformation mechanisms. structural associations. and advanced methods of structural analysis.

ER 692 Var.
Seminar.

ER 695 Var.
Independent Study.

#+ER 696 Var.
Group Study.
Special variable ($30-$60) fee determined by department.

ER 698 Var.
Research.

ER 699 Var.
Thesis.

°ER 712 03(2-2-0)
Watershed Systems.

F. Prerequisite: ER 416 or CE 422. ST 304. Dynamic simulation of watershed behavior; application and evaluation of current hydrologic models.

***ER 714 03(3-0-0)**
Water Quality for Wildland Managers.
F. Prerequisite: ER 418 or C 473. Sampling. statistics of sampling. concepts of ionic equilibrium. water quality modeling. instream flow requirements.

ER 732 03(3-0-0)
Geochemistry.
F. Prerequisite:C 475. written consent of instructor. Chemical principles applied to geologic systems; emphasis on occurrence. distribution of major elements, their roles in the weathering cycle.

ER 733 03(3-0-0)
Exploration Geochemistry.
S. Prerequisite: ER 732 or written consent of instructor. Principles of chemical dispersion in geologic systems; application of geochemical sampling techniques. data evaluation in exploration for mineral deposits.

°ER 737 04(3-3-0)
Advanced Igneous Petrology.
S. Prerequisite: ER 364. Physicochemical principles of igneous systems utilizing phase rule chemistry and thermodynamics.

***ER 738 04(3-3-0)**
Advanced Metamorphic Petrology.
S. Prerequisite: ER 364. Physicochemical principles utilizing phase rule chemistry. thermodynamics. petrofabric analysis.

ER 746 03(2-3-0)
Techniques in Environmental Geology.
S. Prerequisite: ER 652. Advanced techniques and legal aspects pertinent to environmental geology: field application of methods to problems.

***ER 747 04(3-3-0)**
Advanced Sedimentary Petrology.
S. Prerequisite: ER 344. Classification. origin. depositional history, and diagenesis of detrital sedimentary rocks as determined from thin sections.

ER 798 Var.
Research.

ER 799 Var.
Dissertation.

ENGINEERING SCIENCE COURSES

COLLEGE OF ENGINEERING

ES 320 03(3-0-0)
Software Tools for Engineers.
F. Prerequisite: CS 151 or ME 101. Common software tools such as filters. editors. compilers. operating systems. graphics. macros, etc. Engineering projects are assigned.

ES 460 02(2-0-0)
Communications and Networks.
S. Prerequisite: AC 101 or CE 101 or EE 102 or ME 101. Computer networks: network topologies: ISO model including physical layer. data link layer. network layer. and transport layer.

ES 492 01 (0-0-1)
Seminar.

ES 495 Var.
Independent Study.

EXERCISE AND SPORT SCIENCE COURSES

Exercise and Sport Science Department College of Applied Human Sciences

EX 100A-P 01(0-3-0)
Beginning Physical Education.
F.S. SS. Physical activities for the development of personal motor skills. A) Aerobic exercise. B) Badminton. Special fee. $4. C) Soccer. D) Self-defense. E) Tennis. F) Ballet. G) Gymnastics. H) Ballroom dance. I) Modern jazz. J) Volleyball. K) Swimming. L) Golf. Special fee. $25. M) Basketball. N) Racquetball. O) Weight training. P) Ice skating. Special fee. $75.

EX 101A-J 01(0-3-0)
Intermediate Physical Education.
F, S, SS. Prerequisite: EX 100 or meet departmental standards. Physical activities for the development of personal motor ski Ils. A) Self-defense. B) Tennis. C) Volleyball. D) Swimming. E) Golf, Special fee, $25. F) Soccer. G) Basketball. H) Racquetball. I) Aerobics. J) Ice skating. Special fee. $75.

EX 102A-G 01(0-3-0)
Physical Education Activities.
F, S, SS. Physical activities for the development of personal motor skills, A) Aquatic conditioning. B) Corrective-adaptive for handicapped. C) Special activities. D) Advanced swimming. E) Orienteering. F) Conditioning and fitness, G) Athletics.

EX 103A-B 01(0-3-0)
Skiing.
S. Special fee, A) $130. B) $84. A) Alpine. B) Touring.

EX 104 01(0-3-0)
Bowling.
F, S. Special fee,.$24.

EX 105 01.
Beginning Tennis.
F, S, SS. Offered at correspondence course only. Basic concepts and mechanical analyses of tennis; structure for learning various tennis psychomotor skills.

EX 106 01(0-3-0)
Scuba Diving.
F.S. Prerequisite: Intermediate ability. Special fee. $60.

EX 11 IA-D 01(0-2-0)
Physical Education Laboratory.
F.S. SS. Development of skills in physical education activities. A) Basketball. B) Soccer. C) Track and field. D) Weight training.

EX 119 020-2-0)
Games and Rhythmic Activities.
F, S. Methods and materials of movement education: games of low organization; rhythmic activities for all age groups; general program and party organization.

EX 123 020-2-0)
Essentials of Physlcal Activity.
F.S. SS. Body's need for and adaptation to exercise; decision-making aids concerning role of exercise in a healthy life style.

EX 125 03(2-2-0)
Movement and Rhythm Analysis.
F.S. Mechanical principles applied to human movement; analysis of rhythmic form and structure.

EX 145 03(3-0-0)
Health and Wellness.

F.S. Personal health behaviors and personal choice in response to wellness.

EX 203 03(3-0-0)
Motor Learning.
F.S. SS. Prerequisite: PY 100. Motor skill acquisition as function of maturation and experience. Emphasis on strategies for facilitating skill learning in normal school-age population.

EX 209 020-2-0)
Techniques of Officiating.
F.S. SS. Game rules and practical experience in officiating team sports.

EX :11 IA-G 01(0-2-0)
Physical Education Laboratory.
F.S. A) Aerobics. C) Field sports. D) Golf. E) Racquetball. F) Tennis. G) Volleyball.

EX 212 03(2-2-0)
Lifeguard Training/Instructor.
F.S. SS. Prerequisite: Intermediate swimming ability. Special fee. $3. Lifesaving water rescue, water safety. and lifeguard training. Meets requirements for American Red Cross Lifeguard Training/ Instructors certification.

EX 214 03(2-2-0)
Water Safety Instruction.
F.S. Special fee. $3. Pool management and methods of teaching swimming skills and water safety practices. Red Cross Water Safety Instructor Certificate upon completion.

EX 240 020-2-0)
First Aid and Emergency Care.
F.S. Special fee. $8.50. Principles. applied techniques emphasizing emergency rescue and care. Meets requirements for Red Cross Advanced First Aid and Emergency Care Credential.

EX 260 02(2-0-0)
History and Principles of Physical Education.
F.S. Emerging philosophies and principles.

EX 303 03(2-2-0)
Anatomical Kinesiology.
F.S. Prerequisite: AY 301. Analysis of human physical performance: application of anatomy and physics using EMG and high-speed photography.

EX 307 03(3-0-0)
Biomechanical Principles of Human Movement.
F. Prerequisite: EX 303 or concurrent registration. PH 121. Identify with and utilize biomechanical principles pertinent to human movement.

EX 309 02(2-0-0)
Methods of Coaching.
F.S. Preparation to coach in an interscholastic athletic situation.

EX 330 02.
Aerobics-Teaching Techniques and Training.
F.S. SS. Offered as telecourse only. Design. instruct, analyze. and evaluate biomechanically and physiologically sound aerobic exercise program.

EX 331A-D 01(0-2-0)
Techniques of Teaching Team Sports.
F, S. Prerequisite: Corresponding laboratory or competency in area. Practical and theoretical aspects of teaching team sports with special emphasis on materials. teaching techniques. and analyzing skills. A) Soccer. B) Basketball. C) Field sports. D) Volleyball.

EX 332A-H.
Techniques of Teaching Individual Sports.

F, S. Prerequisite: Corresponding laboratory or competency in area. Practical and theoretical aspects of teaching individual sports with special emphasis on materials. teaching techniques, and analyzing skills. A) Badminton 01(0-2-0) B) Golf 01(0-2-0) C) Tennis 01(0-2-0)
D) Track and field 01(0-2-0) E) Stunts, tumbling. Floor exercise 02(0-4-0) F) Weight training 01(0-2-0) H) Aerobics 01(0-2-0).

EX 340 010-0-0)
Exercise Prescription.
F, S. SS. Corequisite: EX 386A. Theory and practice of exercise prescription for healthy individuals, cardiac patients, and other special populations.

EX 344 03(3-0-0)
Methods of Health Education.
F, S. Prerequisite: EX 145. Prepare teaching units and methods for health education in the public schools, K-12.

EX 346 03(2-2-0)
Training Room Methods.
F, S. Prerequisite: AY 301. Preventive measures. taping, bandaging, massage and manipulation, diet and conditioning of athletes.

EX 356 03(3-0-0)
Wellness Programming.
F, S, SS. Prerequisite: EX 145, EX 386A. Assessment of wellness concerns and organizational problems; selection and implementation of program design.

EX 364 02(2-0-0)
Organization and Administration of Athletics.
F, S, State association regulations, budgets, equipment, schedules for interscholastic athletics emphasizing secondary school athletics.

EX 365 02(2-0-0)
Program Administration.
F, S. Problems and nature of organization and administration in health and physical education.

+EX 375 03(2-2-0)
Adapted and Corrective Exercise.
F, S. Prerequisite: AY 301, EX 119. Special fee, $8. Nature and needs of the handicapped student requiring adapted or corrective physical education. Causes, prevention, corrections of postural problems.

EX 386A-B 020-3-0)
Practicum.
Prerequisite: A) EX 123, EX 240, EX 332H. B) EX 386A. Special fee, $10. A) Adult fitness. B) Wellness program management.

EX 403 04(3-2-0)
Physiology of Exercise.
F.S. Prerequisite: AY 301, PS 302. Effects of exercise on tissues, organs, and systems of the body.

EX 405 020-2-0)
Exercise Testing Instrumentation.
F, S. Prerequisite: EX 403. Theory and operation of devices commonly employed in quantifying factors related to exercise.

EX 407 03(3-0-0)
Biomechanics In Sport.
F, S. Prerequisite: EX 307. Identification of biomechanical elements pertinent to exercise and sport.

EX 420 03(2-2-0)
Electrocardiography and Exercise Management.

F, S. Prerequisite: EX 403. Interpretation of 12-lead ECG tracings, administering exercise tests, and prescribing exercise program for healthy individuals and special populations.

EX 430 03(3-0-0)
Advanced Athletic Training.
F.S. Prerequisite: EX 240, EX 346. Theory and techniques of Habilitative and rehabilitative sports medicine. Emphasis on contemporary evaluative procedures and rehabilitative modalities.

EX 439 02.
Coaching Athletes ACEP Level I.
F, S, SS. Offered as telecourse only. Latest information on sport: medicine, psychology, pedagogy, physiology, and management.

EX 444 03(3-0-0)
Exercise and Aging.
F, S, SS. Prerequisite: EX 403. Understanding the aging process and what impact exercise has on this process.

EX 446 02(2-0-0)
Performance Physiology.
F.S. Prerequisite: EX 403. Exercise physiology theory applied to sport and conditioning programs; design of scientifically based fitness programs for athletes in all disciplines.

EX 453 03(3-0-0)
Measurement and Evaluation.
F. S, SS. Prerequisite: M 120. Physical and academic testing; methods of establishing and evaluating a testing program.

EX 456 03(3-0-0)
Advanced Wellness Programming.
F, S, SS. Prerequisite: EX 356. Investigation of established wellness programs with special emphasis on design, implementation, and evaluation of programming models.

EX 476 020-3-0)
Rehabilitation Exercise.
S, SS. Prerequisite: EX 375 or written consent of instructor. Evaluation, design, and selection of exercises for individuals with permanent or temporary disabilities.

EX 479 03(3-0-0)
Psychology and Sport.
F.S. Prerequisite: PY 100. Psychological and social implications involved in teaching of physical education and coaching of athletics.

EX 484 Var (1-5)
Supervised College Teaching.
E S, SS. Maximum of 10 credits allowed in course.

EX 486A-C Var (1-3)
Practicum.
A) Adaptive correctives. B) Wellness program management. Prerequisite: EX 386B. Special fee, $5 per credit. C) Coaching. EX 487 Var. Internship. Prerequisite: EX 486A or B or C or D or E. Special fee, $5 per credit. Practical application of knowledge and skills in a professional situation.

EX 491A-I Var (1-3)
Workshop. .
a) Administration and supervision. B) Adaptives. C) Curncu-E) Professional preparation. G) Health. I) Athletics.

EX 492 01(0-0-0
Seminar.

EX 495A-D Var.
Independent Study.
A) Physical education. B) Health. C) Athletics. D) Biomechanics.

EX 496A-D Var.
Group Study.
A) Physical education. B) Health. C) Athletics. D) Biomechanics. *

EX 501 03(2-2-0)
Principles of Electrocardiography.
F, S. Prerequisite: EX 403. Procedures in stress test administration and analysis emphasizing electrocardiography.

EX 510 03(0-4-0
Microcomputers in Exercise and Sport Science.
F, S. Prerequisite: BD 140 or CS 110. Use of microcomputers in acquisition. analysis, and reporting of data in exercise and sport science.

EX 532 02 0-2-0)
Analysis of Advanced Skills.
F. Prerequisite: EX 331 A or B or C or D. EX 332A or B or C. Analyzing performance in four of the six activities: badminton. golf, racquetball. soccer. tennis. and volleyball.

EX 553 03(3-0-0)
Advanced Measurement and Evaluation.
F. S. SS. Prerequisite: EX 453. Advanced measurement concepts and interpretation and application of quantitative techniques of analysis in physical education and exercise science.

EX 560/FN 560 03(3-0-0)
Exercise and Nutrition.
SS. Prerequisite: EX 403, FN 350. Credit not allowed for both EX 560 and FN 560. Interaction of nutrition and physical fitness in exercise performance and promotion of health.

EX 576 020-2-0)
Adaptive and Corrective Procedures.
F.S. SS. Prerequisite: EX 476. Application of adaptive and corrective procedures.

EX 600 03(3-0-0)
Research Methods.
F. Prerequisite: EX 453. Methods of research applied to physical education including scientific methods. problem development. and research design.

EX 603 03(3-0-0)
Advanced Topics In Exercise Physiology.
S. Prerequisite: EX 405. Advanced principles of theoretical and applied exercise physiology at molecular. cellular. and systemic levels.

EX 605 020-2-0)
Advanced Exercise Testing Instrumentation.
F. Prerequisite: EX 405. Use and theory of devices employed in exercise testing. emphasizing recently developed microprocessor-based instruments.

***EX 618 02(2-0-0)**
Psychomotor Learning.
F.S. Prerequisite: ED 471. Methods of teaching physical education emphasizing new theories. trends. materials. and programs.

EX 650 03(2-2-0)
Biomechanics.
S. Prerequisite: PH 121. Theoretical and practical analysis of problems related to human biomechanics.

EX 656 03(3-0-0)
Comprehensive Stress Management.
F.S. SS. Relationship between stress and illness emphasizing methods to impact its detrimental effects.

EX 684 Var.
Supervised College Teaching.
F.S.

SS. EX 686 Var. (1-3).
Practicum,-Adult Fitness.
Prerequisite: EX 240. Practical experience in supervising exercise programs for adults.

EX 692 02(2-0-0)
Seminar.
Consideration of various aspects of physical education.

EX 695A-E Var.
Independent Study.
A) Physical education. B) Health. C) Athletics. D) Exercise science. E) Biomechanics.

EX 696A-F Var.
Group Study.
A) Physical education. B) Health. C) Exercise and nutrition. D) Athletics. E) Exercise science. F) Biomechanics.

EX 699 Var.
Thesis.

ECOLOGY COURSES

Office of the Graduate School

EY 500A-B.
Theories In Autecology.
F. Prerequisite: One college-level course in each: physics. calculus. statistics. basic ecology. Current theories in population ecology. including evolutionary concepts, sociobiology. regulation and adaptation. and population models. A) 03(3-0-0) B) 04(3-0-0).

EY 501A-B.
Theories in Synecology.
S. Prerequisite: One college-level course in each: physics. calculus. statistics. basic. ecology. Current theories in community ecology. including competition. predation. community organization. and ecosystem function. A) 03(3-0-0) B) 04(3-0-0).

EY 571 Var. (1-3)
Advanced Topics in Ecology.
S. Prerequisite: One course in ecological principles. Current research topics presented and analyzed by visiting scientists.

EY 592 Var (1-3)
Interdisciplinary Seminar in Ecology.
F.S. Prerequisite:. One 300- or 400-level course in ecology. Concepts and principles of basic and applied ecology in an interdisciplinary context.

FOREST SCIENCES COURSES

Forest Sciences Department College of Natural Resources

F 100 03(3-0-0)
Fundamentals of Forestry.
F.S. Elements of forest and wood sciences.

F 201 02(0-4-0)
Forest Mapping.
F. Prerequisite: F 100 Field utilization of aerial photos. planimetric and topographic maps in forestry. Compass surveying. drafting and lettering of field maps.

F 207 02(0-4-0)
Forest Field Ecology.
F. Identification. ecology. and management of forest plants and' animals; sampling techniques.

F 210 03(0-6-0)
Dendrology.
F, S. Prerequisite: B 120. Important forest trees of North America; morphology. taxonomy. nomenclature. ecological requirements. and economic significance.

+F 215 04(2-6-0)
Forestry Field Operations.
F. Prerequisite: F 201. Special fee. $200. Forest management and wood utilization practices. Forestry and wood processing. equipment use. and management plan development.

F 224 01(0-2-0)
Wildland Fire Measurements.
F. Prerequisite: F 100. Wildland fire control and use measurements: fuels. weather. topography. Fire behavior. and fire ecology.

F 230 03(3-0-0)
Forest Mensuration.
SS. Prerequisite: Written consent of instructor. Fifteen days of field study and practice in measurement of trees. logs. lumber. and other forest products.

F 31103(3-0-0)
Forest Ecology.
F. Prerequisite: BY 220. Relationships of ecological concepts to the dynamics of forest ecosystems.

F 321 03(2-2-0)
Forest Biometry.
F. Prerequisite: NR 260 or CS 150; ST 201 or ST 301. Measurement and estimation of timber in logs. trees. and stands. Sampling with varying probabilities.

F 322 03(3-0-0)
Forest Economics.
S. Prerequisite: EC 102. M 141, NR 260. Economic concepts and theories relating to forest resource use; analytical methods for evaluating alternative uses of public and private forests.

F 325 03(34)-0)
Silviculture.
S. Prerequisite: F 210. F 311. Principles of silviculture and their application to major forest types of United States.

F 330 03(2-2-0)
Timber Harvesting and the Environment.
S. Prerequisite: F 215 or F 230 or F 321. Principles of timber harvesting and effects of logging on the environment.

F 331 03(2-2-0)

Wood Anatomy and Properties.
F. Structure. properties. identification. and characteristics of wood.

F 333 03(3-0-0)
Forest Products In Society.
S. Society's dependence on wood and fiber derived from forests.

F 334 04(3-3-0)
Wood Chemistry.
F. Prerequisite:C 245. C 246. Chemical description of cell wall constituents. wood extractives. and reactions of these substances. Chemical utilization and analysis of wood.

F 335 03(2-3-0)
Pulping Processes.
S. Prerequisite: F 334. Pulping processes and chemistry' involved in pulping woody materiak

F 341 04(3-2-0)
Wood Protection.
S. Prerequisite: F 331. Degradative effects of water and biological organisms on wood; methods of protecting wood from these factors.

¥ 42103(2-2-0)
Timber Management.
F. Prerequisite: F 321. F 322. F 325. Growth and yield of trees and forest stands; financial aspects of stand management; harvest scheduling and regulation of forests.

F 422 03(2-2-0)
Quantitative Methods in Forest Management.
F. Prerequisite: F 321. F 322. Design and analysis of optimization and nonoptimization models in forest managerial operations.

F 423 03(3-0-0)
Decision Making in Forest Resource Management.
S. Prerequisite: F 421, F 422. Techniques used to analyze forest management problems: operations research. gaming. and spatial analysis applied to resource allocation on forested lands.

F 424 03(2-2-0)
Forest Fire Management.
F. Prerequisite: F 224 or written consent of instructor. Policies and systems for fire prevention. Fuel treatment. prescribed fire. and wildfire operations in forestry.

°¥ 425 02(2-0-0)
Forest Fire Behavior.
S. Prerequisite: Fire experience. Programmed instruction in fuel. weather,. and topography effects on wildland fire behavior.

F 431A-B.
Mechanics of Wood and Wood Composites.
F. Prerequisite: CE 256. CE 358. Elastic. strength. and rheological behavior of wood and wood composites; laboratory involves testing procedures. data analysis. and interpretation. A) 03(3-0-0) B) 04(3-2-0).

F 432 Var (3-4)
Design of Wood Structures.
F.S. Prerequisite: CE 358 or CE 360. Anatomy and fundamental properties of wood; design of connections and structural elements of wood composites.

F 435 04(3-2-0)
Mechanical Processing of Wood Products.
S. Prerequisite: F 331. Machining and manufacturing of lumber. plywood and particle board.

F 441 03(2-3-0)
Wood Bonding and Finishing.

F. Prerequisite: F 331. Basic principles of adhesion and formation of surface coatings where wood is the basic substrate.

°F 466/H 466 03(2-2-0)
Community Forestry.
S. Prerequisite: F 210 or H 221. H 464. Credit not allowed for both F 466 and H 466. Policies and management of public and privately owned community forests in urbanized areas.

F 487 Var (3-12)
Professional Forestry Internship.
Prerequisite: Written consent of department head. Professional-level field experience with forestry organization.

F 489A-F 03(3-0-10
Technical Fire Management.
F.S. SS. Prerequisite: Al ST 201. A-F) Five years professional. Full-time forestry management. Offered only off campus. A) Numerical analysis for fire managers. B) Economics and management for fire specialists. C) Fuels and fuel management. D) Fire effects. E) Fire and land management. F) Technical fire management project.

F 493A-C 0110-0-1)
Seminar.
A) Forest management science. B) Wood science. C) Forest biology.

F 495A-B Var.
Independent Study.
A) Forestry. B) Wood science. F 510 03(2-3-0). Ecophysiology of Trees. S. Prerequisite: B 440. Environmental factors affecting physiology of woody plants; emphasis on water relations in trees and importance of water in physiological processes.

F 511 03(3-0-0)
Pollution Effects on Forest Ecosystems.
F. Prerequisite: AG 240 F 325. Major pollutants and their direct and indirect effects on forest ecosystems.

F 520 03(3-0-0)
Advanced Quantitative Methods in Forestry 1.
F. Prerequisite: F 322. M 160. Design .red analysis of optimization models in forest management operations: linear. goal. and dynamic programming.

F 521 03(2-2-0)
Advanced Quantitative Methods In Forestry II.
S. Prerequisite: F 5211. Analysis of forest inventory information; dynamic and stochastic models oriented to decision making and research in forestry.

F 522 03(3-0-0).
Advanced Forest Economics.
S. Prerequisite: EC 306. Analysis of forestry issues: financial maturity. management intensity. Federal policy. taxation. natural environments. and silviculture.

F 523 03(3-0-0)
Forest Biometrics.
S. Prerequisite: F 321. Theory and application of tree volume equations. Form classes. log rules. and log grading in forestry.

***F 524 03(2-2-0)**
Forest Fire Meteorology and Behavior.
S. Prerequisite: CS 150. AT 350. Effects of atmospheric processes on wild and prescribed fires; interrelationships of weather. Fuels. and topography on forest and range fires.

***F 534 03(3-0-0)**
Chemical Technology of Wood.
S. Prerequisite: F 334. Chemical technology applied to wood and bark; chemical reactions involving wood constituents; chemical treatment and modification of wood.

F 569/CE 569 03(3-0-0)
Intermediate Design of Wood Structures.
F. Prerequisite: CE 367. F 432. Credit not allowed for both F 569 and CE 569. Characteristics of structural products and their consideration in design: behavior of glulam members. wood trusses. and other wood structural systems.

F 593 0110-0-1)
Seminar-Fire Science.
F.

F 624 0312-2-0)
Fire Ecology.
S. Prerequisite: F 424, completion of one course in ecology. Fire in forest and range ecosystems; principles and techniques for evaluating fire effects on vegetation. soils. watersheds. and wildfire.

***F 625 03(2-240**
Ecology of Forest Production.
S. Prerequisite: One 300-level course in ecology. Development. structure. and production in forest communities; manipulation of forest production.

F 633 03(3-0-0)
Fundamentals of Wood Adhesion.
S. Prerequisite: F 441. Adhesion and its applications in the bonding of the wood.

F 695A-B Var.
Independent Study.
A) Forest science. B) Wood science.

F 698A-B Var.
Research.
A) Forest science. B) Wood science.

F 699A-B Var.
Thesis.
A) Forest science. B) Wood science.

***F 721 02(2-0-0)**
Forest Policy.
F. Prerequisite: NR 320. Significance and evolution of policies and institutions affecting management of forest lands; analysis of current forest policy problem.

***F 730 03(3-0-0)**
Wood Physics.
S. Prerequisite: F431A or B. Physical. elastic. and rheological properties of wood and wood composites.

***F 731 03(3-0-0)**
Wood-Liquid Relations.
F. Prerequisite: F 331. Physical and chemical principles affecting response of wood to liquids.

F 793A-D 01(0-0-0
Seminar.
A) Forest management science. B) Wood science. C) Forest biology. D) Forest science.

F 798A-B Var.
Research.
A) Forest science. B) Wood science.

F 799A-B Var.
Dissertation.
A) Forest science. B) Wood science.

FOOD SCIENCE AND NUTRITION COURSES

Food Science and Human Nutrition Department Colleges of Agricultural Sciences and Applied Human Sciences

FN 125 02(2-0-0)
Food and Nutrition in Health.
F.S. Nutritional quality and safety of food related to human health.

FN 150 03(3-0-0)
Survey of Human Nutrition.
F.S. Nutrition principles; application to national and international food problems.

FN 160 03.
Nutrition and the Preschool Child.
F.S. S& Offered as correspondence course only. Basic nutrition and application of nutrition principles to needs of preschool child.

FN 200 03(34-0)
Food Selection. Preparation, and Preservation.
F, S. Prerequisite: C 101 or one year high school chemistry. Technical and manipulative principles related to foods; their application in obtaining standard products.

FN 201 02(0-44)
Food Preparation Techniques.
ES. Prerequisite: FN 200 or concurrent registration. Techniques and manipulative skills for preparing standard food products.

FN 310 05(3-0-2)
Food Service Systems-Operations.
F.S. Prerequisite: FN 200. Technical operations: menu planning. evaluation; recipe standardization; forecasting, food cost. sanitation, hospital food distribution systems.

FN 311 02(2-0-0)
Food Service Systems-Production and Purchasing.
F.S. Prerequisite: FN 31 O; Concurrent registration in FN 386. Quantity food production principles. purchasing specifications. market channels.

FIN 350 03(34-0)
Human Nutrition.
F.S. Prerequisite: AY 300/ PS 300 or PS 310/Z 310, C 245. Nutrients. dietary requirements for physical well-being; evaluation of various diets.

FN 360 0304-.0)
Nutrition Assessment.
S. Prerequisite: C 246 or C 344. FN 350. Techniques for anthropometric, dietary. and biochemical assessment of nutritional status.

FN 386 02(04-0)
Practicum in Food Service Management.
Corequisite: FN 311.

FN 410 030-4-0)
Foods Theory and Application.
F.S. Prerequisite: FN 200. FN 350. Modification of food products and/or food preparation techniques to meet consumer demands and health concerns.

FN 41403(2-2-0)
Food Service Systems-Operations Analysis.
S. Prerequisite: FN 310. Manual and computer-assisted food management production and cost problem.

FN 428 03(34-0)
Teaching Techniques in Nutrition.
S. Prerequisite: FN 350. nine credits in food science and nutrition. Objectives, principles, and organization of subject matter for nutrition education and counseling.

FN 440 04(24-2)
Food Service Systems-Management.
S. Prerequisite: FN 311. System design. decision hierarchy; organization structure, tools of management. labor relations legislation.

FN 450 04(3-0-0
Diet and Disease.
F, S. Prerequisite: FN 350, AY 300/PS 300. BC 301. Dietary modifications to meet nutritional needs under normal and pathological conditions.

FN 451 03(3-0-0)
Community Nutrition.
F. Prerequisite: FN 350. Influences on nutritional status. assessment of nutrition problems and needs. nutrition intervention programs.

FN 459 03(3-0-0)
Nutrition In the Life Cycle.
F. Prerequisite: FN 350. Nutritional aspects associated with each phase of human life cycle including pregnancy. infancy. childhood. adolescence. and early and late adulthood.

FN 484 Var (1-3)
Supervised College Teaching.
F. SS.

FN 486A-C Var. (1-3)
Practicum.
Prerequisite: A) FN 200 and/ or FT 110. B) FN 350. C) FN 310. Supervised off-campus experience in A) Food science. B) Nutrition. C) Food service management.

FN 492 01(04-0
Seminar In Nutrition.
Capstone seminar; review and evaluation of achievement of educational objectives.

FN 493 01(0-0-0
Seminar in Restaurant Management.
Capstone seminar; review and evaluation of achievement of educational objectives.

FN 495A-B Var.
Independent Study.
A) Nutrition. B) Food service management.

FN 496 Var.
Group Study.

***FN 528 02(24-0)**
Clinical Nutrition.
SS. Prerequisite: FN 450; concurrent registration in FIN/586. Role of nutrition in etiology and treatment of selected disorders.

FN 525 02(2-0-0)
Nutrition Education Theories and Practice.
F. Prerequisite: FN 350. Examination of current theories. skills, and models used in nutrition education programs as preparation for research and practice.

FN 550 03(3-0-0)
Advanced Nutritional Science I. F. **Prerequisite: BC 351 or BC 403.**
FN 350. Protein, vitamin. mineral metabolism; human studies. animal models.

FN 551 03(3-0-0)

Advanced Nutritional Science II.
S. Prerequisite: BC 351 or BC 403. FN 350. Carbohydrate. lipid. energy metabolism; human studies, animal models.

FN 560/EX 560 03(3-0-0)
Exercise and Nutrition.
SS. Prerequisite: EX 403, FN 350. Credit not allowed for both FN 560 and EX 560. Interaction of nutrition and physical fitness in exercise performance and promotion of health.

FN 586 01(0-2-0)
Practicum.
Corequisite: FN 520.

FN 587A-C 06(0-18-0)
Internship.
A) Clinical dietetics. B) Community dietetics. C) Food service management.

FN 590 Var.
Workshop.

FN 620 62(2-0-0)
Advanced Community Nutrition.
S. Prerequisite: FN 350. Community nutrition assessment; nutrition program planning and evaluation. nutrition policy analysis.

FN 640A-D 010-0-0)
Current Concepts of Food and Nutrition Services.
F. °A) Policies and procedures. Prerequisite: FN 440 or FN 451. *B) Cost control and budgets. Prerequisite: FN 310. °C) Dietetic surveys. Prerequisite: FN 310, ST 201. *D) Dietetic practice. Prerequisite: FN 310.

FN 650A-B 02(2-0-0)
Recent Developments In Human Nutrition.
Prerequisite: A) FN 550.8) FN 551. Appraisal of literature on human nutritional status. A) Protein, vitamins, and minerals. S. B) Carbohydrates, lipids, and energy.

SS. FN 660 02(2-0-0)
Prenatal and Pediatric Nutrition.
F. Prerequisite: FN 459. Role of nutrition in normal and abnormal development during fetal and early life.

***FN 661 02(2-0-0)**
International Nutrition.
F. Prerequisite: FN 350. Roles of technological programs and international agencies in meeting nutritional needs.

FN 670 02(0-4-0)
Laboratory Methods.
F. Prerequisite: C 245. C 246. Laboratory techniques and instrumentation in nutrition and food science.

FN 671 020-2-0)
Microcomputer Applications.
S. Prerequisite: FN 350 or FN 414 or Fr 447. Microcomputer applications in nutrition.
Food science, and food service management.

FN 684 Var.
Supervised College Teaching.
F.S.

FN 686 Var.
Practicum.

FN 692 01(0-0-0

Seminar.

FN 695A-C Var.
Independent Study.
A) Food science. B) Nutrition. C) Food service management.

FN 696A-D Var.
Group Study.
A) Food science. B) Nutrition. C) Food service management. D) Exercise and nutrition.

FN 698A-C Var.
Research.
A) Food science. B) Nutrition. C) Food service management.

FN 699A-C Var.
Thesis.
A) Food science. B) Nutrition. C) Food service management.

***FN 700 02(2-0-0)**
Cellular Nutrition.
F. Prerequisite: FN 550. FN 551; or BC 403; PS 501. Essential nutrient requirements of cells and organs.

FN 795 Var.
Independent Study.

FN 796 01(0-0-1)
Group Study.

FN 799A-B Var.
Dissertation.
A) Food science. B) Nutrition.

FORENSIC SCIENCE COURSES

COLLEGE OF NATURAL SCIENCES

FO 487 Var (1-15)
Internship.
Prerequisite: Written consent of instructor. Maximum of 15 credits allowed in course.
Full- or pan-time participation in structured program in agency of criminal justice. e .g. law enforcement. courts. district attorney's office.

FO 496A-I Var.
Group Study.
A) Forensic toxicology. B) Ballistic science. C) Forensic anthropology. D) Comparative osteology. E) Professional ethics. F) Human biology. G) Criminalistics. H) Forensic archeology. I) Selected topics.

FO 796A-I Var.
Group Study.
A) Forensic toxicology. B) Ballistic science. C) Forensic anthropology. D) Comparative osteology. E) Professional ethics. F) Human biology. G) Criminalistics. H) Forensic archeology. I) Selected topics.

FOOD TECHNOLOGY COURSES

Food Science and Human Nutrition Department Colleges of Agricultural Sciences and Applied Human Sciences

FT 110 03(3-0-0)
Introduction to Food Science and Technology.
S. Prerequisite: High school chemistry or C 101. Commercial food processing, preservation. packaging with emphasis on composition. nutritional values. quality. and safety.

FT 320 020-2-0)
Sensory Evaluation of Food.
S. Prerequisite: FN 200 or FT 110. Relationship between sensory characteristics and various physical and chemical properties of foods including statistical considerations.

FT 330 02(2-0-0)
Alcoholic Beverage Technology and Control.
F. Prerequisite: C 103 or C 107. Classification. production. service, and control of wines. beers, and distilled spirits.

FT 334/MB 334 04(2-4-0)
Food Microbiology.
F. Prerequisite: MB 300. Credit not allowed for both FT 334 and MB 334. Microorganisms in production of foods, in preservation and spoilage. and in food-borne diseases. Control of microorganisms in foods.

FT 360/AN 360 03(3-0-0)
Principles of Meat Science.
F.S. Prerequisite: C 107 or C 111. Credit not allowed for both FT 360 and AN 360. Structure. composition, and biology of muscle and associated tissues; wholesomeness. nutritive value, and palatability of beef. pork, and lamb.

°FT 365 03(3-0-0)
Food Processing Technology.
F. Prerequisite: C 245. Food processing technologies used to preserve and enhance nutritive value and acceptability of food.

°FT 366 02(0-4-0)
Food Processing Laboratory.
F. Prerequisite: FT 365 or concurrent registration. Applications of principles involved in food processing and preservation.

FT 400 03(3-0-0)
Food Safety.
F, Prerequisite: Six credits in biology and/or chemistry. Safety of human food emphasizing safe production, processing, marketing, preparation, consumption, and regulations.

FT 420 03(3-0-0)
Quality Control of Food Products.
F. Prerequisite: FT 110, MB 300. Quality control from selection of raw ingredients to storage; transportation of manufactured product.

FT 447 02(2-0-0)
Food Chemistry.
F. Prerequisite: C 245; BC 301 or BC 351 or concurrent registration. Chemistry of food constituents as related to food quality and stability.

FT 448 01 (0-2-0)
Food Chemistry Laboratory.
F. Prerequisite: FT 447 or concurrent registration. Analysis of food constituents as related to food quality and stability.

***FT 449 03(2-2-0)**
Food Analysis.
S. Prerequisite: FT 447. Sampling. separations, physical and chemical measurements. and biochemical techniques.

FT 460/AN 460 03(2-2-0)
Meat Processing.
F. Prerequisite: FT 360/AN 360. Credit not allowed for both FT 460 and AN 460. Formulation, processing, and analysis of meat products.

***FT 470 02(2-0-0)**
Cereal Technology.
F. Prerequisite: FT 365. Composition. processing. and uses of cereal grains.

***FT 472 02(2-0-0)**
Fruit and Vegetable Technology.
S. Prerequisite: FT 365. Processing of fruits and vegetables including storage and quality considerations.

°FT 474 02(2-0-0)
Food Fermentations.
S. Prerequisite: FT 365; MB 334 or concurrent registration. Food fermentations including fermented dairy products, vegetables, meats, Oriental foods, and single cell protein.

°FT 476 02(2-0-0)
Fish and Seafood Technology.
S. Prerequisite: FT 365. Processing of freshwater and marine species of fish and shellfish including storage and quality considerations.

FT 487 Var (1-15)
Internship.

FT 492 01(0-0-0
Seminar In Food Science.
Capstone seminar; review and evaluation of achievement of educational objectives.

FT 495 Var.
Independent Study.

***FT 570 02(2-0-0)**
Food Product Development
F. Prerequisite: FT 447. Food product concepts, feasibility, and evaluation.

***FT 572 02(2-0-0)**
Food Biotechnology.
S. Prerequisite: MB 334. Interrelationships among microorganisms, food processing methods, advances in biotechnology and food quality. spoilage, shelf-life and safety.

FT 574 02(2-0-0)
Flavor Chemistry.
F. Prerequisite: C 245, FT 320. Formation pathways of desirable and undesirable food flavor compounds and their analysis.

FT 576 02(2-0-0)
Cereal Science.
S. Prerequisite: FT 447, Fr 470. Chemistry and functionality of cereal grain components and their importance in human nutrition.

°FT 660/AN 660 030-0-2)
Advanced Meat Science.
S. Prerequisite: AN 360/FT 360 or AN 422 or BC 30 I or FN 350. Credit not allowed for both FT 660 and AN 660. Anatomical, biochemical. histological. and physical factors associated with transformation of muscle into meat.

FT 698 Var.
Research.

FT 699 Var.
Thesis.

FT 799 Var.
Dissertation.

FISHERY AND WILDLIFE BIOLOGY COURSES

Fishery and Wildfire Biology Department College of Natural Resources

FW 100 03(3-0-0)
Wildlife Biology.
F, S. Biology of wild mammals. birds, and fish; conservation of wildlife and fisheries resources.

+FW 204 020-2-0)
Introduction to Fishery Biology.
F. Special fee, $23. Exposure to sampling techniques. agencies. and topics in fish-cry biology careen.

+FW 300 03(2-3-0)
Ichthyology.
S. Prerequisite: BY 103A or Z 110. Special fee, $13. Biology of fishes: anatomy, taxonomy, physiology, behavior, ecology. evolution. and zoogeography.

FW 312 03(3-0-0)
Diseases of Wildfire.
F. Prerequisite: BY 103A or Z 110. Etiological agents, reservoir hosts, transmission, susceptible hosts, environmental influence. diagnostic samples, and preventive and/or control measures.

FW 350 04(3-2-0)
Teaching Shooting Responsibility.
S. Education and instructor certification course to develop knowledge. skills. behavior for teaching about firearms. shooting sports, and associated ethics.

FW 355 02.
Hunter Education for Instructors.
F, S. S S. Offered as correspondence course only. Principles of learning and teaching for instructors of state hunter education courses.

FW 356 03.
Leopold's Ethic for Wildfire and Land.
F. S, SS. Offered as correspondence course only. Philosophy, art, history, and science of wildfire and land management from writings of Aldo Leopold.

FW 357 03.
Wildfire Habitat on the Great Plains.
F, S. SS. Offered as correspondence course only. Management of cover, food, and water for wildfire and fish in the Great Plains. Emphasis on practices compatible with other uses of private land.

FW 360 03(3-0-0)
Principles of Wildfire Management.
F, S. Prerequisite: BY 220, M 141 or M 155. Principles of ecology applied to management of wildfire resources. Quantitative methods. socioeconomic factors, population dynamics.

FW :370 020-0-0
Design of Wildfire Projects.
F, S. Prerequisite: ST 301 or ST 307/EH 307. Design, analysis, and evaluation of wildfire projects; preparation and presentation of project proposals.

+FW 371 04(2-4-0)
Wildlife Management Techniques.
F. Prerequisite: NR 220. NR 260, ST 301 or ST 307/EH 307. Special fee, $11.
Field and laboratory methods used in wildlife management. research.

+FW 375 020-0-0
Field Wildfire Studies.
S, SS. Prerequisite: BY 220. (Special fee, $180, assessed through Division of Continuing

Education.) Field trip to see wildlife management and habitats and to discuss problems and practices with professional ecologists and resources managers.

+FW 377 030-2-0
Habitat for Wildfire.
F. Prerequisite: FW 360. Credit not allowed for both FW 377 and FW 677. Special fee. $15. Wildfire habitat evaluation, classification, and improvement; management.of natural and altered environments for wildfire; wildfire indicator species.

FW 400 03(3-0-0)
Fish Ecology.
F. Prerequisite: FW 300. BY 220. Interactions between fishes and their environments; applications of ecological principles to fishery management. research.

+FW 401 03(2-3-0)
Fishery Science.
F. Prerequisite: FW 300; ST 301 or ST 307/EH 307; NR 260 or CS 110 or Z 279; M 141 or M 155. Special fee. $12. Theory, philosophy, and applications for study and management of fishery resources.

+FW 402 04(3-2-0)
Fish Culture.
S. Special fee, $15. Principles and practices to produce food, bait, and sport fishes.

FW 420 020-2-0)
Water Quality for Fish and Wildfire.
F. Prerequisite: FW 401;C 108 or C 112. Estimation of water quality parameters for health of fish and wildfire.

FW 467 03(3-0-0)
Wildfire Nutrition.
S. Prerequisite: C 245. Basic nutritional concepts applicable to wild vertebrates emphasizing methods of improving nutritional status of wildfire.

+*FW 468 03(2-3-0)
Wild Bird Management.
S. Prerequisite: FW 360. Special fee, $15. Ecology and management of game. pest, and rare bird populations and nongame bird communities.

+FW 469 03(3-0-0)
Big Game Management.
F. Prerequisite: FW 360, ST 301, Z 330. Special fee, $20. Management and ecology of big game mammals; emphasis on North American species.

FW 474 03(2-0-1)
Wildfire Ecology.
S. Prerequisite: BY 220, M 155. Analysis of wildfire communities: distribution. abundance, adaptions; wildlife ethology; human impacts on wildfire.

FW 492 01(0-0-0
Seminar-Wildlife Biology.

FW 495A-B Var.
Independent Study.
Prerequisite: One course in resource management. one course in ecology. written consent of instructor. A) Fishery biology. B) Wildlife biology.

FW 496A-B Var.
Group Study.
Prerequisite: One course in resource management, one course in ecology. A) Fishery biology. B) Wildlife biology.

FW 501 03(2-2-0)
Advanced Ichthyology.

S. Prerequisite: FW 300 or Z 214. Advanced phylogeny, classification, anatomy. physiology. distribution. and ecology of fishes.

***FW 502 03(2-2-0)**
Fish Reproduction and Early Life History.
S. Prerequisite: FW 300. Fish reproduction; embryology; larval biology. habitat, management.

+FW 52103(3-0-0)
Fish Habitat Management.
S. Prerequisite: FW 400 or Z 440. Special fee, $30. Critical fish habitat problems in logic. Fentic, marine, artificial environments; survey techniques; legal constraints; technologies for mitigation.

°FW 540 03(2-2-0)
Stream Fish Ecology and Management.
F. Prerequisite: FW 400, Z 441. Characteristics, ecology, and management of stream fish and their habitats.

FW 544 03(2-0-0
Ecotoxicology.
S. Prerequisite: BY 220, EH 446, ST 301; or written consent of instructor. Ecological effects of contaminants on populations, communities, and ecosystems.

***FW 551 Var (2-3)**
Design of Fish and Wildlife Studies.
F. Prerequisite: ST 301; or ST 512 for three-credit option. Statistical designs applicable to wildfire investigations, their planning and analysis.

FW 555 03(2-0-0
Conservation Biology.
F. Prerequisite: BY 220. Ecological factors in conservation of biological diversity; dis-ffibution of wild vertebrates.

+*FW 560 03(2-3-0)
Management of Fish In Ponds and Reservoirs.
F. Prerequisite: FW 300. Special fee, $30. Life histories, special requirements, management of fishes adaptable to artificial impoundments.

FW 561A-E Var (1-3)
Advanced Topics.
F,& Prerequisite: Written consent of instructor. A) Fishery biology. B) Wildlife biology. C) Population analysis, E) Vertebrate management.

+*FW 565 03(2-2-0)
Managing Human-Wildlife Conflicts.
F. Prerequisite: FW 360. Special fee, $20. Strategies for biologic, chemical, integrated control of wildlife pests; life histories. management; Economic, cultural restraints on control methods.

FW 662 030-2-0
Wildlife Population Dynamics.
S. Prerequisite: FW 360, M 155 or M 160, NR 260, ST 301. Population models; experimental evidence and analysis of theories of population regulation; case studies.

°FW 663 05(3-3-0
Sampling and Analysis of Vertebrate Populations.
S. Prerequisite: FW 360, ST 301. Sampling and analysis of fish and wildlife populations, including survival estimation, capture-recapture sampling, and transect sampling.

+FW 677 030-2-0
Wildlife Habitat Management
F. Prerequisite: FW 360. Credit not allowed for both FW 377 and FW 677. Special fee, $15. Habitat models; vegetation manipulation and monitoring for wildlife; extended field trips.

FW 692A-B Var.
Seminar.
A) Fishery biology, B) Wildlife biology.

FW 695A-B Var.
Independent Study.
A) Fishery biology. B) Wildlife biology.

FW 696A-B Var.
Group Study.
A) Fishery biology. B) Wildlife biology.

FW 698A-B Var.
Research.
A) Fishery biology. B) Wildfire biology.

FW 699A-B Var.
Thesis.
A) Fishery biology. B) Wildlife biology.

FW 798A-B Var.
Research.
A) Fishery biology. B) Wildfire biology.

FW 799A-B Var.
Dissertation.
A) Fishery biology. B) Wildfire biology.

GEOGRAPHY COURSES

Earth Resources Department College of Natural Resources

GR 100 03(3-0-0)
Introduction to Geography.
F, S. Major geographic themes applied to selected regions; physical environment. human-land relationships. regional analysis.

GR 210 03(3-0-0)
Physical Geography.
F, S. Energy, mass budget, and human impacts on atmosphere, hydrosphere, and continental land surfaces.

GR 241 03(3-0-0)
Geography of Natural Resources.
F. Spatial attributes, demand projections, supply alternatives, environmental quality implications of natural resource use, primarily in United States.

°GR 320 03(3-0-0)
Cultural Geography.
F. Prerequisite: GR 100. Geographic analysis of cultural phenomena. elements emphasizing human-land relationships and spatial patterns of agriculture, cities, language, religion.

GR 342 03(3-0-0)
Water Resources of the United States.
S. Spatial analysis of hydrologic elements and water resources development in United States.

GR 345 03(3-0-0)
Geography of Natural Hazards.
F. Special fee, $10. Causes, effects. distributional patterns. and human adjustments to natural environmental hazards.

GR 373 03(3-0-0)
Geography of Colorado.
F. Also offered as correspondence course. Spatial attributes and interactions of physical, demographic, and economic systems of Colorado.

***GR 375 03(3-0-0)**
Geography of South America.
S. Physical characteristics, major population groups. settlement patterns, economic activities of South America.

GR 376 03(3-0-0)
Geography of Middle America.
F. Prerequisite: GR 100. Physical characteristics. major population groups. and economic activities of Mexico. Central America. and Caribbean.

°GR 378 03(3-0-0)
Geography of Africa.
S. Prerequisite: GR 100. Physical characteristics. major populations, economic activities, and regional analysis.

GR 422 03(3-0-0)
Traditional Farming Systems.
F. Prerequisite: GR 100. Extensive and intensive systems; relation of farming to natural and cultural environment, technology, and population.

GR 495 Var.
Independent Study.

GR 595 Var.
Independent Study.

GRADUATE SCHOOL COURSES

OFFICE OF GRADUATE SCHOOL

GS 510 03(2-2-0)
Fundamentals of High Performance Computing.
F. Prerequisite: CS 150 or CS 152 or CS 252. UNIX; networks; scale, vector, and parallel architectures; performance programming.

GS 511 03(2-2-0)
High Performance Computing and Visualization.
S. Prerequisite: GS 510 or written consent of instructor. Iterative methods for linear systems; Monte Carlo methods; visualization and image processing.

GS 670 03(2-2-0)
Interdisciplinary Agricultural Development.
S. Prerequisite: Written consent of instructor, Theory and process for technology transfer to improve on-ram water management. Interdisciplinary teamwork using a systems approach will be emphasized.

GS 770 01(0-2-0)
Teaching Analysis Using Videotape.
F.S. Prerequisite: GS 792 and/or currently assigned teaching duties as a teaching assistant in lecture or laboratory. Video recordings of actual teaching are critiqued and analyzed by instructor and peers.

GS 792 02(0-0-2)
Seminar on College Teaching.
Role of college teacher emphasizing applied principles and practices derived from empirical research and collective experience of teaching professors.

GS 793 01(0-0-0
Genetics Seminar.
Joint seminar in the Genetics Institute offered on a rotational basis in the Departments of Agronomy, Animal Sciences, Biochemistry, Biology, Entomology, Forest Sciences, Horticulture, Physiology, Plant Pathology and Weed Science, Radiological Health Sciences, and Statistics.

HORTICULTURE COURSES

Horticulture Department
College of Agricultural Sciences

H 100 04(3-2-0)
Basic Horticulture.
F, S. Principles of plant science applied to propagation, improvement, culture. and utilization of horticultural plants.

H 130 04(2-4-0)
Landscape Graphics Studio.
F. Mechanical and freehand graphic techniques for landscape design. Use of pencil. ink, and colored markers and models.

+H 140 04(2-4-0)
Principles of Landscape Design.
S. Prerequisite: H 130. Special fee. $20. Basic concepts in the art and process of landscape design.

H 219 020-2-0)
Floral Design.
F. Special fee, $4.0. Basic concepts in art of floral design; design principles, color harmonies. and techniques of preserving plant materials.

+H 221 04(2-4-0)
Landscape Plants.
F.S. Special fee, $12. Identification and landscape use of coniferous and deciduous trees and shrubs, vines and ground covers.

H 230 02(2-0-0)
History of Landscape Design.
SS. Survey of history and principles of landscape design and development of the profession.

H 235 04(2-4-0)
Landscape Grading and Drainage Studio.
F. Prerequisite: H 140 or written consent of instructor. Special fee. $10. Basic design principles for grading, drainage. and earth forms for small-scale projects.

H 260 04(3-2-0)
Plant Propagation.
S. Prerequisite: H 100 Special fee, $5. Theories, principles, and techniques of sexual and asexual propagation.

+H 310 04(3-0-0
Greenhouse Management.
F. Special fee, $15. Use of enclosed structures for manipulation-of environment, effects on growth as applied to horticultural crops. methods of controls. production and .marketing costs.

+H 311 03(2-2-0)
Plants tor Interiors.
F. Prerequisite: One course in botany. biology, or horticulture. Special fee, $12. Identification. culture and environmental requirements of tropical foliage plants used for interiors.

+H 321 04(3-2-0)
Nursery Production and Management.
S. Prerequisite: H 100. Special fee, $12. Nursery industry Organization, management, equipment, plants, planting, storage. protection, and shipping.

+H 322 03(2-2-0)
Herbaceous Plants.

F. Prerequisite: One course in botany or biological science or horticulture. Special fee. *$12.* Identification. culture. and uses of ornamental herbaceous plants.

H 330 020-2-0)
Computers for Landscape Design.
S. Prerequisite: IS 131 or one course or knowledge of AutoCad. Applications and techniques of computer software utilized in small-scale landscape design-build.

H 331 02(2-0-0)
Landscape Design.
S. SS. Prerequisite: H 221. Fundamentals of landscape design theory and plant composition as presented in simple problems.

+H 332 04(2-4-0)
Planting Design Studio.
F.S. Prerequisite: H 140. H 221. H 322. Special fee, $20. Functional and aesthetic values of plant materials; their creative use in landscape design.

H 335 03(2-2-0)
Landscape Structures.
S. Prerequisite: IS 160. H 140. Design and construction methods for structures commonly used in residential landscaping.

H 341 03(2-2-0)
Turfgrass Management.
S. Prerequisite: H 100. Principles and practices of turfgrass propagation and maintenance.

H 384 Var (1-5)
Supervised College Teaching.
F.S. Maximum of 10 credits allowed in course.

+°H 411 04(3-0-0)
Floriculture I.
S. Prerequisite: H 310. Special Ice. $15. Commercial production and marketing of major cut flower crops under cover and/or in the open.

+*H 412 04(3-0-0)
Floriculture II.
S. Prerequisite: H 310. Special fee, $15. Commercial culture .red marketing of bedding plants and major flowering pot plants.

+H 432 04(2-4-0)
Intensive Landscape Design Studio.
S. Prerequisite: H 332. Special lee. $10. Site planning and design for landscape projects of a limited scale. Problems of increasing complexity.

+H 441 03(2-2-0)
Tallgrass Science.
S. Prerequisite: AG 240. B 120. H 341. Special ice. $7.50. Advanced technology in turfgrass science as it relates to specific management practices.

***H 451 03(3-0-0)**
Vegetable Crops.
S. Prerequisite: H 100 or a course in plant biology. Systems and practices used in production and marketing of vegetable crops.

+H 452 03(3-0-0)
Fruit Crop Production.
F. Prerequisite: H I CO or written consent of instructor. Special fee. $15. Fruit crops characteristics. production, harvesting. processing. and marketing.

H 460/AG 460 03(3-0-0)
Plant Breeding.

S. Prerequisite: AG 330. Credit not allowed for both H 460 and AG 460. Theory and practice of plant breeding using principles of genetics and related sciences.

H 461/AG 461 01(0-2-0)
Plant Breeding Laboratory.
S. Prerequisite: H 460/AG 460 or concurrent registration. Credit not allowed for both H 461 and AG 461. Techniques and procedures used in public and commercial plant breeding programs.

***H 462 03(3-0-0)**
Postharvest Physiology of Horticultural Crops.
S. Postharvest physiology of horticultural products and technologies utilized to prolong life and maintain quality.

+H 464 04(3-2-0)
Arboriculture and Urban Plant Management.
F. Prerequisite: AG 240. H 100. Special lee. $12. Cultural management of plants in the urban landscape.

H 465 03(2-2-0)
Landscape Business Practices.
F. Construction estimating. documentation bidding. and other business practices.

°H 466/F 466 03(2-2-0)
Community Forestry.
S. Prerequisite: F 210 or H 221. H 464. Credit not allowed for both H 466 and F 466. Policies and management of public and privately owned community forests in urbanized areas.

***H 475 03(3-0-0)**
Environmental Requirements of Horticultural Plants.
S. Prerequisite: B 440. Relation of light. temperature, water, chemicals. and other environmental factors to growth, development of horticultural and related plants.

H 486 Var. (1-6)
Practicum.

H 487 Var.
Internship.

H 492 01(0-0-0
Seminar.

H 495 Var.
Independent Study.

H 496 Var.
Group Study.

H 540 02(2-0-0)
Plant Growth Substances in Horticulture.
F. Prerequisite: B 440. Nomenclature. occurrence. nature, effects. mechanism of action; practical applications of plant growth substances in horticulture.

H 560 03(2-2-0)
Plant Environmental Measurements.
S. Prerequisite: One course in physics. Principles and use of equipment for measuring environmental parameters in and above plant covers; outdoors and in environmental chambers.

***H 575 02(2-0-0)**
Plant Germplasm Conservation.
S. Prerequisite: H 460/AG 460 or written consent of instructor. Principles. concepts. and methodology for collection. conservation. and utilization of plant genetic resources.

H 588 Var.
Supervised Extension Practices.

F.S. SS. Field experiences in extension practices in horticulture.

H 642 04(2-2-1)
Plant Growth Analysis and Modelling.
S. Prerequisite: One course *each* in calculus. plant physiology. multiple linear regression. Current methodology of plant growth analysis and modelling to include kinetics and mechanistic approaches.

H 675 03(3-0-0)
Plant Stress Physiology.
F. Prerequisite: B 440. Physiological basis of plant injury and survival during water. salt. and temperature .stresses.

H 698 Var.
Research.

H 699 Var.
Thesis.

H 784 Var.
Supervised College Teaching.
F.S.

SS. H 792 01(0-0-0
Seminar.

H 795 Var.
Independent Study.

H 799 Var.
Dissertation.

HISPANO-AMERICAN COURSES

Office of Provost/Academic Vice President

HA 200 03(2-0-1)
Introduction to Hispano-American Studies.
S Examination of structures and institutions beating upon Hispano-American. Cultural and historical phenomena which form Hispano identity.

HA 492 01(0-0-0
Seminar.
Prerequisite: Completion of independent study project.

HOUSING AND CONSUMER SCIENCES COURSES

Design. Merchandising, and Consumer Sciences Department College of Applied Human Sciences

HC 100 03(3-0-0)
Consumer Choices.
F. Personal and family values, goals. and resources emphasizing effective consumption of goods and services.

HC 250 03(3-0-0)
Housing and Interiors.
F, S. Function and aesthetics in planning and analyzing interior spaces based on human needs. HC 296 Var. Group Study.

HC 300 03(3-0-0)
Consumer Choices In Personal Computing.
F. Prerequisite: BD 140 or CS 110. Personal computing choices. uses. and issues related to home and consumer applications.

HC 320 03(3-0-0)
Finance-Personal and Family.
F, S. Management of income, expenditures, credit. savings, investment, insurance, taxes, and assets considering legislation and economic conditions.

HC 330 03(3-0-0)
Decision Making-Personal and Family.
F, S, SS. Also offered as correspondence course, Integration of management functions in the family for realizing values and goals.

HC 340 04(3-2-0)
Equipment and Energy.
F. S, Prerequisite: C 103 or C 107. Physical, chemical, and operating principles of equipment; management of energy use.

HC 360 03(3-0-0)
Homing-Consumer Issues.
F. S, SS. Socioeconomic and political-legal aspects of housing for consumers and citizens.

HC 384 Var.
Supervised College Teaching.
F, S. Maximum of 10 credits allowed in course.

HC 401 03(3-0-0)
Consumer Issues and the Market.
S. Prerequisite: EC 100 or EC 102. Interrelationships of market and consumer.

HC 410 03(3-0-0)
Family Financial Resources and Public Policy.
F. Prerequisite: EC IOO or EC 102. Impact of public policies on solutions of economic problems for individuals and families.

HC 411 02(2-0-0)
Families and the Legal Environment.
F, SS. Credit not allowed for both HC 411 and HC 610. Legal aspects of consumer and family roles.

HC 412/P0 412 03(3-0-0)
Civil Rights in America.
S, SS. Credit not allowed for both HC 412 and PO 412. Legal precepts and principles which discriminate by sex and race; relevant recent judicial and legislative actions.

HC 430 03(3-0-0)
Research and Problem Solving In Consumer Sciences.
S. Prerequisite: HC 330. Research and problem solving in consumer sciences using a variety of decision-making approaches.

HC 460 03(3-0-0)
Housing and Design for Special Populations.
F, S. Prerequisite: HC 360 or ID 275. Housing and design problems of special population groups.

HC 479 02(0-4-0)
Home Economics Communications.
F. Prerequisite: AR 101, HC 340. Communications theory and methods; demonstrations. photographs. and printed media as public relations tools.

HC 494A-E Var.
Independent Study.
A) Consumer issues. B) Finance and economics. C) Management. D) Equipment and energy. E) Housing.

HC 496 Var.
Group Study.

°HC 51103(3-040
U.S. Consumption Standards.
S. Prerequisite: Six credits in economics and/or family economics. Consumption patterns of American households; "American Standard of Living", budgets.

HC 518 03(3-0-0)
Consumer Issues-Global Perspectives.
F. Prerequisite: HC 401. Understanding and analysis of consumer well-being and issues from global perspective.

°HC 519 03(3-0-0)
Issues in Family Economies.
F. Prerequisite: HC 410. Current economic issues and their impact on households.

HC 520 03(2-0-0
Family Financial Decisions.
F. Prerequisite: HC 320. Issues in income and expenditure choices throughout the family life cycle.

HC 560 03(3-0-0)
Housing and Public Policy.
S. Prerequisite: HC 460. Local, state, and federal policies and programs directed at current housing issues.

°HC 578A-D 03(2-0-0
Trends.
F, S, SS. Prerequisite: A) HC 340. B) HC 360. C) HC 401. D) HC 330. A) Equipment and energy. B) Housing. C) Consumer issues. D) Family resource management.

HC 590 Var.
Workshop.

HC 610 03(241-0
Families and the Legal Environment.
F. Prerequisite: HC 401 or HD 434. Credit not allowed for both HC 610 and HC 411. Legal aspects of consumer and family roles and their effect on decision making.

HC 684 Var.
Supervised College Teaching.
F.S.

HC 687 Var.
Internship.

HC 692 02(0-0-2)
Seminar.

HC 694 Var.
Independent Study.

HC 696 Var.
Group Study.

HC 696 Var.
Research.

HC 699 Var.
Thesis.

HUMAN DEVELOPMENT AND FAMILY STUDIES COURSES

Human Development and Family Studies Department College of Applied Human Sciences

HD 10103(3-0-0)
Individual and Family Development.
F, S. SS. Also offered as correspondence course. Basic principles and sequences in human development; family structure and functions as they support human development.

HD 175/PY 175 03.
Developmental Psychology Across the Life Span.
F, S, SS. Credit not allowed for both HD 175 and PY 175. Offered as telecourse only. Theory and research on physical, cognitive, and psychosocial human development across the life span.

HD 211 03(3-0-0)
Infancy and Childhood.
F, S. Prerequisite: HD 101 or PY 100. Behavior, development. and guidance from conception through late childhood.

HD 217 03(3-0-0)
Creative Experiences for Children.
F. Special fee. $6. Theones of play; art. music. literature as related to child development.

HD 218 03.
Creative Experiences for Preschool Children.
F.S. SS. Credit not allowed for both HD 218 and HD 217. Offered as correspondence course only. Role of art. music. and literature in development; emphasis on planning and conducting creative experiences for preschool children.

HD 254/AY 254 l13(3-0-0)
Biological Aspects of Human Development.
F.S. Prerequisite: Z 101 orZ 110 or BY 102. Credit not allowed for both HD 254 and AY 254. Human embryology. genetics. developmental processes resulting in birth defects. human physical development through the lifespan and aging.

HD 276 03.
Studying Young Children.
F,S, SS. Offered as correspondence course only. Increasing understanding of young children through development of observation skills while participating in an early childhood center.

HD 277 02(2-0-0)
Professional Skills Development 1.
F.S. Corequisite: HD 286. Beginning development of skills for working in professional setting.

HD 286 01(0-3-0)
Practicum.
Prerequisite: HD 211 or concurrent registration. Laboratory experience with preschool-aged children.

HD 301 03(3-0-0)
Perspectives in Gerontology.
S. Prerequisite: HD 101 or PY 1001 or S 100 or written consent of instructor. Also offered as telecourses. Process of aging from a multidisciplinary perspective.

HD 311 03(3-0-0)
Adolescence.
F.S. Prerequisite: HD 101 or HD 211 or PY 260. Behavior. development. and guidance of the adolescent.

HD 321 03(3-0-0)
Marriage and Family Relationships.

F.S. Prerequisite: PY 100. S 100. Also offered as telecourse. Preparation for and adjustment to marital and family relationships throughout the life cycle.

HD 322 03(3-0-0)
Adult Development and Aging.
F.S. Prerequisite: HD 101 or PY 100 or S 100. Developmental processes through adult years including aging.

HD 323 03(2-0-0
Death, Dying, and Grief.
S. Prerequisite:HD 100 or HD 211 or HD 311 or HD 322 or PY 260 or PY 465. Developmental processes of death and dying related to the dying individual and family; applied to dealing with grief. death in human service agencies.

HD 330 03(3-0-0)
Childhood Socialization.
ES. Prerequisite: HD 211. Social and cultural processes affecting human development. cultural differences in children.

HD 334 03(3-0-0)
Parenting-Theory and Application.
F.S. Prerequisite: HD 101 or HD 211. Parenting styles as they are influenced by interface of child and adult developmental needs.

HD 375 03(2-2-0)
Children's Programming/Curriculum Development.
F.S. SS. Prerequisite: HD 286, concurrent registration in HD 387 and HD 376. Special fee. $18.75. Principles of designing and evaluating developmentally appropriate programs for children.

HD 376 03(3-0-0)
Professional Skills Development II.
S. Prerequisite: H D 101. HD 286, SW 3 20 or concurrent registration. Development of interactive skills for use by human developmentalists in a variety of professional settings.

HD 387 Var (3-5)
Internship.
Prerequisite: HD 286. HD 277. concurrent registration in HD 376. Supervised participation in human developmental settings.

HD 430 02.
Play Behavior.
F.S. SS Prerequisite: HD 101 or HD 211. Offered as correspondence course only. Role of play in human development. designing developmental play environments. and guiding development through play.

HD 434 03(3-0-0)
Family Studies.
F.S. SS. Prerequisite: HD 101 or HD 321 or HD 334. Theory and research concerning relationships within families; interaction between family and other social institutions.

HD 438 03(3-0-0)
Administration of Human Development Centers.
S. Prerequisite: HD 286. Center administration to meet objectives of budgeting. equipping. operating. program planning. and licensing.

HD 439 03.
Administration of Child Care Centers.
F.S. SS. Prerequisite: Any two of the six courses meeting state child care certification requirements. Offered as correspondence course only. Center administration related to program development and operations. budgeting, state regulations and licensing. and personnel issues.

HD 484 Var 11-3)
Supervised College Teaching.
F.S.

SS. HD 487 Var (1-14)
Specialized Internship.
Prerequisite: HD 387. Application of human development skills in a professional setting.

HD 490A-B Var (1-3).
Workshop.
A) Human development. B) Family studies.

HD 492 03(0-0-3)
Seminar.
Prerequisite: Written consent of instructor.

HD 495A-C Var.
Independent Study.
A) Human development. B) Family studies. C) Early childhood education.

HD 497 Var.
Group Study.

HD 498A-B Var (1-3)
Research.
A) Human development. B) Family studies.

HD 500 03(0-0-3)
Selected Readings.
F. Prerequisite: Six credits in human development and family studies or related area. Selected readings in human development and family studies with emphasis on historical and contemporary topics. issues. problems. and trends.

HD 510 03(3-0-0)
Theories of Human Development.
S. Prerequisite: HD 211. HD 311. Comparative analysis of major theories in human development.

HD 511 03(2-2-0)
Infant Behavior and Development.
F. Prerequisite: Six credits in human development. Human development from conception through two years.

HD 524 03(3-0-0).
Family Theory.
F. Prerequisite: HD 434. Major theories and conceptual frameworks for family analysis.

HD 528 03(2-2-0)
Developmental Assessment.
F. Prerequisite: Nine credits in human development and family studies or behavioral science at 300-400 level. Developmental assessment procedures including purpose. specific procedures. and communicating the results.

HD 530 03(3-0-0)
Social Development.
F. Prerequisite: Six credits in 300-400 level HD courses or written consent of instructor. Social and personality development in children.

HD 534 03(3-0-0)
Marriage and Family Therapy.
F. Prerequisite: HD 524. Theories and techniques.

HD 550 03(3-0-0)
Research Methods I.
S. Prerequisite: Six credits in 300-400 level HD courses. written consent of instructor. Research strategies and ethical considerations.

HD 590A-B Var (1-3)
Workshop.

A) Human development. B) Family studies.

HD 600A-E 03(3-0-0)
Advanced Studies.
F.S. Prerequisite: A-C, E) Six credits in social or behavioral science. D) HD 550 or concurrent registration. A) Cross-cultural. B) Grief and loss. C) Functional/dysfunctional sexuality. D) Program planning and evaluation. E) Parenting.

HD 612 03(3-0-0)
Adolescent Development.
F.S. Prerequisite: Six credits of 300-500 level behavioral science. Classical and contemporary theory; review of research related to major developmental processes.

HD 613 03(3-0-0)
Adult Development and Aging.
F.S. Prerequisite: Six credits of 300-500 level behavioral science. Advanced study of developmental change and adaptation during adult years.

HD 624 03(3-0-0)
Skills and Techniques In Family Therapy.
F. Prerequisite: HD 534. Elaboration of techniques and therapy skills based on theory and research.

***HD 630 03(3-0-0)**
Emotional Development.
F. Prerequisite: Six credits in human development. Development of emotions and emotional behavior.

HD 631 03(3-0-0)
Cognitive Development.
F.S. Prerequisite: Nine credits in HD courses. Perceptual-motor, intellectual. and language development.

HD 634 03(3-0-0)
Evaluation of Family Research.
S. Prerequisite: HD 434 or HD 524. Classical and contemporary research and theory; applications.

°HD 636 03(3-0-0)
Aging and the Family.
F. Prerequisite: Three upper-division credits in social and behavioral science. Theory and research relating to topics on aging during middle and late years of family life cycle.

HD 644 03(3-0-0)
Foundations in Family Therapy.
F, SS. Prerequisite: HD 524 or concurrent registration. Historical overview and current influences of theories related to marriage and family therapy.

HD 650 03(3-0-0)
Research Methods II.
S. Prerequisite: HD 550. Design and analysis.

***HD 677 03(3-0-0)**
Ethical and Legal Issues.
S. Prerequisite: HD 534 or concurrent registration. Ethical and legal issues in the field of human development and family studies.

HD 684 Var.
Supervised College Teaching.

HD 686A-E Var (1-18)
Practicum.
Prerequisite: A, B, D, and E) Nine credits in human development. C) HD 677 or concurrent registration. Application of human development skills in a variety of professional settings. A)

Human development. B) Family studies. C) Marriage and family therapy. D) Developmental assessment. E) Early childhood education.

HD 687A-C Var.
Internship.
Prerequisite: A-B) Nine graduate credits in human development. C) HD 677. HD 686C. Application of advanced human development skills in professional .settings. A) Human development. B) Family studies. C) Marriage and family therapy.

HD 692 Var. (1-3)
Seminar.
HD 695A-C Var. Independent Study. A) Human development. B) Family studies. C) Early childhood education.

HD 697 Var. (1-6)
Group Study.

HD 698A-B Var (1-3)
Research.
A) Human development. B) Family studies.

HD 699 Var.
Thesis. Prerequisite: HD 550.

°HD 710 03(3-0-0)
Advanced Theories of Human Development.
S. Prerequisite: HD 510. HD 524. Historical roots and current trends in theories of human development and family studies.

°HD 750 03(3-0-0)
Advanced Developmental Research.
F. Prerequisite: ST 311 or ST 312, HD 650. Multivariate research designs and data analysis applied to individual development and family systems.

HD 774 03(0-0-3)
Marriage and Family Therapy Supervision.
F. Prerequisite: HD 534, HD 644, 16 credits of HD 686C. Theories and skills related to supervising marriage and family therapists-in-training.

HD 786A-C Var (3-15)
Practicum.
Prerequisite: A) HD 677. B) HD 686D. C) HD 774. A) Lifespan development and family studies. B) Developmental assessment. C) Marriage and family therapy.

HI) 787A-B Var. (3-15)
Internship.
Prerequisite: B) HD 786C. Supervised work experience in an approved agency or setting. A) Lifespan development and family studies. B) Marriage and family therapy.

HD 795A-B Var. (1-6).
Independent Study.
A) Lifespan development and family studies. B) Marriage and family therapy.

HD 799A-B Var (1-15)
Dissertation.
A) Lifespan development and family studies. B) Marriage and family therapy.

HIGHER EDUCATION COURSES

Occupational and Educational Studies School College of Applied Human Sciences

HE 590A-I Var (1-3)
Workshop-Student Personnel.
A) Admissions, B) College union administration. C) Housing/ auxiliary services. D) Financial aid. E) Career services. F) Balancing professional lifestyles, G) Today's college student. H) Designing and facilitating workshops. 0 Institutional diversity.

HE 670 02(2-0-0)
College Student Personnel Administration.
F. Prerequisite: Written consent of instructor. Historical, philosophical. and professional development in student affairs functions; analysis of relationships with constituent groups.

HE 671 02(2-0-0)
Higher Education Administration.
F. Prerequisite: HE 670. Purpose. structure. and role of administration of higher education. Emphasis on financial management for student affairs administrators.

HE 672 02(0-0-2)
Campus Ecology.
F. Prerequisite: HE 670. Relationships between college students and their environments; impact on student development.

HE 673 02(0-0-2)
Student Development Theory.
F. Prerequisite: HE 670. Strategies for application of student development theories in practice of student affairs.

HE 675 03(3-0-11)
The Community College.
F. Prerequisite: VE 601 or appropriate experience. Role and scope of community college: history. philosophy. organization. administration.

HE 676 03(3-0-0).
Organizational Behavior in Student Affairs.
S. Prerequisite: HE 670. Understanding and application of basic organizational behavior principles within administration of student affairs in higher education.

HE 677 02(2-0-0)
Law in Student Affairs.
F. Prerequisite: HE 670. Legal issues focusing on sources and application of educational law and responsibilities of higher education administrators.

HE 687A-B Var.
Internship.
A) Student personnel. B) Community college administration.

HE 692A-B Var.
Seminar.
Prerequisite: A) HE 670 or written consent of instructor. A) Student personnel. B) Community college administration.

HE 694A-B Var.
Independent Field Studies.
A) Student personnel. B) Community college administration.

HE 695A-B Var.
Independent Study.
A) Study., personnel. B) Community college administration.

HE 7 IO 03(0-0-3)

Community College Finance.
F, SS. Prerequisite: VE 611 or HE 675. Federal, state. and local revenue distribution, budget preparation and controls, accounting options, audit preparation.

HOME ECONOMICS COURSES

College of Applied Human Sciences

HM 179 02(2-0-0)
Introduction to Home Economics.
S. Career options in home economics and professional leadership responsibilities.

HM 379 010-0-0)
Colloquium-Home Economics.
F, S. Current topics and issues related to professional roles and opportunities.

HM 484 Var (1-6)
Supervised College Teaching.
F.S.

SS. HM 487A-C Var.
Internship.
A) Extension. B) Community service. C) Business.

HM 494 Var.
Independent Study.

HM 496 Var.
Group Study.

HM 590 Var (1-3)
Workshop.

HM 687 Var (1-15)
Internship.

HM 692 Var (1-3)
Seminar.

HM 694 Var (1-3)
Independent Study.

HM 696 Var 11-3)
Group Study.

HM 698 Var.
Research.

HM 699 Var.
Thesis.

HONORS COURSES

Office of Provost/Academic Vice President

HP 100 01 (0-0-1)
Honors Western Civilization I.
F. Corequisite: HY 100; participation in Honors Program. Selected readings complementing Western Civilization material.

HP 101 01(0-0-0)
Honors Western Civilization II.
S. Corequisite: HY 101; participation in Honors Program. Selected readings complementing Western Civilization material.

HP 102 01(0-0-1).
Honors Attributes of Living Systems.
F. Corequisite: BY 102: participation in Honors Program. Special fee. $45. Selected readings complementing "Attributes of Living Systems" material.

HP 103 01 (0-0-1).
Honors Biology of Organisms.
S. Corequisite: BY 103A and BY 103B; participation in Honors Program. Selected readings complementing "Biology of Organisms" material.

HP 110 03(3-0-0)
Western Heritage-Ancient Period to 400 A.D.
F. Prerequisite: Participation in Honors Program. Ancient civilization integrating history, philosophy, and literature.

HP 111 03(3-0-0).
Western Heritage-400-1648 A.D.
S. Prerequisite: Participation in Honors Program. Development of Western heritage from 40)-1648 A.D. in history, philosophy. and literature.

HP 170 01(0-0-1).
Honors World Civilizations, Ancient-1500.
F. Corequisite: HY 170: participation in Honors Program. Selected readings complementing "World Civilizations. Ancient- 1500" material.

HP 171 01(0-0-1)
Honors World Civilizations, 1500-Present.
S. Corequisite: HY 171; participation in Honors Program. Selected readings complementing "World Civilizations. 1500-Present" material.

HP 192 01(0-0-1).
Freshman Seminar.
Prerequisite: Participation in Honors Program. Special fee. $38.

HP 197 Var (1-4)
General Honors Colloquium.
Limited to qualified freshmen and sophomores. Students from all major fields meet in small groups 10 focus on a problem of concern to all.

HP 310 03(3-0-0)
Western Heritage-1648 A.D.-Present.
F. Prerequisite: Participation in Honors Program. Development of Western heritage from 1648 A.D. to present in history. philosophy. and literature.

HP 384 Var.
Supervised College Teaching.
F.S.

HP 397 Var (1-4)

General Honors Colloquium.
Normally limited to qualified juniors and seniors. Students from all major fields meet in ,%mall groups to focus on a problem of concern to all.

HP 445 03(3-0-0).
Origins of the Conscious Mind.
S. Prerequisite: Six credits of science, philosophy. psychology. or mathematics; written consent of instructor. Current psychophysiological models of mind and behavior; philosophical views on the nature of mind and reality.

HP 492 03(0-0-3)
Seminar.
Prerequisite: Participation in Honors Program.

HP 495 Var. (1-5)
Independent Study.
Individual projects developed by the student and the major adviser at the upper-division level but which transcends basic course content.

HP 498 Var (2-3)
Primary Honors Colloquium.
Individual preparation followed by discussion within area of student's major. Student is expected to contribute ideas showing insight and depth of knowledge.

HP 499 Var. (3-5).
Senior Honors Thesis.
Prerequisite: Enrolled in the Honors Program and approval of the Honors Director. Maximum of 6 credits allowed in course.

HUMAN SERVICES COURSES

College of Applied Human Sciences

HS 100 03(0-0-3)
Nonprofit Agency Administration.
F. Administration of youth agencies.

HS 401 03(0-0-3)
Volunteer Management and Service-Learning.
S. Prerequisite: YA 100. Volunteer management practices. styles. and relationships of nonprofit community agencies and programs.

HS 402 03(0-0-3)
Nonprofit Agency Fund Raising and Management.
S. Prerequisite: YA 100. Method of developing financial support for nonprofit organizations.

HS 487 Var (1-16)
Internship In Human Services.
Prerequisite: Written consent of instructor. Application of skills learned in interdisciplinary program or major to a variety of human service settings.

HS 490 Var (1-5)
Workshop.

HS 492 Var. (1-5)
Seminar.

HS 4.95 Var (1-5).
Independent Study.

HS 590 Var. (1-5).
Workshop.

HS 692 Var (1-5)
Seminar.

HS 695 Var (1-5)
Independent Study.

HISTORY COURSES

History Department College of Liberal Arts

HY 100 03(3-0-0)
Western Civilization 1.
F.S. SS. Western world from ancient times to the Reformation.

HY 101 03(3-0-0)
Western Civilization II.
F. S. SS. Western world from Reformation to contemporary era.

HY 150 03(3-0-0)
U.S. History to 1876.
ES. SS. Principal themes in development of United States from colonial period through reconstruction.

HY 151 03(3-0-0)
U.S. History Since 1876.
F.S. SS. Principal themes in development of United States since reconstruction.

HY.170 03(3-0-0)
World Civilizations. Ancient-1500.
F. History of world civilizations from ancient to modern times.

HY 171 03(3-0-0)
World Civilizations. 1500-Present.
ES. History of world civilizations in modern times.

HY 200 010-0-0)
Prologue.
F.S. Study of history including ideas. methods. writings. and meaning of history.

HY 210 03(3-0-0)
20th-Century World.
ES. Major world events with emphasis on perspective of United States.

HY 215 03(3-0-0)
Revolution and Conflict in the Middle East.
F. Sources of conflict in Middle East from Ottoman Turks to present; emphasis on forces which influence modern problems.

HY 230 03(3-0-0)
Medieval Europe.
SS. Political. legal. socioeconomic development of Europe from 300-1500 emphasizing emergence of major states.

HY 235 03(3-0-0)
Slavic and East Central European Civilizations.
F.S. Evolution of cultural characteristics of Slavic and East Central Europe emphasizing similarity and diversity of the peoples of the region.

HY 240 03(3-0-0)
History of England.
F. SS. From Roman period to present emphasizing constitutional. legal. political developments.

HY 242 03(3-0-0)
History of Ireland.
S. History of Ireland from earliest times to the present day.

HY 245 03(3-0-0)
World War II in Europe.
S, SS. History of World War 11 in Europe. 1939-1945: its origins, major events. and nature.

HY 25003(3-0-0)
African-American History. 1619-1865.
F.S. SS. Also offered as correspondence course. Survey of African background and slavery in the American South to abolition.

HY 251 03(3-0-0)
African-American History Since 1865.
F. Political. socioeconomic. and cultural history of Black Americans since abolition.

HY 253 03(3-0-0)
History of Modern Christianity.
S. Development of Christianity from the Reformation to the present emphasizing its institutional and societal role.

HY 260 03(3-0-0)
Colorado.
F.S. SS. Survey of Colorado history from ancient Indians to present.

HY 261 010-0-0)
Colorado Since 1945.
F, S. Review of postwar social. political. and economic developments affecting changes in Colorado from 1945 to present.

HY 263 02(2-0-0)
War for Independence.
S. Surveys the War for Independence. 1775-1781.

HY 264 03(3-0-0)
The War In Vietnam.
S. Causes and consequences of U.S. involvement in the war in Vietnam.

HY 265 03(3-0-0)
Cowboys of the Americas.
S. SS. Traces origins of cowboy culture and livestock industry from 16th century Spain to present.

HY 270 03(3-0-0)
Colonial Latin America.
F, SS. Iberian (Spanish and Portuguese) empires in America: origins. establishment. organization. and conclusion in independence.

HY 271 03(3-0-0)
Latin America Since Independence.
S. SS. Development of nation-states in Latin America; their adjustment to independence.

HY 273 03(3-0-0)
Asia-The Formative Years.
F. Major traditional intellectual and cultural patterns of Asia before 1800.

HY 274 03(3-0-0)
Asia-Years of Transformation.
S. SS. Transformation of major intellectual and cultural patterns of Asia in modern times.

HY 277 03(3-0-0)
Science In Modern History.
F, SS, Basic principles and historical impact of the three great scientific revolutions precipitated by Copernicus. Darwin, and Freud.

HY 279 03(3-0-0)
History of Technology.
F, S, SS. Development of social and scientific technologies emphasizing their relation to cultural, environmental. and historical factors.

HY 297 Var (1-3)
Group Study.

°HY 302 03(3-0-0)
Ancient Civilization-Near East.
F, SS. Development of civilization in Near East from neolithic times to 500 B.C. emphasizing Mesopotamia and Egypt.

***HY 303 01(3-0-0)**
Ancient Civilization-Greece.
F. SS. From Minoan to Roman times emphasizing political. socioeconomic, and cultural developments.

***HY 304 03(3-0-0)**
Ancient Civilization-Rome.
S, SS. From Etruscan period to later Empire stressing political, legal. social, economic, and cultural achievements.

***HY 310 03(3-0-0)**
The Age of the Reformation.
S. Development. of European society during Reformation and Counter-Reformation; religious wars. dynastic struggles. and rise of nation-states.

***HY 312 03(3-0-0)**
The Age of the Enlightenment.
S. Development of European society from settlement of religious wars to Napoleonic era emphasizing political. economic. ,red intellectual trends.

HY 316 03(3-0-0)
Modern Europe, 1815-1914.
F. SS. Europe in 19th century emphasizing growth of liberalism. nationalism. and industrialism.

HY 318 03(3-0-0).
Europe in Crisis. 1914-1941.
F. Political. social. economic developments since 1914: consequences of world wars. Great Depression. spread of totalitarianism. decline of imperialism.

HY 319 03(3-0-0)
Contemporary Europe.
F. SS. Political. economic. social. and cultural history of major European nations since World War II.

HY 326 03(2-0-1).
European Biography.
S. SS. Historical inquiry into European social. intellectual. political. and economic development through study of leading personalities.

HY 340 03(3-0-0)
Late Imperial China.
F. SS. Imperial China during the Ching era. 1644-1912 emphasizing changes in sociopolitical institutions and culture.

HY 341 03(3-0-0)
Revolutionary China.
S. SS. Revolutionary movements and changes from Sun Yat-sen to Communist era.

HY 342 03(3-0-0).
Japan Since 1800.
S. SS. From a feudal society to a modern, industrialized state emphasizing political. intellectual. socioeconomic developments. and Western intrusion.

HY 346 03(3-0-0)
Eastern Rome, Islam and the West, 500-1453.
S. Political. social, and cultural development of the High Islamic empires.

HY 347/E 347 03(3-0-0)
Modern Mideast Through Literature.

S. Credit not allowed for both HY 347 and E 347. Modern history and culture of Middle East peoples through their literature in English translation.

***HY 350 03(3-0-0)**
Mexico.
S, SS. Social, economic. and political development of Mexican people from pre-Columbian times to present.

°HY 352 03(3-0-0)
Caribbean Civilization.
S. SS. Socioeconomic. political. and cultural development of the nations of the Caribbean.

HY 360 03(3-0-0)
Colonial and Provincial America to 1740.
F. SS. English colonies and their maturation to the Great Awakening.

HY 362 03(3-0-0)
Era of the American Revolution.
S. SS. Imperial relations and American society during revolutionary period.

HY 364 03(3-0-0)
Age of Jefferson.
F. SS. Society. culture, and political life in times of Thomas Jefferson.

HY 368 03(3-0-0)
Age of Jackson.
S. SS. National growth. 1815 to 1850. emphasizing political. social. and economic developments.

fly 370 03(3-0-0).
Civil War Era.
S. U.S. history between 1848 and 1865 emphasizing causes and results of the Civil War.

HY 372 03(3-0-0).
Reconstruction and the New South.
F. Reconstruction Era. 1865-1877. and the South to present with emphasis on purposes and results of Reconstruction.

HY 375 03(3-0-0).
United States, 1876-1917.
S, SS. Victorian way of life; rise of industry; reform movements; imperialism: World War I.

HY 376 03(3-1-1)
United States, 1917-1945.
F. SS. World War I. the 19208. the Great Depression. and World War II.

HY 377 113(3-0-0)
United States Since 1945.
S. SS. The Cold War. Foreign and domestic affairs from Truman to present.

HY 379/EC 379 03(3-0-0).
Economic History of the United States.
F. Prerequisite: Two courses in United States history; or EC 100 and either EC 102 or EA 102. Credit not allowed for both HY 379 and EC 379. Economic analysis of growth and welfare from beginning of industrialization to present.

HY 401/MS 401 03(3-0-1).
The American Military Experience.
F. SS. Credit not allowed for both HY 401 and MS 401. Role of the armed forces in American society; development of military traditions. institutions. and practices.

"HY 404 113(3-0-0)
Ancient Israel.
S, SS. Ancient Israel to 70 A.D. emphasizing the Near Eastern background. using archaeological data and the Old Testament.

***HY 4111 03(3-0-0)**
Medieval England.
S. Political. social and intellectual development of England from Romans to end of Middle Ages.

HY 414 03(3-0-0)
Tudor Stuart England, 1485-1689.
F. SS. Political. economic. and social history of England from 1485-1689 emphasizing religious movements. revolution. and constitutional development.

HY 41603(3-0-0).
Victorian Era, England and Empire, 1783-1901.
S. SS. Transition of aristocratic. stable. agrarian England to the first middle-class. urban-industrial society.

***HY 418 03(3-1-0).**
Britain in the 20th Century.
F. Political. economic. and social developments emphasizing role of Britain in world affairs and internal changes that led to welfare state.

HY 419 113(3-0-0).
Africa.
F. Africa from earliest times to present with emphasis on recent centuries and sub-Sahara.

HY 420 03(3-0-0)
History of Spain.
F. Iberian Peninsula from Roman era emphasizing modern Spain.

HY 421 03(3-0-0)
Modern France Since 1789.
F. France from the Revolution to present.

***HY 422 03(3-0-0).**
Habsburg Empire.
F. From Charles V through World War I emphasizing significance. uniqueness. and crucial role of Danubian Europe in modern history.

***HY 423 03(3-0-0)**
Eastern Europe Since 1918.
F. SS. Breakup of Austrian. German. Russian. Turkish Empires; successor states between warm communist revolutions and character of East European socialist regimes.

HY 435 03(3-0-0)
20th-Century Germany.
F. German history from fall of Bismarck to present.

HY 440 03(3-1-0).
Imperial Russia.
F.S. SS. Also offered as correspondence course. Tsarist Russia from its beginnings to Revolution of 1905 with emphasis on modern period.

HY 44.1 03(3-0-0)
Revolutionary Russia and the Soviet Union.
S. SS. Background of Revolutions of 1917, formation of Soviet system, and development of Soviet economic. political. social. and cultural institutions to World War II.

HY 442 03(3-0-0)
Contemporary Soviet Union in Perspective.
F.S, SS. Contemporary period since WWII emphasizing emergence of an advanced socialist state.

HY 445 03(3-0-0).
Themes in World History.
F.S. Major themes in world history including urbanization. technology. religion. politics, and economics..

HY 450 0313-0-0)
History of Sport.
F.S. Evolution of athletics from ancient times to present with emphasis upon the United States.

°HY 451 03(3-0-0)
Early Christian Church to 500 A.D.F.
Growth of Christian Church from 1st to 5th century; emphasis on its role in Roman Empire: development of ecclesiastical institutions and literature.

HY 452 03(3-0-0)
Medieval Christianity, 500-1500.
S. Christian Church in Eastern and Western Christendom emphasizing its role in medieval society, relationship with the state. and its institutions.

HY 453 03(3-0-0)
Pacific Wars, 1937-1975.
S. World War 11 in the Pacific; subsequent conflicts in China. Korea. and Viet Nam.

HY 459 03(3-0-0).
European Diplomatic History Since 1914.
S. Diplomacy of Europe from origins of World War I to present.

HY 463 03(3-0-0)
European Culture in the 20th Century.
S. Cultural developments since World War I emphasizing science. art. clash of ideologies. existentialism. youth culture. and environmental issues.

HY 466 03(3-0-0)
American Intellectual History.
S. SS. Ideas and institutions that have molded American character from earliest times to present.

HY 468 03(3-0-0)
Women in America.
F. Roles and contributions of women from colonial times to present.

HY 470 03(3-0-0)
American West I.
S. Early period of extension of European culture. institutions into West by Spain. France. Great Britain: Americans' reconnaissance till mid-19th century.

HY 471 03(3-0-0)
American West II.
S. Pioneering settlement after Civil War through development by farmers. railroads..red other economic forces including aspects of cultural development.

HY 472 03(3-0-0)
American Southwest.
F.S. SS. Borderlands. northern Mexico. southwestern U.S. From 16th century to 1912; intercultural relationships among Indian. Spanish. Mexican. Anglo cultures.

HY 473 02(2-0-0).
Victorian Colorado. the Gold Rush to WWI.
S. Topical survey 01' impact of Victorian culture on a mining frontier; cultural and industrial developments.

HY 484 Var.
Supervised College Teaching.
F.S. SS. Assisting the instructor in teaching introductory history courses; relevant readings and discussions.

HY 492 03(0-0-3)
Seminar.
Prerequisite: HY 200.

HY 495 Var (1-3).
Independent Study.

HY 497 Var (1-3).
Group Study.

HY 500A-C 03(0-0-3)
Historical Method.
F. Prerequisite: Written consent of instructor. A) Historiography. B) Archives. C) Historic preservation.

HY 510A-C 03(0-0-3)
Reading Seminar.
F.S. SS. Prerequisite: HY 500A or written consent of instructor. A) United States. B) Europe. C) Third World.

HY 586 Var.
Practicum.
Prerequisite: HY 500A.

HY 587 Var (1-6)
Internship.
Prerequisite: HY 500A or written consent of adviser. Work-oriented instruction involving implementation of classroom or laboratory experiences coordinated by faculty member.

HY 610A-C 03(0-0-3).
Research Seminar.
F.S. SS. Prerequisite: HY 500A or written consent of instructor. A) United States. B) Europe. C) Third World.

HY 684. Var.
Supervised College Teaching.
F.S. SS. Discussions and readings to enhance teaching proficiency.

HY 695 Var.
Independent Study.
Prerequisite: HY 500A.

HY 697 Var (1-3)
Group Study.

HY 699 Var.
Thesis.
Prerequisite: HY 500A.

INTERIOR DESIGN COURSES

Design, Merchandising, and Consumer Sciences Department College of Applied Human Sciences

ID 130 03(3-0-0)
Design Appreciation.
F, S. Impact of elements and principles of design on everyday life.

ID 266 03(0-6-0).
Design Communications 1.
F.S. Prerequisite: IS 130. Beginning graphic communication techniques, emphasizing delineation. For interior designers.

ID 275 03(0-4-0)
Interior Design 1.
F, S. Overview of interior design discipline; application of elements and principles of design, awareness of human factors. and understanding programming.

ID 330 03(3-0-0)
Color and Light.
S. Prerequisite: ID 275. Special fee. $15. Theories and systems of color and tight.

ID 340 03(2-2-0)
Interior Materials and Market Study.
S. Prerequisite: ID 375. Analysis of materials and understanding of resources for interior design professionals.

ID 357 03(3-0-0)
History of European Interiors.
F. Prerequisite: AR 110. AR 111 or written consent of instructor. Major interior periods/styles throughout European history.

ID 358 03(3-0-0)
History of American Interiors.
S. Prerequisite: AR 110. AR I I 1 or written consent of instructor. Historical American interiors from 1600 to present, including prominent interior designers.

ID 366 03(0-6-0)
Design Communications II.
S. Prerequisite: ID 266. 1S 132. Advanced communication and presentation techniques for interior designers.

ID 375 030-4-0)
Interior Design II.
F. Prerequisite: ID 275. IS 132. Application of design principles to interiors. emphasizing lighting. materials. historic solutions. and human needs.

ID 376 03(0-4-0)
Interior Design III.
S. Prerequisite: ID 330 or concurrent registration. ID 340 or concurrent registration, ID 375. Application of components of interior design to intermediate-scale interiors.

ID 384 Var.
Supervised College Teaching.
Maximum of 10 credits allowed in course.

ID 410 03(2-2-0)
Computer-Aided Design and Drafting.
F. Prerequisite: CS 110. ID 376. Computer-aided design and drafting for interior designers.

ID 430 03(3-0-0)

Environmental Technologies.
F. Prerequisite: ID 375. Technical systems of interior environment and their influence on human comfort.

ID 475 030-4-0)
Interior Design IV.
F. Prerequisite: ID 340, ID 357 or ID 358, ID 366, ID 376. Comprehensive planning and design of large-scale interior environments.

ID 476 04(1-6-0)
Comprehensive Design Project and Portfolio.
S. Prerequisite: ID 410 or concurrent registration, ID 475. Senior exhibition and portfolio organization using all major interior design *components.*

ID 495 Var.
Independent Study.
Maximum of 10 credits allowed *in* course,

ID 496 Var.
Group Study.
Maximum of 10 credits allowed in course.

ID 553 03(3-0-0)
Design Research Methods.
F. Research methods for design history, interior design studio, and textiles design.

ID 575 Var (1-8)
Studio Problems in Interior Design.
F, S. Prerequisite: Nine credits of interior design,

ID 578 03 (2-0-0)
Trends/Issues in Interior Design.
F, S; Prerequisite: Written consent of instructor.

ID 590 Var.
Workshop.

ID *596* Var.
Group Study.

ID 675 Var (1-8)
Studio Problems In Interior Design.
F, S. Prerequisite: Four credits of ID 575.

ID 684 Var.
Supervised College Teaching.
F.S.

ID 692 02(0-0-2)
Seminar.

ID 695 Var.
Independent Study.

ID 698 Var.
Research.

ID 699 Var.
Thesis.

INTERNATIONAL EDUCATION COURSES

Office of Provost/Academic Vice President

IE 270A-B 03(3-0-0)
World Interdependence.
A) World food and population. S.* B) The revolutionary century. F.

IE 271 03(3-0-0)
India.
S. Interdisciplinary interpretation of philosophical. historical, cultural, physical. social. and technological influences shaping modern India.

IE 470 03(3-0-0)
Women and Development.
S. Research and policy issues related to women in developing countries.

IE 550/PL 550 03(3-0-0)
Ethics and International Development.
F. Prerequisite: Written consent of instructor. Credit not allowed for both IE 550 and PL 550. Ethical reflection applied to development goals, strategies of Third World countries; relations between developed and developing countries.

INDUSTRIAL SCIENCES COURSES

Industrial Sciences Department College of Applied Human Sciences

IS 102 01(1-0-0).
Technology and Society.
F. A variety of technologies and their effects on society.

IS 130 02(0-4-0)
Drafting Fundamentals.
F, S, SS. Drafting techniques and procedures, multiview projection, pictorial representation, sectioning. dimensioning. and print-making.

IS 132 02(0-4-0)
Construction Graphics.
F, S. Prerequisite: IS 130, IS 160. Special fee, $3. Symbols, conventions, and graphic techniques of construction drawing.

IS 133 03(0-4-0)
Introductory Computer Graphics.
F. Prerequisite: CS 110, IS 130. Use of desk-top computers and software for CAD applications.

IS 134A-D 03.
AutoCAD Fundamentals.
F, S, SS. Offered as correspondence course only. AutoCAD computer-aided drafting and design software. A) AutoCAD 9.2.6 x and 2.5 x. B) AutoCAD 10. C) AutoCAD 11.D) AutoCAD 12.

IS 135A-D 03.
CADKEY Fundamentals.
F. S, SS. Offered as correspondence course only. CADKEY *2D* and 3D computer-aided design and drafting software. A) CADKEY 1, 1.4.2.06 M, 2.11. B) CADKEY 3.5. C) CADKEY 4.0 x. D) CADKEY Light.

IS 14:1 03(2-2-0)
Electricity/Electronics.
F.S. Prerequisite: M 125. Special fee, $10. Theory and application of direct and alternating current circuits emphasizing components and equipment utilization.

IS 143 03(2-2-0)
Energy and Transportation Systems.
S. Global impacts of energy and transportation.

IS 152 03(2-2-0)
Industrial Materials.
F, S. Special fee. $6. Material properties and selection for manufacturing functions. Structure and characteristics of metallic and nonmetallic materials.

#IS 154 030-4-0)
Product Design and Fabrication.
F.S. Special variable ($50-$100) fee determined by department. Wood technology systems as related to technological world. Development and design of products, new trends, and processes relating to wood technology.

18 160 03(2-2-0)
Construction Materials and Techniques.
F. S. Building material properties, characteristics. and methods of construction.

#IS 205 03(0-4-0)
Occupational and Recreational Materials.
F, S, SS. Special variable ($25-$50) fee determined by department. Designing and constructing articles utilizing leather, plastics. graphic arts, ceramics, and other materials for carving; emphasis on techniques and processes.

#IS 106 03(0-4-0)
Occupational and Recreational Woods.
F, S. Special variable ($30-$110) fee determined by department. Shop management. small project design, use and care of hand and power tools.

IS 210 03(2-2-0)
Quality Improvement Techniques.
F, S. Decision-making tools utilized in quality assessment and improvement efforts in modern organizations.

IS 232 04(2-4-0)
Architectural and Construction Planning.
F, S. Prerequisite: IS 132. Special fee. $5. Building design concepts, project planning. and working drawings applied to wood frame residential structures. investigation of alternative building systems.

IS 233 030-4-0)
Manufacturing Graphics.
F.S. Prerequisite: IS 131 and background in drafting. Manufacturing graphics principles: auxiliary views. Fasteners, welding. Fits, surface finishes, and linkages.

IS 234A-D.
Advanced AutoCAD.
F, S. SS. Prerequisite: Knowledge of AutoCAD fundamentals. Offered as correspondence course only. Advanced AutoCAD computer-aided drafting and design software. A) AutoCAD 9, 2.6 x and 2.5 x. 02. B) AutoCAD 10. 03. C) AutoCAD I 1.03. D) AutoCAD 12. 03.

IS 242 03(2-2-0)
Linear Circuit Applications.
F, S, Prerequisite: IS 142. Special fee, $10. Principles and applications of basic power supplies, amplifiers. and oscillators of receiving circuits utilizing semiconductor devices.

IS 244 03(2-2-0)
Fluid Power.
F, S. Prerequisite: IS 242. Concepts of fluid power and its role in integrated motion control and power transmission systems.

IS 252 03(2-2-0)
Manufacturing Processes.
F.S. Prerequisite: IS 152. Special variable ($25-$50) fee determined by department. Basic manufacturing processes including metal, polymer, and wood products.

IS :261 03(2-3-0)
Construction Surveying.
F, S. Prerequisite: M 125. Special fee. $10. Surveying fundamentals to field of construction. building layout. measurement procedures. vertical controls. line and grade. surveying instrument operation.

IS 263 03(2-2-0)
Construction Equipment and Methods.
F.S. Prerequisite: CS 110, M 125. Equipment and methods in building, heavy-highway. and utility construction; equipment and *crew* productivity. ownership and operating costs.

IS 306 020-2-0)
Landscape Construction Principles.
S. Construction methods. building systems. specifications. and estimating related to parks and recreational facilities.

IS 310 03(2-2-0)
Process Planning and Costing.
F, S. Prerequisite: BN 300. *CS* 110. IS 252. Application of project management software to manufacturing process planning and costing in areas such as new product introduction or plant layout.

IS 317 02(2-0-0)

Safety Management.
F.S. Safety management in a) industrial. b) construction. or c) school environments.

IS 318 03(2-2-0)
Manufacturing Facilities Planning.
F.S. Prerequisite: BL 300. Designing. planning. equipping. and organizing manufacturing facilities.

IS 333 030-4-0)
Industrial-Mechanical Design.
F.S. Prerequisite: IS 233. Industrial mechanical design principles: working drawings.jigs and fixtures. design for manufacturability. and group design.

IS 342 03(2-2-0)
Industrial Electronics Control Circuits.
F.S. Prerequisite: IS 242. Special fee. $10. Electronic devices and circuits for industrial and technical application.

IS 352 03(2-2-0)
Advanced Manufacturing Processes.
F.S. Prerequisite: IS 252. Special fee. $20. Production and nonproduction machining methods.

IS 353 03(2-2-0)
Industrial Plastics.
F.S. Prerequisite: C 103 or C 107. IS 152. Special fee. $20. Materials and processes used in the plastics industry.

#IS 354 0304-0)
Advanced Materials and Processes.
F. Prerequisite: IS 154. Special variable ($100-$230) fee determined by department. Special techniques in cabinet construction emphasizing 32 mm. high-pressure laminates. and substrates.

IS 360 03(3-0-0)
Building-Electrical and Plumbing Systems.
F.S. Prerequisite: IS 232. Coordination of mechanical construction including water supply. waste disposal. electrical distribution; temporary services for construction.

IS 361 03(3-0-0)
Building-Envlroumental Systems.
F, S. Prerequisite: IS 232. Environmental *comfort* in buildings; heating. cooling. and ventilating; fuels; coordination of mechanical construction; related codes and standards.

IS 362 02(2-0-0)
Construction Contracts.
ES. Prerequisite: IS 232. Commercial construction planning. bidding. and contract administration.

18 364 03(2-2-0)
Commercial Construction Procedures.
F.S. Prerequisite: IS 232. IS 263. Special fee. $20. Commercial construction field procedures: sitework. Foundations. concrete. steel. wood. enclosures. Finishes.

#IS 365 04(2-4-0)
Construction Estimating.
F.S. Prerequisite: IS 362. IS 364. Special variable ($10-$20) fee determined by department. Quantity surveying. work item analysis and pricing; compilation of spread sheet and bid book; preparation of bid proposals.

IS 371 02(2-0-0)
Principles of Technology Education.
S. Historical and philosophical basis of technology education.

IS 374 030-4-0)
Technology Applications.
F. Prerequisite: IS 142. Special fee. $7.50. Principles of technology including electrical. mechanical. Fluid. and thermal systems.

IS 384 Var. (1-5)
Supervised College Teaching.
F.S. SS. Maximum of 10 credits allowed in course.

IS 410 03(2-2-0)
Modern Manufacturing Management Strategies.
F.S. Prerequisite: BL 471. IS 310. IS 318. Evaluation and application of modern manufacturing management strategies for continuous organizational improvement in a competitive global economy.

IS 442 03(2-2-0)
Digital and Microprocessor Controls.
F.S. Prerequisite: IS 342. Special fee. $10. Industrial electronics emphasizing microprocessor controls and circuit applications.

IS 443 02.
Motor Vehicle Emissions Control.
F, S. SS. Offered as correspondence course only. Purposes. Functions. 'identification. and testing of emissions control systems.

IS 452 03(2-2-0)
Specialized Manufacturing Processes.
F.S. Prerequisite: IS 352. CNC. DNC production applications. including fixturing. scheduling. and programming. EDM. ECM. and PM processing.

#IS 454 02(04-0)
Advanced Product Design and Fabrication.
S. Prerequisite: IS 154. Special variable ($30-$60) fee determined by department. Design/fabrication of wood products involving forming. bending. and lamination; latest trends in wood technology.

IS 461 04(2-4-0)
Construction Project Scheduling and Cost Control.
F.S. Prerequisite: IS 365. Construction project control through CPM and PERT scheduling. Development of project cost control systems using microcomputers.

IS 464 03(3-0-0)
Construction Project Administration.
F, S. Prerequisite: IS 461 or written consent of instructor. Planning processes. administrative procedures, subcontractor coordination required to administer a construction project from start up to close out.

IS 466 020-2-0)
Systems Building and Land Planning.
S. Prerequisite: IS 232. Special fee, $25. Application of residential building systems; community planning emphasizing aesthetics, market. engineering, and government functions.

IS 47102(2-0-0)
Methods of Teaching Technology Education.
S. Prerequisite: IS 371. Strategies to teach technology education to elementary, secondary, and community college students.

IS 472 02(2-0-0)
Laboratory Organization and Management.
S. Prerequisite: IS 371. Unique ways of developing, organizing activities, facilities, modules for technology laboratories at elementary, secondary. community college levels.

#IS 474 030-4-0)
Product Development and Manufacturing.
F. Prerequisite: IS 154. IS 251. Special variable ($15-$45) fee determined by department. Industrial organization, materials, processes, and products; product development and manufacturing.

IS 487 Var.
Internship.

IS 495A-L Var.
Independent Study.
A) Automotive-power. B) Construction. C) Drafting. D) Electronics. E) Industrial sciences education. F) Machine tools. G) Manufacturing. H) Safety. 0 Welding. 0 Wood. L) Robotics.

IS 496A-C Var.
Group Study. Maximum of 9 credits allowed per subtopic.
A) Construction. B) Industrial sciences education. C) Industrial technology.

#IS 501A-C Var (1-3)
Special Problems In Technology Education.
F.S. SS. Prerequisite: A) IS 354. B) IS 251. C) IS 143. Special variable ($40-$75) fee per subtopic determined by department. A) Woods. B) Manufacturing. C) Energy and transportation.

IS 530 030-4-0)
Computer-Aided Design Applications.
F. SS. Prerequisite: Written consent of instructor. Advanced CAD techniques: 3-D modeling. I10 devices. design. and analysis.

IS 540 03(3-0-0)
Computerized Industrial Electronics.
S, SS. Prerequisite: Written consent of instructor. Recent innovations in industrial electronics.

IS 543 03(2-2-0)
Trends in Mobile Sources Air Pollution.
SS. Prerequisite: C 107. C 108 or C 109. C 110; IS 342; PH 121 or PH 141. Developments and innovations in vehicle exhaust emission testing and measurement.

IS 545 03(2-2-0)
Auto Emissions Control.
F, SS. Prerequisite: Written consent of instructor. Vehicle emissions systems, control units. operating procedures. inspection-maintenance procedures and guidelines.

IS 550 020-2-0)
Manufacturing Technology.
F. SS. Prerequisite: IS 352. New techniques of machining and fabricating processes.

IS 551 03(2-2-0)
Flexible Manufacturing and Automation.
S. Prerequisite: Written consent of instructor. Fixed and flexible automation applications and designs for manufacturability.

#IS 554 020-2-0)
Woodworking Technology.
SS. Prerequisite: IS 454. Special variable ($30-$60) fee determined by department. Innovative processes in woodworking industry.

IS 556 02(2-0-0)
Manufacturing Planning and Administration.
F. Prerequisite: Written consent of department head. Manufacturing processes and procedures involving equipment. Facilities, and personnel.

IS 560 03(3-0-0)
Construction Project Management.
F. Prerequisite: IS 461 or written consent of instructor. Construction project management at corporate level. Survival/ failure of construction organizations.

IS 561 03(3-0-0)
Cost. Productivity. and Financial Control.
S. Prerequisite: IS 365. IS 461, BA 210 or BA 500. Optimizing time-cost restraints; controlling expenditures; account code designations; reporting systems.

IS 562 03(3-0-0)
Trends in Project Development.
F. Prerequisite: IS 461. Analysis of construction markets; strategic planning for growth; project development and financing; public relations for construction.

IS 564 03(2-2-0)
Microcomputer Applications in Industry.
F. S. SS. Prerequisite: CS 110 or written consent of instructor. Use of microcomputers and software applications currently used in construction, manufacturing. and educational environments.

IS 565 03(3-0-0)
Legal Aspects of Construction Process.
S. Prerequisite: IS 560. Common points of dispute; methods of avoiding disputes among owner. architect. engineer, and contractor.

IS 566 03(3-0-0)
Advanced Construction Estimating.
F. Prerequisite: IS 365. Advanced estimating procedures dealing with special application and techniques in construction.

IS 568 03(2-2-0)
Highway and Heavy Construction Management.
S. Prerequisite: IS 461. Specialized techniques of managing highway. utilities. and heavy construction.

IS 570 03.
Grantsmanship and Proposal Writing.
F.S. SS. Offered as correspondence course only. Mechanics of proposal writing. including intangibles of the grant-seeker's art.

IS 589 02(2-0-0)
Radon Technology for Mitigators.
F.S. SS. Offered only off campus. Radon mitigation techniques.

#IS 590A-J Var.
Workshop.
Special variable ($30-$60) fee per subtopic determined by department. A) Construction. B) Electronics. C) Graphics. D) Manufacturing. E) Wood. F) Auto emissions control. G) Elementary school projects. H) Alternate energy. 0 Model rocketry. J) Computer applications.

IS 592 Var.
Seminar.

IS 600 03(3-0-0)
Research Methods.
F. Special fee. $4. Identification. analysis of research problems in applications of technology.

IS 610 03(3-0-0)
Industry Management Planning and Communication.
S. Prerequisite: Admission to industrial sciences graduate program or written consent of instructor. Principles and applications of industrial management.

IS 669 010-0-0)
Construction Management Seminar.
F.S. Research areas and resources in construction management.

IS 671 02(2-0-0)
Facility Planning.
S. SS. Prerequisite: Admission to IS master's program or written consent of instructor. Planning and organizing technology laboratories for elementary, secondary. and community college facilities.

IS 672 02(2-0-0)
Technology Curriculum Development.

S. SS. Prerequisite: IS 471. Curriculum development and organization. task analysis. accountability. and evaluation utilizing interdisciplinary and clustering approach.

IS 674 03(3-0-0)
Trends in Technology Education.
F, SS. Prerequisite: IS 471. Philosophy. principles. objectives of technology education; significant historical movements and their impact on contemporary programs.

IS 677 02(2-0-0)
Administration in Industrial Sciences.
F. SS. Prerequisite: IS 472. Administration. supervision. management. and planning techniques necessary for successful operation of industrial sciences.

IS 684 Var.
Supervised College Teaching.
F.S.

SS. IS 687 Var. (1-6)
Internship.
Maximum of 6 credits allowed in course.

IS 695A-C Var.
Independent Study.
A) Construction. B) Industrial sciences education. C) Industrial technology.

IS 698 Var.
Research in Industrial Sciences.

IS 699 Var (1-6)
Thesis.

TECHNICAL JOURNALISM COURSES

Technical Journalism Department College of Liberal Arts

JT 100 03(3-0-0)
You and Media.
F, S. Nature. process. effects. problems of mass media: newspapers. magazines. radio. TV. Film. technical publications.

JT 200 03(2-0-1)
Professional Writing.
F.S. Prerequisite: CO 150. Basic elements of writing for professional and specialized audiences.

JT 210 04(2-4-0)
Newswriting.
F.S. Prerequisite: Pass typing examination given first day of class. Theory and practice in newswriting.

JT 235 03(2-2-0)
Photojournalism.
F.S. Special fee. $25. Basic black and white photography. processing and printing. emphasizing word-picture relationships for publication. Access to 35mm camera required.

JT 250 02(2-0-0)
Advertising.
F. Advertising principles and techniques used to develop effective advertising campaigns.

JT 300 03(3-0-0)
Technical Communication.
F.S. Prerequisite: CO 150. Reporting of scientific and technical data with emphasis on formal research *repons.*

JT 301 03(3-0-0)
Business Communication.
F, S. Prerequisite: CO 150. Credit not allowed for both JT 301 and BG 200. Principles and practice of effective business communication with emphasis on written professional reports.

JT 310 04(2-4-0).
Copy Editing and Production.
F, S. Prerequisite: JT 210. Theory and practice of copy preparation and editing; publication design and layout. Introduction to commercial printing processes.

JT 311 03(3-0-0)
History of Media.
F.S. Media development, growth, trends within context of political. social, and economic change.

JT 320 030-4-0)
Reporting.
F, S. Prerequisite: JT 210. Theory, methods, and practice of gathering information and reporting news.

+JT 340 03(2-2-0)
Videotape Editing.
F. Special fee, $85. Theory, techniques of picture and sound editing on videotape.

JT 341 03(2-2-0)
Broadcast News.
F.S. Prerequisite: JT 210. Practical application of principles. techniques used in broadcast newswriting and radio and television reporting.

JT 342 03(2-2-0)
Writing for Specialized Electronic Media.

F. Prerequisite: JT 210. Audience and subject research; script structure and development; narrative techniques; visual story and role of visual media as change agents.

+JT 345 04(2-4-0)
Electronic Field Production.
ES. Prerequisite: JT 340. Special fee. $85. Theory. techniques of videotape field production emphasizing news. current affairs. and special interest programs.

JT 350 03(3-0-0)
Public Relations.
F.S. Public relations principles and practices of business. industry. education. and public agencies.

JT 351 03(2-0-0)
Public Relations Practices.
F.S. Prerequisite: JT 210. JT 350. Case studies. problems in public relations. Planning. preparation. and application of public relations techniques.

JT 361 03(2-2-0)
Writing for Specialized Magazines.
F.S. Prerequisite: JT 310. Writing articles for agricultural. business. hobby. technical. trade. and other specialized periodicals whose readers use information to make decisions.

JT 410 02(2-0-0)
Newspaper Editing.
F. Prerequisite: JT 310. Editorial techniques. responsibilities. news evaluation.

JT 411 03(3-0-0)
Media and Society.
F.S. Relation of media systems to the social system; ethics and journalism.

JT 412 03(3-0-0)
International Mass Communication.
S. Media communication systems. their roles throughout the world; news flow; propaganda in national development: role of foreign correspondents.

JT 414 03(3-0-0)
Media Effects.
F.S. Perspectives on audience processes and media effects on individuals and society.

JT 415 03(3-0-0)
Communications Law.
F.S. Constitutional guarantees of freedom of speech and press; libel; privacy; access; administrative law of advertising and broadcasting; other legal problems of mass communication.

JT 420 03(3-0-0)
Interpretive Reporting.
S. Prerequisite: JT 320. Advanced techniques forgathering and evaluating information; interpretive reporting of public affairs issues.

JT 435 03(2-2-0)
Pictorial Communication.
F.S. Prerequisite: JT 210. JT 235. Special fee. $10. Advanced photojournalism applications in print media. slide sets. and informational exhibits.

+JT 440 03(I-4-0)
Advanced Electronic Reporting.
F.S. SS. Prerequisite: JT 341. JT 345. Special fee. $60. Gathering. writing. Field producing. videotaping. editing, and presenting local television news and public affairs programming.

JT 450 03(2-2-0)
Public Relations Campaigns.
F.S. Prerequisite: JT 310. JT 351. Preparation of materials. use of media to achieve objectives with target audiences; work with nonprofit organizations in actual campaigns.

JT 460 03(3-0-0)
Publication Management.
F.S. Advertising. circulation. editorial. production. and management problems of print media.

JT 464 03(2-2-0)
Technical Writing.
F.S. Prerequisite: JT 361. Writing technical information for a variety of media.

JT 465 03(2-2-0)
Technical/Specialized Editing.
S. Prerequisite: JT 464. Editorial purpose. techniques. and evaluation of technical and specialized print and online information.

JT 471 03(3-0-0)
Communication Research Methods.
F. Prerequisite: Written consent of instructor. Credit not allowed for both JT *471* and JT 500. Quantitative. qualitative methods of analyzing process and effects of mass and interpersonal communication.

JT 484 Var. (1-3)
Supervised College Teaching.
F.S.

JT 487 Var 11-3)
Internship.

JT 490 Var. (1-3)
Workshop.

JT 495A-G Var. (1-3)
Independent Study.
A) Electronic reporting. B) Editing. C) Photojournalism. D) Public relations. E) Readings. F) Reporting. G) Technical communication.

JT 496 Var (1-3)
Group Study.

JT 500 03(3-0-0)
Communication Research and Evaluation Methods.
F. Prcrequisite: ST 201. Credit not allowed tot both JT 500 and JT 471. Theory and applied communication research and evaluation methodologies lot assessing and improving communication in technological environment.

JT 501 03(3-0-0)
Process and Effects of Technical Communication.
F. Corequisite: JT 500. Examination of technical communication including communicator credibility. messages, channels, audiences, and information. behavior. and attitude change.

JT 502 03(3-0-0)
Technical Communication.
F.S. Offered only off campus. Communication principles and their application emphasizing technical communication in a business environment.

JT 544113(2-3-0)
Corporate Video.
S. Prerequisite: JT 345 or SP 345. Advanced techniques for managing messages and communication tasks with video in corporate. governmental. and organizational settings.

JT 550 03(3-0-0)
Public Relations.
F.S. Offered only off campus. Contemporary public relations principles and practices.

JT 560 03(3-0-0)
Managing Communications Systems.

S. Prerequisite: JT 501. Examination of role. responsibilities of communication managers in translating theory into effective. applied communication programs.

JT 568A-C Var (1-3)
Journalism for High School Advisers.
F. S. SS. A) Journalism concepts. B) Newspapers. C) Yearbooks.

JT 614 03(3-0-0)
Public Communication Campaigns.
F. Prerequisite: JT 501 or written consent of instructor. Conceptual. methodological issues and decisions underpinning determination of communication campaign effects. planning. implementation. and evaluation.

JT 640 03(3-0-0)
Telecommunication.
S. Prerequisite: JT 501. Theory and application of telecommunication in information age.

JT 650 03(3-0-0)
Public Relations Management.
F. Prerequisite: JT 501 or concurrent registration. Theoretical and practical management techniques for public relations campaigns including societal, ethical. and legal issues involved.

JT 660 03(3-0-0)
Communication in Technology Transfer.
F. Prerequisite: JT 501 or concurrent registration. Communication's role in technology transfer as related to nature. process. and effects of technology transfer. knowledge dissemination. and utilization.

JT 661 03(3-0-0).
Information Design.
S. Prerequisite: JT 500. Theoretical and empirical review of creation, presentation. storage..red distribution of information.

JT 662 03(3-0-0).
Communicating Science and Technology.
S. Prerequisite: JT 501. Examination of theoretical and empirical studies concerning understanding of communication science and technology subject matter.

JT 684 Var.
Supervised College Teaching.
F.S. SS. Prerequisite: Written consent of instructor. Philosophy. techniques. and approaches to teaching journalism skills courses. as supervised by faculty.

JT 687 Var (1-3)
Internship.
Prerequisite: Written consent of instructor.

JT 690 Var (1-3)
Workshop.
Prerequisite: Written consent of instructor.

JT 695 Var. (1-3).
Independent Study.
Prerequisite: Written consent of instructor.

JT 696 Var (1-3)
Group Study.
Prerequisite: Written consent of instructor.

JT 698 02(0-0-2).
Research.
Prerequisite: JT 501 and two of the following: JT 640, JT 650. JT 660. JT 661. JT 662. Development of theoretical basis and methodology for thesis.

JT 699 Var.
Thesis.

FOREIGN LANGUAGES AND LITERATURES COURSES

Foreign Languages and Literatures Department College of Liberal Arts

L 102 03(3-2-0)
Introduction to Language and Culture 1.
F, SS. Basic skills emphasis: speaking. aural comprehension, reading. writing. J)Japanese. K) Korean.

L 103 03(3-2-0)
Introduction to Language and Culture II.
S. SS. Prerequisite: 1. 102. J) Japanese. K) Korean.

L 105 05(5-2-0)
First-Year Language I.
F.S. SS. Prerequisite: Registration allowed only for sludents with no previous study in the language. Credit not allowed for both L 105 and L 106. Essentials of the language for the beginner: aural comprehension. speaking, reading. writing. C) Chinese. F) French. G) German. I) Italian. J) Japanese. R) Russian. S) Spanish.

L 106 04(3-3-0)
First-Year Language Review.
F.S. SS. Prerequisite: Placement exam or instructor placement. For students with minimal proficiency. Credit not allowed for both L 106 and 1. 105. Basic review of essential skil Is: aural comprehension. speaking, reading. writing. F) French. G) German. S) Spanish.

L 107 05(5-2-0)
First-Year Language II.
F. S, SS. Prerequisite: L 105 or L. 106. Essentials of the language for the continuing student: aural comprehension. speaking. reading, writing. C) Chinese. F) French. G) German. H) Italian. J) Japanese. R) Russian. S) Spanish.

L 108 05(5-2-0).
Intensive Language 1.
F. Prerequisite: Grade of A in 1.105 or L 106 and written consent of instructor; or placement by exam. Accelerated practice in speaking, reading. writing. and aural comprehension. F) French. G) German. S) Spanish.

L 120 03(3-0-0)
Reading for Proficiency.
F, S, SS. Credit for L 120 not allowed if L 107 or L 108 has been completed, Essentials of language for developing reading proficiency. F) French. G) German. S) Spanish.

L 124 03.
French in Action I.
F.S. SS. Offered as telecourse only. Spoken and written French language and culture using video assisted correspondence format.

L 125 03.
French in Action II
F.S. SS. Prerequisite: L 124. Offered as telecourse only.

L 150 03(3-0-0)
First-Year Latin I.
F. Essentials of the language. reading. and translating.

L 151 03(3-0-0)
First-Year Latin II.
S. Prerequisite: L 150. Essentials of the language. reading, and translating.

L 152 03(3-0-0)
Classical Greek I.

F. Essentials of the language. reading. and translation.

***L 153 03(3-0-0)**
Classical Greek II.
S. Prerequisite: L 152. Essentials of the language. reading. and translation.
L 200. Second-Year Language I.F. S, SS. Prerequisite: L 107 or L 108 or placement exam. Grammar review and extensive practice in conversation, reading. and writing.
F) French 04(3-3-0) G) German 04(3-3-0) I) Italian 03(3-2-0) J) Japanese 05(5-2-0)
R) Russian 05(5-2-0) S) Spanish 03(3-2-0).

L 201.
Second-Year Language II.
F.S. SS. Prerequisite: L 200 or placement exam. F) French 04(3-3-0) G) German 04(3-3-0)
D) Italian 03(3-2-0) J) Japanese 05(5-2-0) R) Russian 05(5-2-0) S) Spanish 03(3-2-0).

L 202 03(3-2-0)
Intermediate Language and Culture I.
F. S, SS. A) Arabic. J) Japanese. Prerequisite: L 103J or L, 107J. K) Korean. Prerequisite: L 103K.

L 203 03(3-2-0)
Intermediate Language and Culture II.
F. S, SS. Prerequisite: L 202. A) Arabic. J) Japanese. K) Korean.

L 208 03(5-0-0)
Intensive Language II.
S. Prerequisite: L 108. Accelerated practice in speaking, reading. writing. and aural comprehension. F) French. G) German. S) Spanish.

L 224 03.
French In Action III.
F. S, SS. Prerequisite: L 125. Offered as telecourse only. Intermediate-level proficiencies in French language and culture. using video-assisted correspondence format.

L 225 03.
French in Action IV.
F, S. SS. Prerequisite: L 224. Offered as telecourse only.

L 250 03(3-0-0)
Culture and Literature In Translation.
S. Foreign literature and culture through literary works in translation from different periods and genres. F) French. G) German. I) Italian. S) Spanish.

L 296 Var (1-5)
Group Study.
Prerequisite: L 107. Group study in language/literature/culture. C) Chinese. F) French. G) German. I) Italian. J) Japanese. R) Russian. S) Spanish.

L 300 03(3-0-0)
Third-Year Language I.
Prerequisite: L 201 or L 208. In-depth language study to improve proficiency in all language skills emphasizing composition. F) French. F.S. G) German. F. J) Japanese. F. R) Russian.
F. S) Spanish. F.S.

L 301 03(3-0-0)
Third-Year Language II.
Prerequisite: L 300. In-depth language study to improve proficiency in all language skills emphasizing oral. F) French. F.S. G) German. S. J) Japanese. S. R) Russian. S. S) Spanish.
F.S.

L 309 03(3-0-0)
Contemporary Chinese Literature and the Arts.
S. Trends resulting from traditional Chinese and contemporary foreign influences in Chinese literature and the arts.

L 310 03(3-0-0)
Introduction to Literary Study.
F.S. Prerequisite: L 201 or L 208. Critical reading in literature through analysis of representative texts from poetry, essays, drama. and prose fiction. F) French. G) German. S) Spanish.

L 335 03(3-0-0)
Introduction to Civilization.
S. Prerequisite: L 201 or L 208. Major social and cultural developments in the continental civilizations of France. Germany, or Spain. F) French. G) German. S) Spanish.

L 336 03(3-0-0)
Introduction to Spanish-American Civilization.
F. Prerequisite: L 201S or L 208S. Geography, major social and cultural developments in the civilization of Spanish-American countries.

L 345 03(3-0-0)
Business Language.
F, S, SS. Prerequisite: L 301. Business and commercial aspects of the target language and culture. G) German. S) Spanish.

L 350 03(3-0-0)
Survey of Literature I.
F. Prerequisite: L 310 or concurrent registration. Survey of major literary developments in literature through study of representative master works. F) French. G) German. S) Spanish.

L 351 03(3-0-0)
Survey of Literature II.
S. Prerequisite: L 310 'or concurrent registration. Survey of major literary developments in literature through study of representative master works. F) French. G) German. S) Spanish.

L 400 03(3-0-0)
Fourth-Year Language I.
F. Prerequisite: L 301. Intensive study and practice in the written and spoken language; emphasis on developing syntactic and semantic accuracy and fluency. F) French. G) German. S) Spanish.

L 40103(3-0-0)
Fourth-Year Language II.
S. Prerequisite: L 400. F) French. G) German. S) Spanish.

L 426 03(3-0-0)
Phonetics.
F.S. Prerequisite: L 301 or concurrent registration. Phonetic principles and their application to language sound system; intensive practice in pronunciation. intonation. F) French. G) German. S) Spanish.

L 435 03(3-0-0)
Advanced Studies in Civilization.
F. Prerequisite: L 335. Development of critical approaches to culture through analysis of selected aspects or periods in civilization: emphasis on modern period. F) French. G) German. S) Spanish.

L 449 03(3-0-0)
Spanish-American Literary Movements and Periods.
F. Prerequisite: L 350S. L 351S. Studies in selected literary movements and periods of Spanish America such as classicism, realism, naturalism. existentialism.

L 450 03(3-0-0)
Selected Literary Movements and Periods.
F. Prerequisite: L 350. L 351. Studies in selected literary movements and periods of France. Germany. or Spain. such as classicism. realism. naturalism. existentialism. F) French. G) German. S) Spanish.

L 452 03(3-0-0)
Genre Studies.
F. Prerequisite: L 350. L 351. Development of critical approaches to major works in literature

through selected literary genres and subgenres. F) French. G) German. S) Spanish.

L 453 03(3-0-0)
Author Studies.
S. Prerequisite: L 350. L 351. Development of critical approaches to authors through the appreciation and analysis of selected works. F) French. G) German. S) Spanish.

L 454 03(3-0-0)
Topic Studies.
S. Prerequisite: L 350, L 351. Selected topic studies such as themes. topoi. and interdisciplinary subjects in literature. F) French. G) German. S) Spanish.

L 495 Var (1-6)
Independent Study.
Prerequisite: Three years of the same language at college level. C) Chinese. F) French. G) German. I) Italian. R) Russian. S) Spanish.

L 496 Var. (1-5)
Group Study.
Prerequisite: L 301. Group study in language/literature/culture. C) Chinese. F) French. G) German. 0 Italian. J) Japanese. R) Russian. S) Spanish.

L 500 02(2-0-0)
Advanced Syntax/Stylistics.
S. Prerequisite: L 401 or written consent of instructor. Theory, analysis of style through examination of literary and nonliterary texts; development of style through composition. F) French. G) German. S) Spanish.

L 505 02(2-1-0)
Methods/Technologies in Language Instruction.
SS. Prerequisite: Admission to Summer Institute for Foreign Language Teaching. Theory and methodology of teaching foreign languages and cultures, including video and computer-assisted technology.

L 508 04(3-3-0)
Intensive Language-Graduate Review.
SS. Prerequisite: Admission to Summer Institute for Foreign Language Teaching. Immersion review of language lot the teacher, developing intermediate-level proficiency in culture and the four skills. F) French. G) German. S) Spanish.

L 510 02(2-0-0)
Research Methods.
F. Prerequisite: Written consent of instructor. Resources and reference tools appropriate to research in foreign languages and literatures.

L 525 03(3-0-0)
History of the Language.
S. Prerequisite: L 400. Investigation of both internal (strictly linguistic) and external (sociolinguistic) factors in development of the language. F) French. G) German. S) Spanish.

L 535 02(2-0-0)
Graduate Studies in Civilization.
F, SS. Prerequisite: L 435 or AP 320. Critical and analytical approaches to a foreign civilization and culture. Research related to language of specialization.

L 549 03(3-0-0)
Literary Periods of Spanish America.
F. Prerequisite: Undergraduate degree in the language or written consent of instructor. Advanced studies in critical approaches to selected literary movements or periods of Spanish America.

L 551 03(3-0-0)
Selected Literary Movements/Periods.
F. Prerequisite: Undergraduate degree in the language or written consent of instructor.

Advanced studies in and critical approaches to selected literary movements or periods. F) French. G) German. S) Spanish.

L 552 03(3-0-0)
Advanced Studies in Literary Genres.
F. Prerequisite: Undergraduate degree in the language or written consent of instructor. Advanced studies in and critical approaches to literary genres through study of major works in foreign literatures. F) French. G) German. S) Spanish.

L 553 03(3-0-0)
Advanced Author Studies.
S. Prerequisite: Undergraduate degree in the language or written consent of instructor. Critical approaches to the study of selected authors through appreciation and analysis of their major works. F) French. G) German. S) Spanish.

L 554 03(3-0-0)
Advanced Topic Studies.
S. Prerequisite: Undergraduate degree in the language or written consent of instructor. Selected topics (theme, topoi. and interdisciplinary subjects) in foreign literatures. F) French. G) German. S) Spanish. L 596 Var. (1-51. Group Study.

L 610 03(3-0-0)
Literary Theory and Criticism.
S. Prerequisite: Written consent of instructor. Theoretical and critical approaches to foreign literatures.

L 684 Var.
Supervised College Teaching.
F.S.

1.692 03(0-0-3)
Seminar.
Prerequisite: Undergraduate degree in the language or written consent of instructor. Treatment of selected topics in seminar. F) French. G)German. S) Spanish.

L 695 Var (1-6)
Independent Study.
F) French. G) German, S) Spanish.

1. 699 Var. (1-6).
Thesis.

LANDSCAPE ARCHITECTURE COURSES

Horticulture Department College of Agricultural Sciences

LA 120 03(3-0-0)
History of the Landscape.
S. Major monuments and spaces from ancient Middle East through classical antiquity. the Renaissance. and Western tradition.

#+LA 130 04(2-4-0)
Visual Expression.
F. Special variable ($40-$90) lee determined by department. Concepts and techniques for visual expression of design and planning: research. analysis. and synthesis.

#+I.A 140 040-6-0)
Landscape Architectural Basic Design.
S. Prerequisite: LA 130. Special variable ($40-$90) fee determined by department. Basic theory and skills of landscape architectural site analysis and design.

#+LA 360 04(0-8-0)
Landscape Architectural Design and Construction.
F. Prerequisite: H 221. IS 261. LA 140. Special variable ($40-$90) fee determined by department. Site planning and implementation of landscape architectural design.

#+I.A 361 020-2-0)
Computer-aided Landscape Architecture.
F. Prerequisite: I-A 360 or concurrent registration. Special variable ($40-$90) fee determined by department. Theory and application of computer-aided design. planning, and management.

#+LA 362 03(0-6-0)
Landscape Architectural Site Design.
S. Prerequisite: LA 361. Special variable ($40-$90) fee determined by department. Concepts and techniques in landscape architectural site design.

#+LA 363 03(0-6-0)
Landscape Architectural Construction.
S. Prerequisite: LA 361. Special variable ($40-$90) lee determined by department. Comprehensive concepts and techniques in landscape architectural construction.

#+LA 364 040-6-0)
Landscape Resource Analysis and Design.
F. Prerequisite: LA 361. Special variable ($40-$90) fee determined by department. Processes for site and regional project design.

#+LA 365 03(2-2-0)
Landscape Architectural Construction Details.
F. Prerequisite: LA 363. Special variable ($40-$90) fee determined by department. Theory, and applications of technical details in implementation relationships with clients and contractors.

#+LA 366 05(0-10-0)
Landscape Architectural Planning and Design.
S. Prerequisite: I.A 365. Special variable ($40-$90) fee determined by department. Landscape architectural planning and design of private and public land areas.

LA 384 Var (1-5).
Supervised College Teaching.
F. S, SS. Maximum of ten credits allowed in course.

LA 392 02(0-0-2)
Seminar.
S. Prerequisite: LA 365, Analytical exploration of the core and boundaries of landscape architecture.

LA 445 030-4-0)
Methods of Landscape Analysis.
F. Prerequisite: LA 366. Theory and practice of analysis for site and regional landscape ecological planning.

#+LA 446 04(0-8-0)
Landscape Architectural Urban Design.
F. Prerequisite: LA 366. Special variable ($40-$90) fee determined by department. Concepts and techniques in the design of urban landscapes.

LA 447 04(0-8-0)
Landscape Architectural Project Design.
S. Prerequisite: LA 446. Development of proposal, research, analysis. schematics. alternatives, final *plan,* construction drawings, cost estimates, and presentations for a project.

#+LA 449 020-0-0
Landscape Architectural Professional Practice.
S. Prerequisite: LA 447 or concurrent registration. Special variable ($40-$90) fee determined by department. Theory and skills of landscape architectural professional practice including functional, human, business. legal. and political aspects.

LA 486 Var. (1-8)
Landscape Architectural Practicum.
Maximum of 16 credits allowed in course. Public and private assistance projects for Colorado communities.

LA 495A-B Var (1-4).
Landscape Architectural Independent Study.
A) Design projects. B) Field service.

LA 510 ***03(2.2-0)***
Advanced Analysis Methods.
S. Prerequisite: NR 360. Theory and application of analysis methods for planning. design, and environmental management.

LA 560 03(2-2-0)
Structure of Landscape Patterns.
S. Prerequisite: 300-level ecology course, Mechanisms and concepts in landscape structure for planning, design. and environmental management.

LIBERAL ARTS COURSE

College of Liberal Arts

LB 192 03(0-0-3)
Seminar.
Traditions, concepts. and topics integral to the liberal arts; cultivates reading. communication, and critical thinking.

LIBRARY INFORMATION COURSE

Office of University Libraries Director

LI 301 01(0-0-0)
Library Research Methods.
F.S. Developing strategies for library research; locating appropriate resources; and selecting, evaluating, and recording relevant information.

MATHEMATICS COURSES

Mathematics Department College of Natural Sciences

M 120 01(0-0-0)
College Algebra I.
F, S. SS. Prerequisite: Satisfactory performance on Colorado State Mathematics Placement Examination. Polynomials. linear equations and inequalities. system of linear equations, factoring, rational equations, graphs and asymptotes, applied problems.

M 121 010-040
College Algebra II.
F.S. SS. Prerequisite: M 120 or placement. Integer and fractional exponents, radical expressions, quadratic functions, quadratic formula, combinations and permutations, binomial theorem.

M 124010-0-0)
Logarithmic and Exponential Function.
F, S, SS. Prerequisite: M 121 or placement. Definition and graphs of exponential and logarithmic functions, properties of logarithmic functions, exponential and logarithmic equations. applications.

M 125 01(04-0)
Numerical Trigonometry.
F, 5, SS. Prerequisite: M 121 or placement. Definition and graphs of trigonometric functions. laws of sines and cosines, solutions of right and oblique triangles, applications.

M 126 010-0-0)
Analytic Trigonometry.
F, S. SS. Prerequisite: M 125 or placement. Inverse trigonometric functions, trigonometric identities. solving trigonometric equations.

M 130 03(3-0-0)
Mathematica In the Social Sciences.
F, S., SS., Prerequisite: Satisfactory performance on Colorado State Mathematics Placement Examination. Also offered as telecourse. Networks, scheduling, linear programming, descriptive statistics, probability, inference. voting theory. Fair division, game theory.

M 133 02(2-0-0)
Concrete Mathematics.
F, S. SS. Prerequisite: Satisfactory performance on Colorado State Mathematics Placement Examination. Calculator required. Offered through Division of Continuing Education only. Consumer mathematics. interest, annuities. amortization. and other topics.

M 141 03(34-0).
Calculus in Management Sciences.
F, S. SS. Prerequisite: M 120. M 121. Credit allowed for only one of the following sequences: M 141; M 155. M 255; M 150. M 161, M 261. Analytic geometry. limits. equilibrium of supply and demand. differentiation; integration, applications of the derivative, integral.

MISS 04(4-0-0)
Calculus for Biological Scientists 1.
F. S, SS. Prerequisite: M 124, M 126, Credit allowed for only one of the following sequences: M 141; M 155. M 255; M 160, M 161, M 261. Limits. continuity, differentiation. and integration of elementary functions with applications in the biosciences.

M 160 04(44)-0)
Calculus for Physical Scientists I.
F.S. SS. Prerequisite: M 126; concurrent registration in M 124. Credit allowed for only one of the following sequences: M 141; M 155, M 255; M 160. M 161, M 261. Limits, continuity. differentiation, and integration of elementary functions with applications; conic sections.

M 161 04(4-0-0)
Calculus for Physical Scientists II.

F. S, SS. Prerequisite: M 124. M 160. Credit allowed for only one of the following sequences: M 141; M 155, M 255; M 160. M 161, M 261. Differentiation and integration of transcendental functions, sequences, series.

M 201/CS 20104(4-0-0)
Discrete Structures.
F.S. Prerequisite: CS 151. M 160. Credit not allowed for both M 201 and CS 201. Machine logic. data structures. spanning trees. machines and languages, Boolean algebra. algebraic structures. recursive algorithms.

M 229 010-0-0)
Matrices and Linear Equations.
F.S. SS. Prerequisite: M 121. Solutions of systems of linear equations. augmented matrix. row reduction, matrix operations. inverses. determinants. eigen-values and eigenvectors.

M 255 04(4-0-0)
Calculus for Biological Scientists II.
F.S. SS. Prerequisite: M 155. Credit allowed for only one of the following sequences: M 141; M 155. M 255; M 160. M 161. M 261. Derivatives and integral of functions of several variables. differential and difference equations, matrices. applications in the biosciences.

M 260 02(2-0-0)
Elementary Linear Algebra.
F.S. Prerequisite: M 126, M 229. Geometry and algebra of R=. subspaces. linear independence. basis. dimension. solutions of linear systems. linear transformations and matrices.

M 261 03(341-0)
Calculus for Physical Scientists III.
F.S. SS. Prerequisite: M 161. Credit allowed for only one of the following sequences: M 141: M 155. M 255; M 160. M 161. M 261. Vector functions. partial differentiation. cylindrical and spherical coordinates. multiple integrals. line integrals. Green's theorem.

M 301 03(3-0-0)
Introduction to Combinatorial Theory.
F. Prerequisite: M 160. M 260. Matrices. orthogonal Latin squares. designs. difference sets. sets. binomial coefficients. inclusion and exclusion. recurrence. Ramsey's theorem. SDRs.

M 315 04(4-0-0)
Mathematics for Economists.
F. Prerequisite: M 141. Functions of several variables. matrix algebra. optimization. and applications to economics.

M 317 04(4-0-0)
Advanced Calculus of One Variable.
F.S. Prerequisite: M 161. Limits. continuity, differentiation, integration, sequences and series of one-variable functions; development of skills for proving theorems.

M 318 03(3-040
Advanced Multivariable Calculus.
S. Prerequisite: M 261. M 317. and either M 260 or M 369. Rigorous presentation of limits. continuity. differentiation and integration of functions of several variables.

M 331 03(3-0-0)
Methods of Applied Mathematics I.
F. Prerequisite: M 340. Mathematical modeling, applied linear algebra, systems of linear and nonlinear ordinary differential equations, stability theory.

M 332 03(3-0-0)
Methods of Applied Mathematics II.
S. Prerequisite: M 340. Credit not allowed for both M 332 and M *532.* Partial differential equations. separation of variables. Fourier series and transforms. Laplace. heat. and wave equations.

M 335 03(0-4-0)
Projects in Applied Mathematics.

S. Prerequisite: M 340 and some knowledge of FORTRAN programming. Open-ended projects with emphasis on problem identification and formulation. team approach. and reporting results.

M 340 04(4-0-0)
Introduction to Ordinary Differential Equations.
F.S. SS. Prerequisite: M 229; M 255 or M 261. First and second order equations. series. Laplace transforms. linear algebra. eigenvalues, first order systems of equations. numerical techniques.

M 350 04(3-2-0)
Introduction to Numerical Analysis I.
F. Prerequisite: M 340 and some knowledge of FORTRAN programming. Systems of linear and nonlinear equations. matrix eigenvalue problems. interpolation. approximation. computing.

M 35104(3-2-0)
Introduction to Numerical Analysis II.
S. Prerequisite: M 350. Numerical integration and differentiation. numerical solution of ordinary and partial differential equations. optimization problems. computing.

M 364 03(3-0-0)
Number Theory.
F. Prerequisite: M 161. Divisibility, prime numbers. numerical functions. congruence, quadratic reciprocity law.

M 366 03(3-0-0)
Groups, Rings and Fields.
S. Prerequisite: M 261 or M317. Sets. groups. rings. Fields, real and complex numbers; development of skills for proving theorems.

M 367 03(3-04))
Galois Theory and Polynomial Rings.
S. Prerequisite: M 366. Rings of polynomials.
Factorization. Galois theory. Finite fields; topics chosen from quadratic forms. groups. group actions. and abstract algebra.

M 369 03(3-0-0)
Linear Algebra.
F, S. SS. Prerequisite: M 340; or M 161. M 260. Vector spaces. linear transformations. matrices. similarity. eigenvalues and eigenvectors. canonical forms.

M 384 030-4-0)
Supervised College Teaching.
F.S. Prerequisite: M 161 or M 255 or M 315: written consent of instructor. Maximum of 3 credits allowed in course; may not be used to satisfy degree requirements in mathematics. Design and implementation of the Mathematics Module System; supervised tutoring in the Mathematics Learning Center.

M 425 03(3-0-0)
History of Mathematics.
S. Prerequisite: M 161. Historical development of geometry. arithmetic. algebra. and calculus from ancient times to 20th century.

M 433 03(3-0-0)
Introduction to Complex Variables.
F.S. Prerequisite: M 261. Analyticity. Cauchy integral theorem and formula. Taylor and Laurent series. residue calculus. conformal mapping and harmonic functions.

M 460 03(3-0-0).
Applied Algebra.
S. Prerequisite: M 201/CS 201 or M 301 or ST 220. Modern algebra applied lo information theory; finite fields; error correcting codes. computational complexity. one-way functions. public key cryptosystems.

M 470 03(3-0-0)
Euclidean and Non-Euclidean Geometry.

S. Prerequisite: M 161. Topics from real Euclidean, affine metric and non-Euclidean geometries emphasizing methods and connections with other areas of mathematics.

M 475 03(3-0-0)
Introduction to Topology.
S. Prerequisite: M 317. Euclidean spaces. metric spaces. topological properties of sets in metric spaces: continuity and convergence in metric spaces.

***M 479 03(3-0-0)**
Differential Geometry.
S. Prerequisite: M 261. Curves in R: curvature. torsion. Frenet equations. Surfaces in R: metric tensor geodesics. Gauss curvature. Surfaces via computer graphics.

M 484 Var. (1-3)
Supervised College Teaching.
F.S. Maximum of 6 credits allowed in course; may not be used to satisfy degree requirements requiring mathematics courses.

M 487 Var (1-16)
Internship.
A work-learn experience integrating classroom theory with practical experience.

M 495A-J Var.
Independent Study.
A) Analysis. B) Differential equations. C) Numerical analysis. D) Algebra. E) Geometry. F) Topology. G) Logic and foundations. H) Number theory. 0 Combinatorial theory. J) Applied mathematics.

M 50103(3-0-0)
Combinatorics I.
F. Prerequisite: M 301 or M 366 or M 460. Permutations and combinations. generating functions. recurrence relations. inclusion-exclusion. Polya counting. connected-ness and traversability.

M 501 03(3-0-0)
Combinatorics II.
S. Prerequisite: M 501. Trees. circuits. outsets. planarity. domination and coloring. networks. matchings. designs. geometries. schemes.

M 505 03.
Teaching Problem Solving In Mathematics K-12.
F. S. Prerequisite: Teacher certification or admission to teacher certification program. Offered as telecourse only. Problem-solving strategies. cooperative learning. and manipulatives for K- 12 classroom.

M 510/EG 510 03(3-0-0)
Linear Programming and Network Flows.
F.S. SS. Prerequisite: M 261 or M 315 and some knowledge of FORTRAN. Credit not allowed for both M 510 and EG 510. Optimization methods; linear programming. simplex algorithm. duality. sensitivity analysis. minimal cost network flows. transportation problem.

M 517 03(3-0-0)
Introduction to Mathematical Analysis I.
F. Prerequisite: M 318. Euclidean spaces. metric spaces. sequences. series. limits. continuity. differentiability. Reimann-Stieltjes integral.

M 518 03(3-0-0)
Introduction to Mathematical Analysis II.
S. Prerequisite: M 369. M 517. Sequences and senes of functions. Differential and integral calculus of functions of several variables.

M 519 03(3-0-0)
Complex Variables I.
F. Prerequisite: M 317. Analytic functions. complex integration theory. singularities. elementary functions. and mappings.

M 520/EG 520 03(3-0-0)
Nonlinear Programming.
S. Prerequisite: EG 510/M 510. Credit not allowed for both M 520 and EG 520. Theoretical. computational. practical aspects of nonlinear programming (NLP); unconstrained. constrained NLP; quadratic programming; large-scale NLP.

M 531 03(3-0-0)
Applied Mathematics I.
F.S. Prerequisite: M 340. Simultaneous linear ordinary differential equations. matrices. vector analysis. and tensor analysis.

M 532 03(3-0-0)
Applied Math.rustics II.
F.S. Prerequisite: M 340. Credit not allowed for both M 532 and M 332. Fourier series. Fourier integrals. partial differential equations. Bessel and Legendre functions. Laplace transforms. and finite differences.

M 540 03(3-0-0)
Dynamical Systems.
F. Prerequisite: M 318. M 369. Linear and nonlinear systems. orbits. phase space. Flows of vector fie Ids. stability. bifurcation theory. chaos. strange attractors and applications.

M 545 03(3-0-0)
Partial Differential Equations I.
F. Prerequisite: M 340. Second order linear PDEs. elliptic and parabolic equations. equations of math physics. separation of variables. Fourier series.

M 546 03(3-0-0)
Partial Differential Equations II.
S. Prerequisite: M 545. Laplace's equation. Green's functions. complex variable methods. eigen function expansions.

M 550 03(3-0-0)
Difference Methods-Partial Differential Equations.
S. Prerequisite: CS 150; M 532 or M 545. Explicit. implicit methods for second order equations. higher-dimensional problems. stability analysis. method of characteristics.

M 560 04(4-04)
Linear Algebra.
F. Prerequisite: M 369. Finite dimensional vector spaces, inner products, dual spaces, direct sums, transformation projections, adjoints, norms, eigen values. eigenvectors.

M 561 04(4-0-0)
Numerical Linear Algebra.
S. Prerequisite: M 318, M 560, knowledge of FORTRAN or Pascal. Numerical linear algebra. linear systems. least squares. eigen-analysis, iterative methods. computing.

M 566 03(3-0-0)
Introduction to Abstract Algebra I.
F. Prerequisite: M 366, Analysis of algebraic structures including groups. rings, fields, and vector spaces.

M 567 03(3-0-0)
Introduction to Abstract Algebra II.
S. Prerequisite: M 566. Field theory, Galois theory, and advanced linear algebra.

M 570 03(3-0-0)
Topology I.
F. Prerequisite: Twelve credits of mathematics at 300 level or above. Point-set topology including basic set theory, continuity. product and quotient spaces, metrization, compactness, and connectedness.

M 571 03(3-0-0)
Topology II.

S. Prerequisite: M 566. M 570. Fundamental group, free groups and presentations. and manifolds.

M 584 010-04)
Supervised College Teaching.
F.S.

M 601 03(3-0-0)
Advanced Combinatorics I.
F. Prerequisite: M 567. M 502. Special numbers. mobius inversions. transversals. partial orders. different sets. codes. t-designs.

M 602 03(3-0-0)
Advanced Combinatorics II.
S. Prerequisite: M 601. Hypergeometric functions. graph algorithms. hadamard matrices. strongly regular graphs. association schemes.

M 617 04(4-0-0)
Real Analysis I.
S. Prerequisite: M 517. Measure and integration. Fubini's theorem, Lp spaces. differentiation theory.

M 618 03(3-0-0)
Real Analysis II.
F. Prerequisite: M 560. M 617. Normed linear spaces. Banach and Hilbert spaces. elements of functional analysis.

M 619 03(3-0-0)
Complex Variables II.
S. Prerequisite: M 519. Infinite products. entire functions. analytic continuation. Reirnann surfaces. other topics.

M 620 03(3-0-0)
Variational Methods and Optimization I.
F. Prerequisite: M 518. M 560; or written consent of instructor. Unconstrained and constrained infinite dimensional optimization. calculus of variations. applications.

M 611 03(3-0-0)
Variational Methods and Optimization II.
S. Prerequisite: M 620 or written consent of instructor. Unconstrained and constrained infinite dimensional optimization. variational inequalities. Lagrange multipliers. control. applications.

M 640 03(3-0-0)
Ordinary Differential Equations I.
F. Prerequisite: M 340. M 369. M 517. Existence and uniqueness. continuation. continuous dependence. linear systems. and stability.

M 641 03(3-0-0)
Ordinary Differential Equations II.
S. Prerequisite: M 640. Topics .selected from nonlinear boundary value problems. periodic phenomena. differential operators. and others.

***M 645 03(3-0-0)**
Advanced Partial Differential Equations I.
F. Prerequisite: M 550. Abstract methods for linear partial differential equations.

***M 646 03(3-0-0).**
Advanced Partial Differential Equations II.
S. Prerequisite: M 645. Problems in nonlinear partial differential equations.

M 65104(4-0-0).
Numerical Analysis.
F. Prerequisite: M 560. Approximation theory. numerical differentiation and integration. nonlinear systems of equations. initial value problems, computing.

°M 652 04(4-0-0)
Finite Element Methods.
S. Prerequisite: M 560. Rayleigh-Ritz, Galerkin. and collocation methods. variational inequalities approximations over rectangles and triangles, applications and computing.

M 666 03(3-0-0)
Advanced Algebra I.
F. Prerequisite: M 567. Theory of rings and algebras with applications.

M 667 03(3-0-0)
Advanced Algebra II.
S. Prerequisite: M 666. Advanced topics from algebra: representation theory. Wedderburn theory. bilinear forms. multilinear and homological algebra.

***M 6711 03(3-0-0)**
Introduction to Differential Manifolds.
S. Prerequisite: M 518. M 560. Finite-dimensional differential manifolds. submanifolds, vector fields and flows. Lie groups and algebras.

M 675A-J 03(3-0-0)
Topics in Mathematics.
S. A) Analysis. B) Differential equations. C) Numerical analysis. D) Algebra. E) Geometry. F) Topology. G) Logic and foundations. H) Number theory. I) Combinatorial theory. J) Applied mathematics.

M 687 Var. (1-9).
Internship.
A work-learn experience integrating classroom theory with practical experience.

M 699A-J Var.
Thesis.
A) Analysis. B) Differential equations. C) Numerical analysis. D) Algebra. E) Geometry. F) Topology. G) Logic and foundations. HI Number theory. I)Combinatorial theory. J) Applied mathematics.

°M 717 03(3-0-0)
Functional Analysis I.
F. Prerequisite:Written consent of instructor. Topological vector spaces; Banach and Hilbert spaces.

M 718 03(3-0-0).
Functional Analysis II.
S. Prerequisite: M 717. Spectral theory. operator theory, semigroups of transformations, and distribution theory.

M 750 03(3-0-0)
Numerical Methods and Models I.
F. Prerequisite: M 561. Derivation of model equations. introduction to solution techniques and computing.

M 751 03(3-0-0).
Numerical Methods and Models II.
S. Prerequisite: M 561. Convergence, stability. error estimates and computing.

M 775A-J 03(3-0-0)
Topics in Mathematics.
F. A) Analysis. B) Differential equations. C) Numerical analysis. D) Algebra. E) Geometry. F) Topology. G) Logic and foundations. H) Number theory. 11 Combinatorial theory. J) Applied mathematics.

M 795A-J Var.
Independent Study.
A) Analysis. B)Differential equations. C) Numerical analysis. D) Algebra. E) Geometry.

F) Topology. G) Logic and foundations. H) Number theory. 0 Combinatorial theory. J) Applied mathematics.

M 798A-J Var.
Research.
A) Analysis. B) Differential equations. C) Numerical analysis. D) Algebra. E) Geometry.
F) Topology. G) Logic and foundations. H) Number theory. 11 Combinatorial theory. J) Applied mathematics.

M 799A-J Var.
Dissertation.
A) Analysis. B) Differential equations. C) Numerical analysis. D) Algebra. El Geometry.
F) Topology. G) Logic and foundations. H) Number theory. 11 Combinatorial theory. 11 Applied mathematics.

MICROBIOLOGY COURSES

Microbiology Department College of Veterinary Medicine and Biomedical Sciences

MB 149 03(3-0-0)
The Microbial World.
S. Role of microorganisms in nature with emphasis on environmental, medical, food. and agricultural microbiology.

MB 192 01(1-0-0).
Introductory Seminar.
Credit not allowed for both MB 192 and AY 160. Introduction to microbiology major; academic and career planning; research information sources in biomedical sciences.

MB 300 04(3-3-0)
General Microbiology.
F.S. Prerequisite: C 245 or C341 or concurrent registration ;B 120 or BY 102 or Z 110. Structure, function. development. physiology. and molecular biology.

MB 334/FT 334 04(2-4-0)
Food Microbiology.
F. Prerequisite: MB 300. Credit not allowed for both MB 334 and FT 334. Microorganisms in production of foods, in preservation and spoilage. and in food-borne diseases. Control of microorganisms in foods.

MB 342 03(3-0-0)
Immunology.
F.S. Prerequisite: C 245 or C 341. MB 300. Principles of immunology;cellular and humoral mechanisms of immunity.

MB 343 02(0-4-0)
Immunology Laboratory.
S. Prerequisite: MB 342 or concurrent registration. Techniques used in research and clinical immunology. including diagnostic problem solving and data analysis.

MB 350 03(3-0-0)
Microbial Diversity.
F. Prerequisite: MB 300. Physiological, taxonomic, and phylogenic aspects of microbial diversity. Yeasts and filamentous fungi as microbial entities.

MB 351 03(3-0-0)
Medical Microbiology.
S. Prerequisite: MB 342. Host-parasite relationships in human diseases caused by bacteria and fungi; disease mechanisms. prevention, and therapy.

MB 352 03(0-6-0)
Medical Microbiology Laboratory.
S. Prerequisite: MB 351 or concurrent registration. Laboratory skills and techniques necessary for identifying medically important bacteria and fungi.

MB 384 Var (1-5)
Supervised College Teaching.
F.S. SS. Maximum of 10 credits allowed in course.

MB 420 04(4-0-0)
Medical and Molecular Virology.
F. Prerequisite: MB 342. Principles of virology: structure, function. replication. assay, classification. host-parasite relationships. control diagnosis. immunization.

MB 425 02(0-4-0)
Virologic and Cell Culture Techniques.

F. Prerequisite: MB 342. MB 420 or concurrent registration. Isolation and characterization of viruses. Viral diagnostic and cell culture techniques.

MB 432 04(3-3-0)
Aquatic Microbiology.
S. Prerequisite: MB 300. Microorganisms and their functions in aquatic environments; effects of pollution on aquatic microbial communities; sanitary microbiology.

MB 436 04(2-4-0)
Industrial Microbiology.
F. Prerequisite: MB 300. Use of microorganisms for producing commercially valuable products.

MB 443 04(3-0-0)
Microbial Physiology.
S. Prerequisite: MB 300. Structure. Function of bacterial constituents; comparison with other organisms. Bacterial growth. energy production. biosynthesis.

MB 450 03(3-0-0)
Microbial Genetics.
F. Prerequisite: MB 300. Principles of genetics at molecular level: mutation. recombination. complementation. suppression. control of gene expression, and recombinant DNA.

MB 462/Z 462 05(3-4-0)
Parasitology and Vector Biology.
F. Prerequisite: BY 102, BY 103A; orZ 110. Credit not allowed for both MB 462 and Z 462. Protozoa. helminths. and insects and related anhropods of medical importance; systematics, epidemiology, host damage and control.

MB 495 Var.
Independent Study.
Prerequisite: MB 300.

MB 498 Var.
Research.

°MB 530 03(3-0-0)
Advanced Molecular Virology.
S. Prerequisite: BC 351. MB 300. Animal virus structure, mechanisms and regulation of replication, latency, tumor induction. Comparative virology.

°MB 533/EH 533 03(2-0-0
Epidemiology of Infections Diseases/Zoonoses.
S. Prerequisite: MB 300. Credit not allowed for both MB 533 and EH 533. Epidemiologic aspect of major infectious diseases and zoonoses. Modes of transmission/prevention/treatment measures.

MB 550 030-6-0)
Microbial and Molecular Genetics Laboratory.
S. Prerequisite: MB 450. written consent of instructors. Use of both in vivo genetics and in vitro molecular techniques to study gene structure. Function, and regulation in bacteria.

MB 562/Z 562 05(1- 8-0)
Field Ecology of Disease Vectors.
SS. Prerequisite: MB 4.62/Z 462 or MB 300; EN 302. Credit not allowed for both MB 562 and Z 562. Evolution, morphology. life cycles. and field biology of disease vectors; field techniques and experience in surveillance of arthropods and pathogens.

***MB 624 02(1-0-1)**
Microbial Ecology.
S. Prerequisite: MB 300 or relevant ecology course. Concepts in ecology as applied to microbial systems including analysis of communities, interactions, and biogeochemical cycling.

***MB 630 02(2-0-0)**
Advances in Microbial Physiology.

Contemporary developments in bacterial physiology: organelle assembly; membrane flow; chemotaxis; two-component regulatory systems; multi-gene regulation.

***MB 636 04(3-0-0**
Mechanisms of Viral Infection and Disease.
S. Prerequisite: MB 420 or MB 530. Cytopathic mechanisms, pathogenetic events in viral diseases; host response and antiviral immunity; cancer induction by DNA and RNA viruses.

***MB 651 03(3-0-0)**
Immunobiology.
F. Prerequisite: MB 342. Structure. Function. regulation of immunoglobulins and the immune system. Cellular immunity including transplantation and cancer.

MB 699 Var.
Thesis.

MB 700 01(0-0-0)
Topics in Microbiology.
F.S. Prerequisite: MB 300. Current literature in bacteriology. immunology. and virology.

***MB 720 020-3-0)**
Methods In Carbohydrate Analysis.
S. Prerequisite: C 343. Structural analysis of complex carbohydrates using gas chromatography, mass spectrometry, and nuclear magnetic resonance.

***MB 740 03(2-0-0**
Microbial and Molecular Genetics.
S. Prerequisite: MB 450. Molecular biology and genetics of prokaryotic and eukaryotic cells and their viruses: strategies for genetic manipulation.

°MB 760 03(2-0-1)
Mechanisms of Bacterial Pathogenesis.
F. Prerequisite: BC 351, MB 342. Molecular mechanisms of selected bacterial virulence determinants, including colonization, evasion of host defenses, invasion of tissues, and toxins.

MB 784 Var.
Supervised College Teaching.
F.S.

SS. MB 792 01(0-0-0
Seminar.

MB 795 Var.
Independent Study.

MB 799 Var.
Dissertation.

MECHANICAL ENGINEERING COURSES

Mechanical Engineering Department College of Engineering

ME 101 03(2-2-0)
Engineering Computing.
F. Credit not allowed for both CS 150 and ME 101. Computer programming with application to mechanical engineering problems.

ME 102 03(2-2-0)
Mechanical Engineering Design.
S. Prerequisite: ME 101; concurrent registration in M 160. Graphical design languages. modeling and analysis in engineering design. design automation.

ME 237 03(3-0-0)
Introduction to Thermal Sciences.
F.S. Prerequisite: PH 142. First and second laws of thermodynamics. properties of materials, energy conversion. statistical aspects. heat transfer.

ME 250 02(2-0-0)
Computer Applications in Mechanical Engineering.
S. Prerequisite: M 161, ME 101. Use of digital computers in instrumentation. control. and analysis.

ME 304 03(2-2-0)
Engineering Design 1.
S. Prerequisite: ME 307. Design fundamentals, including design processes. project planning. creativity. manufacturing, and human factors.

ME 307 04(3-2-0)
Instrumentation.
F. Prerequisite: CE 261. EE 204. M 340. ME 250. Laboratory measurement systems; computerized measurements.

ME 310 02(2-0-0)
Engineering Economy.
F.S. Credit not allowed for both ME 310 and ME 410. Economic and financial analysis of investment in engineering projects.

ME 324 04(3-2-0)
Dynamics of Machines.
F. Prerequisite: CE 261, concurrent registration in M 340. Analysis and synthesis of moving machinery.

ME 325 04(3-2-0)
Machine Design and Manufacturing.
S. Prerequisite: CE 360. Analysis and application to design of mechanical components and methods of manufacturing.

ME 331 04(3-2-0)
Introduction to Engineering Materials.
F, S. Prerequisite: C 111. PH 142. Characteristics of metallic. plastic. and ceramic material; basic principles which relate properties of materials to their atomic and microstructure.

ME 337 03(3-0-0)
Thermodynamics.
F.S. Prerequisite: M 261, ME 237. First and second laws of thermodynamics. characteristic functions of thermodynamics, power and refrigeration cycles. applications.

ME 338 01(0-3-0)
Thermosciences Laboratory.
F.S. Prerequisite: ME 344 or concurrent registration. Experimental methods in heat transfer. Fluid flow. and thermodynamics.

ME 342 03(3-0-0)
Mechanics and Thermodynamlcs of Flow Processes.
F.S. Prerequisite: ME 337 or concurrent registration. Engineering details of viscous flow with losses. measurements. compressibility. turbomachinery, convective heat transfer.

ME 344 03(3-0-0)
Heat and Mass Transfer.
F.S. Prerequisite: ME 342. Transport and rate processes, laws of heat and momentum transfer. conduction in solids. radiation, convection principles. change of phase. applications.

ME 404 03(3-0-0)
Engineering Design II.
F. Prerequisite: Completion of all required junior year engineering courses. Class projects in design of engineering devices and systems.

ME 405 03(3-0-0)
Engineering Design III.
S. Prerequisite: ME 404. Class projects in design of engineering devices and systems.

ME 408 03(2-0-0
Design of Computer Simulation Models.
F. Prerequisite: M 340. ME 250. Design of simulation models for manufacturing and other engineering systems.

ME 409 03(2-0-0
Design of Models for Decision Making.
S. Prerequisite: M 340. ME 250. Design of decision-making models for industrial engineering.

ME 410 02(2-0-0)
Engineering Economy for Engineers.
F. Prerequisite: ME 101. Credit not allowed for both ME 410 and ME 310. Economic evaluation of engineering projects.

ME 411 03(3-0-0)
Manufacturing Engineering.
S. Prerequisite: ME 331. Casting. Forming. machining. and welding processes used in manufacturing operations.

ME 412 02(2-0-0)
Quality Control.
F. Prerequisite: ST 301 or ST 309. Applications of probability and statistics to control of product quality in manufacturing operations.

ME 417 03(3-0-0)
Control Systems.
F. Prerequisite: M 340. ME 304. Feedback and forward loop control design; frequency and time domain methods; performance and stability requirements.

ME 424 03(3-0-0)
Advanced Mechanics.
S. Prerequisite: ME 324. Analyze and control vibrations in mechanical systems; advanced topics in mechanics.

ME 431 03(3-0-0)
Metals and Alloys.
F. Prerequisite: C 111. ME 331, PH 142. Engineering metals and alloys. modification of properties by alloying. plastic deformation, and heat treatment. Fundamentals of physical metallurgy.

ME 440/AE 440 04(3-2-0)
Design of Off-Highway Vehicles.
S. Prerequisite: ME 237, CE 261 or CE 262. Credit not allowed for both ME 440 and AE 440. Power sources. transmissions. wheels. tracks, and human factors for off-highway vehicles. tillage, and earthmoving machinery.

ME 444 03(2-0-0
Engineering Applications of Heat and Mass Transfer.
F. Prerequisite: ME 337, ME 344. Design and analysis of thermal devices; mass transfer. natural convection. solar collectors. heat exchangers; group design project.

ME 460 03(3-0-0)
Aeronautics.
S. Prerequisite: ME 342. Thermodynamics and fluid mechanics principles applied to the mechanics, aerodynamics. performance. stability, and control of airplanes.

ME 463 03(3-0-0)
Solar and Building Energy Engineering.
S. Prerequisite: ME 344. Comfort, psychrometrics, loads, solar radiation. heating and cooling system design. transport, solar system design. economics.

ME 467 03(3-0-0)
Energy Conversion Engineering 1.
F. Prerequisite: ME 237. EE 204. Energy resources and their consumption; energy conversion cycles; conventional mechanical and electrical components; economic considerations.

ME 495 Var.
Independent Study.

ME 501 03(3-0-0).
Principles ofMechanics.
F. Prerequisite: ME 324. Kinematics and dynamics of frigid body motion; Lagrangian and Hamiltonian formulations of mechanics; applications to engineering problems.

ME 510 03(2-0-1)
Capital Budgeting.
F. Prerequisite: ME 410. Independencies among proposals. minimum attractive rate of return. continuous and discrete cash flows, complete and incomplete information.

ME 512 02(2-0-0)
Reliability Engineering.
F. Prerequisite: ME 412. Models for predicting satisfactory service of devices or systems under specified operating conditions.

ME 519 03(3-0-0)
Algorithmic Control.
S. Prerequisite: ME 417 or EE 411. Design and implementation of real-time feedback control strategies for multi-tasking robotic systems.

ME 52104(3-3-0)
Geometric and Solid Modeling.
S. Prerequisite: M 340 or written consent of instructor. Techniques for computer modeling of engineering objects. analysis. and display.

ME 525 03(3-0-0)
Applied Fracture Mechanics.
S. Prerequisite: CE 560. Stress distribution near cracks; energy criteria for fracture; design criteria: fracture toughness testing.

ME 530 03(3-0-0)
Advanced Composite Materials.
F. Prerequisite: CE 360. ME 331. Materials aspects of advanced composite constituents and how their combination yields synergistic results.

ME 531 03(3-0-0)
Materials Engineering.
S. Prerequisite: ME 331 or ME 431. Structural engineering materials and their selection on basis of properly. processing. and economic considerations.

°ME 537 03(3-0-0)

Thermodynamics.
F. Prerequisite: ME 337. Statistical interpretations of first. second. and third laws; irreversible thermodynamics; quantum statistics.

ME 538 03(3-0-0)
Mechanical Engineering Thermodynamics.
S. Prerequisite: ME 337. First and second laws of thermodynamics applied to engineering devices and systems. Introduction to availability, energy, and lost work analysis.

°ME 551 03(3-0-0)
Physical Gas Dynamics I.
F. Prerequisite: ME 342. Characteristics of real gases in reacting and nonequilibrium systems; equilibrium air; statistical mechanics; chemical thermo-dynamics.

***ME 558 03(3-0-0)**
Combustion.
F. Prerequisite: ME 342. Combustion processes: explosions, detonations, flame propagation, ignition, generation ofpollutants in moving and stationary energy conversion systems.

°ME *561* 04(4-0-0)
Space Propulsion and Mission Analysis.
S. Prerequisite: M 340. Analysis of space flight missions and propulsion systems.

***ME 563 03(3-0-0)**
Air Pollution Control.
S. Prerequisite: ME 337. Abatement of emissions from mobile and stationary sources; monitoring, dispersion, air quality standards, electrostatic precipitation. energy consumption.

ME 564 03(3-0-0)
Fundamentals of Robot Mechanics and Controls.
F. Corequisite: ME 417 or EE 411. Kinematics of robots. controls for robots.

ME 565 03(2-2-0)
Robotlc Assembly.
S. Prerequisite: ME 564. Introduction to robotics, design for assembly. robot planning. robotic programming abstractions. autonomous and intelligent robotic systems.

°ME 567 03(3-0-0)
Broad-Beam Ion Sources.
F. Prerequisite: EE 342. PH 351. Physical processes in broad-beam electron-bombardment ion sources for space propulsion and ion machining applications.

***ME 570 03(3-0-0)**
Bioengineering.
F. Prerequisite: ME 307, ME 324. Physiological and medical systems analysis using engineering methods including mechanics. Fluid dynamics. control. electronics. and signal processing.

***ME 571 03(3-0-0)**
Biomechanics.
S. Prerequisite: ME 570. Mathematical approach to analysis of living systems. their function. diseases, and replaceable parts.

ME 610/EA 662 03(3-0-0)
Planning for Development.
S. Prerequisite: ME 410 or EC 460. Credit not allowed for both ME 610 and EA 662.
Theory of central planning and quantitative methods for execution; experiences of selected underdeveloped nations.

ME 621 03(3-0-0)
Design Theory and Methodology.
F. Prerequisite: ME 404 or ME 405 or written consent of instructor. Systematic approach to design; modern design practices in industry; use of computing in engineering design theory.

°ME 644 03(3-0-0)

Conduction Heat Transfer.
F. Prerequisite: ME 344. Linear and nonlinear. isotropic and nonisotropic conduction; analytical, numerical techniques; inverse methods.

°ME 645 03(3-0-0).
Radiation Heat Transfer.
S. Prerequisite: ME 344. Radiation fundamentals; properties; spectral. directional variations; transfer between surfaces; participating media; numerical. Monte Carlo methods.

***ME 646 03(3-0-0)**
Convection Heat Transfer.
F. Prerequisite: ME 344. Fundamentals; conservation, constitutive equations; second law; forced. Free convection; internal. external flows; laminar. turbulent flows.

***ME 675/CE 675 03(3-0-0)**
Solar and Alternative Energies.
F. Prerequisite: M 340. Credit not allowed for both ME 675 and CE 675. Solar radiation. Flat-plate and concentrating collectors. energy storage. space heating and cooling, power generation. agricultural applications.

***ME 676/CE 676 03(2-2-0)**
Building Energy Design.
S. Prerequisite: ME 675/CE 675. Credit not allowed for both ME 676 and CE 676.
Design of space heating and cooling systems. Solar thermal electric power systems. industrial and agricultural process heat.

ME 695A-K Var.
Independent Study.
A) Bioengineering. B) Energy conversion. C) Environmental engineering. D) Heat and mass transfer. E) Industrial and systems engineering. F) Mechanics and design. G) Computer-assisted engineering. H) Robotics. 0 Solar engineering. J) Computation III fluids. K) Materials.

ME 699A-K Var.
Thesis.
A) Bioengineering. B) Energy conversion. C) Environmental engineering. D) Heat and mass transfer. E) Industrial and systems engineering. F) Mechanics and design. G) Computer-assisted engineering. H) Robotics. 0 Solar engineering. J) Computational fluids. K) Materials.

ME 727 03(3-0-0)
Continuum Mechanics.
S. Prerequisite: CE 502. Mechanics of continuous media; cartesian tensors, vector analysis, Enematics of deformation. balance of momentum. mass and energy. constitutive equations.

***ME 744 03(3-0-0)**
Advanced Topics In Heat Transfer.
S. Prerequisite: ME 644 or ME 645 or ME 646 or written consent of instructor. Advanced numerical methods; two-phase flow; experimental. asymtotic. perturbation. and vanational methods.

°ME 752 03(3-0-0)
Physical Gas Dynamics II.
S. Prerequisite: ME 551. Flows with chemical and vibrational rate processes. nonequilibrium kinetic theory. Flow with translational nonequilibrium radiative heat transfer in gases.

ME 799A-K Var.
Dissertation.
A) Bioengineering. B) Energy conversion. C) Environmental engineering. D) Heat and mass transfer. E) Industrial and systems engineering. F) Mechanics and design. G) Computer-assisted engineering. H) Robotics. I) Solar engineering. J)Computation III fluids. K) Materials.

MILITARY SCIENCE COURSES

Office of Provost/Academic Vice President

MS 110 02(2-0-0)
Military Skills I.
F, S. Organization and role of the defense establishment; national strategy and policies; basic map reading and land navigation; physical fitness training.

MS 121 02(2-1-0)
Military Skills II.
S. Basic military skills; communication and time management techniques; first aid; physical fitness training.

MS 210 02(2-1-0)
Contemporary Management Principles.
F. Development of basic management skills; delegation and control; interpersonal skills; behavioral evaluation techniques; rifle marksmanship.

MS 22102(2-1-0)
Dynamics of Military Operations.
S. Prerequisite: MS 210 or written consent of instructor. Operation orders; theories of conflict; small unit operations; troop leading procedures; observing and classifying behavior; physical fitness training.

MS 250 03(2-3-0)
Basic Camp I.
SS. Organization. role of defense establishment; map reading; land navigation; basic military skills; communication; time management techniques; first aid.

MS 251 03(2-3-0)
Basic Camp II.
SS. Basic management skills: operations orders; theories of conflict; small unit tactics: troop leading procedures, observing and classifying behavior.

MS 294 Var (1-2)
Independent Study.
Prerequisite: MS 110. MS 121.

MS 295 Var. (1-2)
Independent Study.
Prerequisite: MS 110. MS 121.

+MS 310 03(3-1-0)
Leadership Assessment.
F. Special fee. $50. Leadership theory review: leadership assessment program to further develop leadership and management skills: physical fitness training.

+MS 320 03(3-1-0)
Applied Leadership.
S. Prerequisite: MS 310 or written consent of instructor. Special fee. $50. Command and staff functions; operations orders; tactical unit operations; military skills; physical fitness training; field training exercises.

MS 386 05(2-6-0)
Advanced Camp Practicum.
SS. Prerequisite: MS 320. Theories and principles applied to actual field situations.

MS 395 Var (1-3)
Independent Study.
Prerequisite: MS 310 or written consent of instructor. Leadership theory and skills as applied to the military.

MS 401/HY 401 03(3-0-0)
The American Military Experience.
F. Credit not allowed for both MS 401 and HY 401. Role of the armed forces in American society; development of military traditions. institutions. and practices.

+MS 420 03(3-1-0)
Role and Ethics of the Officer.
S. Prerequisite: MS 320. MS 401/HY 401. Special fee. $50. Role of the officer; ethics and professionalism; military justice; law of land warfare; preparation for active duty; physical fitness training.

MS 425 01 (0-2-0)
Staff Functions and Leadership Principles.
F. Prerequisite: MS 310. MS 320. Military staff planning. information briefing, decision briefings. and in-progress reviews.

+MS 492 01 (0-0-0)
Seminar.
Prerequisite: MS 110. MS 121. MS 210, MS 221. Special fee. $50. Military staff functions and issues in leadenhip.

MS 495 Var. (1-3)
Independent Study.
Prerequisite: MS 320 or written consent of instructor. Role of the Army officer, ethics. professionalism. military justice. and law of land warfare.

MUSIC COURSES

Music. Theatre. and Dance Department College of Liberal Arts

MU 111 03(3-0-0)
Music Fundamentals.
F.S. SS. For nonmusic majors and majors needing basic skills. Basic visual and aural fundamentals of music including intervals. scales. key and time signatures, chord construction. basic harmony. melodic writing.

MU 117 04(3-3-0)
Music Theory I.
F. Prerequisite: MU 111 or satisfactory completion of placement examination. Sight singing, ear training. and other fundamental skills; introduction to aesthetics. notation. melody. rhythm. and musical structure.

MU 118 04(3-3-0)
Music Theory II.
S. Prerequisite: MU 117. Chronological study of harmonic procedures from Middle Ages through Renaissance: melodic. rhythmic. and harmonic dictation.

MU 130 03(3-0-0)
Understanding Music.
F, S, SS. Previous musical training not necessary. Survey of music of all periods and styles.

MU 131 03(3-0-0)
Introduction to Music History and Literature.
F. Landmarks of music history and literature from 1300 to the present.

MU 150 02(2-0-0)
Piano Class I.
F.S. SS. For nonmusic majors and majors needing basic skills. Basic piano technique; keyboard harmony and music rudiments.

MU 151 02(2-0-0)
Piano Class II.
F.S. Prerequisite: MU 150. Intermediate piano technique; introduction to ensemble playing.

MU 152 02(2-0-0)
Piano Class III.
F.S. Prerequisite: MU 151. Advanced piano techniques; further development of technical skills.

MU 153 02(2-0-0)
Piano Class IV.
F.S. Prerequisite: MU 152. Practical application of piano skills as a teaching tool in the classroom.

MU 155 02(2-0-0)
Guitar Class I.
F.S. SS. Fundamental techniques for guitar emphasizing chord study and related literature.

MU 156 02(2-0-0)
Guitar Class II.
F.S. Prerequisite: MU 155. Fundamentals of guitar emphasizing solo literature and accompaniment.

MU 157 02(2-0-0)
Voice Class I.
F.S. Techniques of singing. emphasizing posture. breathing. tone production and diction. as applied to song literature.

MU 158 02(2-0-0)
Voice Class II.

F.S. Prerequisite: MU 157. Techniques of singing. emphasizing resonance. articulation. projection. and repertoire.

MU 200 01(0-3-0)
Women's Chorus.
F.S. Rehearsal and performance of a variety of types and styles of music for women's voices.

MU 204 01(0-3-0)
Marching Band.
F. Marching routines utilizing popular and jazz musical idioms with performances at all home football games and other athletic events.

MU 217 04(3-3-0)
Music Theory III.
F. Prerequisite: MU 118. Four-part harmonic style of Bach; fugal procedure; structural harmony and formal design in Haydn. Mozart. and Beethoven.

MU 218 04(3-3-0)
Music Theory IV.
S. Prerequisite: MU 217. 19th-century harmonic styles; chromaticism; 20th-century systems of composition; writing in tertian and nontertian styles.

MU 230 03(3-0-0)
Music of Black Americans.
S. Music indigenous to or composed by Black Americans.

MU 241 03(3-0-0)
Introduction to Music Therapy.
F. Overview of music therapy. related helping professions. and problems in human functioning; emphasizes basic skills for managing behavior problems.

MU 252A-G 01(0-2-0)
Instrumental Techniques.
F.S. Tone production. tuning. Fingerings. care. materials. and teaching methods for brass. percussion. string. and woodwind instruments. A) Low brass. B) High brass. C) Clarinet and saxophone. D) Double reeds and flute. E) Low strings. F) High strings. G) Percussion.

MU 254 02(2-0-(0
Beginning Conducting.
S. Prerequisite: MU 117. Basic conducting patterns and techniques.

MU 265A-B 01(0-2-0)
Singers Diction.
F. Pronunciation of each language for singing; basic vocabulary from song poetry of each language; use of the International Phonetic Alphabet. *A)German/English. °B) French/Italian.

MU 272A-V Var (1-3)
Applied Music Instruction.
F, S, SS. Corequisite: Any music ensemble. One or two half-hour lessons per week and one hour weekly performance class (no performance class in summer term). BRASS: A) Euphonium. B) French horn. C) Trombone. D) Trumpet. E) Tuba. COMPOSITION: F) Composition. KEYBOARD: G) Harpsichord. H) Organ. 0 Piano. PERCUSSION: J) Percussion. STRING: K) Guitar. L) Harp. M) String bass. N) Viola. O) Violin. P) Violoncello. VOICE: Q) Voice. WOOD-WIND: R) Bassoon. S)Clarinet. T) Flute. U)Oboe. Vl Saxophone (Alto).

MU 286A-B 01(0-2-0)
Practicum.
Prerequisite: A) MU 241. A) Music therapy. B) Music education.

MU 301 01(0-34))
University Chorus.
F.S. Rehearsal and performance of a variety of types and styles of music for mixed voices.

MU 302 01(0-3-0)

University Orchestra.
F.S. Rehearsal and performance of standard orchestral literature.

MU 304 01(0-3-0)
Symphonic Band.
F.S. SS. Prerequisite: Written consent of instructor. Preparation for public performance of full symphonic instrumentation of concert band literature.

MU 305 01(0-3-0)
University Singers.
F.S. Prerequisite: Written consent of instructor. Rehearsal and performance of choral literature emphasizing extended works with orchestral accompaniment.

MU 309 01(0-3-0)
Jazz Ensemble.
F.S. Prerequisite: Written consent of instructor. Rehearsal and performance of jazz ensemble literature of standard and experimental types.

***MU 311 02(2-0-0)**
Counterpoint I.
S. Prerequisite: MU 217. 16th-century polyphonic style; analysis of compositions by Josquin. Palestrina. Lassus.

°MU 312 02(2-04))
Counterpoint II.
S. Prerequisite: MU 217. 18th-century polyphonic style; analysis of works by Bach.

MU 332 03(3-0-0)
History of Jazz.
S, SS. Jazz since the 1880s emphasizing its various influences and developments.

MU 334 03(3-0-0)
Music History I.
F. Prerequisite: MU 118; MU 130 or MU 131. Music of the medieval. Renaissance. and baroque periods.

MU 335 03(3-0-0)
Music History II.
S. Prerequisite: MU 118; MU 130 or MU 131. Music of the classical. Romantic. and contemporary periods.

MU 342 03(3-0-0)
Psychology of Music.
F. Prerequisite: PY 100. Psychological aspects of music: perception. psychoacoustics, aesthetics. musical function. communication. measurement. and affective responses.

MU 343 03(3-0-0)
Research Methods In Music Therapy.
S. Prerequisite: ST 201; CS 110 or CS 150; PL 110 or PL 210. Techniques of observing. measuring, and recording behavior. Basic expert mental methods and procedures used in music therapy research.

MU 355 02(0-2-0).
Choral Conducting and Literature.
F. Prerequisite: MU 254. Basic techniques of choral conducting and analysis of selected works as an aid to interpretation.

MU 356 02(0-2-0)
Instrumental Conducting and Literature.
S. Prerequisite: MU 254. Essentials of instrumental conducting and analysis of selected works.

MU 400 01 (0-3-0)
University Chamber Singers.

F.S. Prerequisite: Written consent of instructor. Performance of chamber choral literature from all musical periods ranging from madrigals to music in a contemporary idiom.

MU 401 Var (1-2).
Opera Theater.
F.S. SS. Prerequisite: Written consent of instructor. Performance of opera and/or operatic scenes emphasizing operatic singing and acting techniques.

MU 402 01(0-3-0)
Theater/Chamber Orchestra.
F.S. SS. Prerequisite: Written consent of instructor. Performance of selected operas. musicals. oratorio. orchestral accompaniments. and chamber music.

MU 404 01(0-3-0)
Symphonic Wind Ensemble.
F.S. Prerequisite: Written consent of instructor. Performance of wind ensemble and band literature emphasizing most challenging of repertoire. using a select ensemble of performers.

°MU 407 01(0-34))
Accompanying.
F.S. SS. Prerequisite: MU 2721. Practical experience in the interpretation and execution of piano accompaniments.

MU 408 01(0-34))
Chamber Music.
F.S. Prerequisite: Written consent of instructor. Performance literature for small instrumental ensembles: duets. trios. quartets. and quintets.

MU 411 03(3-0-0)
Orchestration.
S. Prerequisite: MU 218. Unique characteristics of each orchestral instrument; arranging for variety of types of ensembles.

MU 416 03(3-04))
Stylistic Analysis.
F. Prerequisite: MU 218. Harmonic and formal analysis of representative works from the baroque to the present.

MU 420 02(2-0-0)
Marching Band Techniques.
F. Prerequisite: MU *204.* MU 356. 'Marching band conducting. design. and .performance techniques.

MU 430 03(3-0-0)
20th-Century Music.
S. Musical styles from 1900 to present; major 20th-century movements which reflect a changing society.

MU 431 03(3-0-0)
American Music.
S. Sacred. patriotic. popular. and cultivated musical developments from the Pilgrims to 1900 including music on the Western frontier.

°MU 437 020-2-0)
History and Structure of the Organ.
F. Prerequisite: MU 472H. Physical structure. tonal disposition. acoustical surroundings. and historical development.

MU 440 03(3-0-0)
Music Therapy Methods I.
S. Prerequisite: MU 241. Basic characteristics of handicapped children encountered in the music classroom; methods and materials for educating them in music.

MU 443 03(3-0-0)

Music Therapy Methods II.
S. Prerequisite: MU 286A; admission to professional curriculum. Relation of music to health; current and future music therapy scenes; and emphasis on cognitive, affective. and psychomotor approaches to therapy.

MU 444 03(3-0-0)
Music Therapy Methods III.
S. Prerequisite: MU 286A; admission to professional curriculum. Music therapy techniques: assessment. Formulating objectives. designing and implementing programs. evaluation. problem solving. and creativity.

MU 445 02(2-0-0)
Improvisation Techniques in Music Therapy.
S. Prerequisite: Admission to professional curriculum. Music/movement improvisation techniques with clinical populations.

MU 465 020-2-0)
Keyboard Literature.
F. Survey of early keyboard literature from pre-piano to early Romantic period; problems in present day performance.

***MU 466 020-2-0)**
Song Literature.
S. Development of song as an art form from monody to German Lieder. French school. and contemporary songs of England and America.

MU 468 020-2-0)
Organ Literature.
S. Prerequisite: MU 437. Survey of literature from earliest known works to present; stylistic content and interpretation.

MU 469 02(1-2-0)
Instrumental Literature.
S. Survey of literature for string. woodwind, and brass ensembles.

MU 471 01(0-0-0)
Recital.
F.S. SS. Prerequisite: Written consent of instructor. Demonstration of individual musical proficiency through public performance.

MU 472A-V Var (1-3)
Applied Music Instruction.
F.S. SS. Prerequisite: MU 272A-V; concurrent registration in any music ensemble; successful completion of upper-division qualifying exam. One or two half-hour lessons per week and (except in summer) one weekly performance class. emphasizing pedagogical methods.
BRASS: A) Euphonium. B) French horn. C) Trombone. D) Trumpet. E) Tuba. COMPOSITION: F) Composition. KEYBOARD: G) Harpsichord. H) Organ. 0 Piano. PERCUSSION: J) Percussion. STRING: K) Guitar. L) Harp. M) String bass. N) Viola. O) Violin. P) Violoncello. VOICE: Q) Voice. WOOD-WIND: R) Bassoon. S) Clarinet. T) Flute. U) Oboe. V) Saxophone (Alto).

MU 486A-B Var (1-3)
Practicum.
Prerequisite: A) Piano proficiency. B) Admission to teacher certification.
A) Music therapy. B) Music education.

MU 495A-H Var (1-3).
Independent Study.
A) Composition and theory. B) Conducting. C) Improvisation. D) Music history. E) Music literature. F) Music therapy. G) Pedagogy. H) Performance.

MU 496A-I Var I 1-3)
Group Study.

A) Composition and theory. B) Conducting. C) Improvisation. D) Music education. E) Music history. F) Music literature. G) Music therapy. H) Pedagogy. 0 Performance.

MU 517 02(2-0-0)
Analytic Techniques I.
F. Prerequisite: Satisfactory completion of placement examination. Appropriate analytic techniques for Middle Ages. Renaissance. and baroque music.

MU 518 03(3-0-0)
Analytic Techniques II.
S. Prerequisite: Satisfactory completion of placement examination. Appropriate analytic techniques for classical. Romantic. and 20th-century music.

°MU 519 03(3-0-0)
History of Music Theory.
S. Prerequisite: MU 416. Important authors. treatises. and texts dealing with acoustics. composition. counterpoint. harmony. notation. orchestration. thorough bass. and tuning.

MU 520 I)3(3-0-0)
Elementary School Music.
F. Prerequisite: ED 450. Musical concepts and teaching strategics for grades K-6; contemporary influences on music education.

MU 521 03(3-0-0)
Junior and Senior High School Music.
S. Prerequisite: ED 450. Music for grades 7-12. General music classes. choral and instrumental organizations. common problems. practices. and new concepts.

MU 525A-C 030-0-2)
Orff-Schulwerk Training Program.
SS. Prerequisite: MU 590L. A) Orff-Schulwerk Training I. B) Orff-Schulwerk Training II. C) Orff-Schulwerk Training III.

***MU 530 03(3-0-0)**
Music Through the Middle Ages.
F. Prerequisite: MU 334. Music in Western civilization from its beginnings through Middle Ages.

***MU 531 03(3-0-0)**
Music of the Renaissance.
S. Prerequisite: MU 334. Music of 15th and 16th centuries.

MU 532 03(3-0-0)
Music of the Baroque.
SS. Prerequisite: MU 334. Style and musical language of baroque from Gabriellis through Johann Sebastian Bach.

***MU 533 03(3-0-0)**
Music of the Classical Era.
S. Prerequisite: MU 335. Vocal and instrumental music of middle and late 18th century.

MU 534 03(3-0-0).
Music of the Romantic Era.
SS. Prerequisite: MU 335. Musical works. philosophies. and related arts of 19th century.

***MU 535 03(3-0-0)**
Contemporary Music.
S. Prerequisite: MU 430. 20th-century music emphasizing stylistic and theoretical concepts.

MU 555 03(3-0-0)
Choral Techniques. Style. and Interpretation.
F. Prerequisite: MI.: 355. Techniques for achieving expressive conducting. problems of tone and diction. musical style and interpretation. and rehearsal techniques.

MU 556 03(3-0-0)

Advanced Instrumental Conducting and Techniques.
S. Prerequisite: MU 356. Score reading and analysis. preparation of instrumental scores for performance; expressive baton techniques, rehearsal methods and procedures.

MU 565 02(2-0-0)
Piano Literature-1800 to Present.
S. Prerequisite: MU 465. Keyboard music representing Romantic and Impressionistic periods. nationalism. twelve-tone. and recent developments including aleatory elements.

MU 566 02(2-0-0)
Choral Literature-Renaissance and Baroque.
F. SS. Prerequisite: MU 355. Analytical and comparative survey of choral literature from Renaissance to 1750.

MU 567 02(2-0-0)
Choral Literature-1750 to Present.
S. SS. Prerequisite: MU 356. Analytical and comparative survey of choral literature from 1750 to present.

MU 569 020-2-0)
Symphonic Literature.
F. Prerequisite: MU 469. Symphonic development from early classicism through Impressionism; emphasis on formal structure. thematic sources. and social and historical influence.

MU 590A-M Var (1-3)
Workshop.
A) Choral music. B) Conducting. C) Beginning guitar. D) Humanities. E) Music for exceptional children. F) Organ. G) Organ music I. H) Orff music II. I) Kodaly. J) Beginning handbells. K) Computers in music education. L.) Advanced handbells. M) Macmillan music.

MU 630 03(3-0-0)
Methods of Music Research.
F. Prerequisite: MU 416. Research. documentation, and bibliography for music history. literature, performance. theory. acoustics. music education. and quantitative testing.

MU 669 02(2-0-0)
Instrumental Literature.
S. Prerequisite: MU 469. Solo and small ensemble literature for string. woodwind. and brass instruments.

MIr 672A-V Var (1-3).
Applied Music Instruction.
F, S. SS. Prerequisite: MU 472A-V. One or two half-hour lessons per week and one hour weekly performance class (no performance class in summer term). BRASS: A) Euphonium. B) French horn. C) Trombone. D) Trumpet. E) Tuba. COMPOSITION: F) Composition. KEYBOARD: G) Harpsichord. H) Organ. I) Piano. PERCUSSION: J) Percussion. STRING: K) Guitar. L) Harp. M) String bass. N) Viola. O) Violin. P) Violoncello. VOICE: Q) Voice. WOOD-WIND: R) Bassoon. S) Clarinet. T) Flute. U) Oboe. V) Saxophone (Alto).

MU 684 Var. (1-3)
Supervised College Teaching.
F, S, SS. Supervised assistance in instruction.

MU 692 Var (1-3)
Seminar.

MU 695A-H Var (1-3)
Independent Study.
A) Composition and theory. B) Conducting. C) Improvisation. D) Music education. E) Music history. F) Music literature. G) Music therapy. H) Pedagogy.

MU 696A-1 Var. (1-3)
Group Study.

A) Composition and theory. B) Conducting. C) Improvisation. D) Music education. E) Music history. F) Music literature. G) Music therapy. H) Pedagogy. 0 Performance.

MU 698 Var (1-3)
Research.

MU 699 Var.
Thesis.

NEUROBIOLOGY COURSES

Office of Graduate School

NB 501 02(2-0-0)
Cellular and Molecular Neurophysiology.
F. Prerequisite: One college-level course in each: biology, biochemistry, physics. calculus. Credit not allowed for both NB 501 and PS 500. Membrane properties of nerve and muscle; molecule mechanisms of synaptic function; neuromuscular units.

NB 502 01(0-3-0)
Techniques In Neuroscience.
F, S. Prerequisite: One college-level course with laboratory in each: biology, biochemistry. physics. Current research projects in research labs of neuroscience faculty.

NB 503a1 C 503 02(2-0-0)
Developmental Neurobiology.
F. Prerequisite: One college-level course in each: biology. biochemistry. physics, calculus. Credit not allowed for both NB 503 and BC 503. Molecular mechanisms of neuronal growth, pathfinding. and synaptogenesis; regulation of neuronal gone expression.

NB 505 03(3-0-0)
Functional Neurobiology.
S. Prerequisite: NB 501. NB 503. Anatomical and physiological organization of the nervous system emphasizing structural basis of CNS function.

NB 506 020-3-0)
Neurobiology Laboratory.
F. Prerequisite: NB 501 or concurrent registration. Classic and contemporary experiments emphasizing electro-physiological recording techniques and principles of neurobiology.

NB 793 01 (0-0-1)
Neuroscience Seminar.

NB 795 Var.
Independent Study.

NB 796A-B Var.
Group Study In Neurosciences.
A) Ion channels. B) Neuronal growth and regeneration.

NATURAL RESOURCES COURSES

College of Natural Resources

NR 120 03(3-0-0)
Environmental Conservation.
F, S, SS. Overview of natural resources environmental concerns including population, pesticides. energy, and pollution.

NR 200 03(2-0-1)
Maintenance of Biotic Diversity.
S. Prerequisite: Introductory biology course. Biological diversity examined in context of species; extinction. Principles. techniques of conservation biology utilized to understand and resolve issues.

+NR 220 05(2-6-0)
Natural Resources Ecology and Measurements.
SS. Prerequisite: B 120 or BY 103B. (Special fee, $595, assessed through Division of Continuing Education.) Ecology of major communities of the Rocky Mountains; basic measurements of natural resource environments. Pingree Park Campus.

NR 260 03(2-2-0)
Introduction to Natural Resource Analysis.
F.S. Communication and analysis techniques with computers for natural resource management.

NR 320 03(3-0-0)
Natural Resources Policy and Administration.
S. Policy and administration in resource agencies.

NR 322 03(2-3-0)
Introduction to Geographic Information Systems.
S. Prerequisite: LA 361 or NR 260. Fundamental concepts of spatial data handling and computer-assisted map analysis.

NR 323 03(2-2-0)
Remote Sensing of Natural Resources.
F. Remote sensing systems and applications; characteristics of photographic. scanner and radar images; imagery interpretation.

NR 3.30 03(:3-0-0)
Human Dimensions in Natural Resources.
S. Prerequisite: NR 120 or written consent of instructor. Social, political. cultural. and economic considerations in natural resource management.

NR 352 03(2-2-0)
Principles of Wilderness Management.
S. Prerequisite: NR 120. Principles for managing park, wilderness. and other protected areas.

NR 384 Var. (1-5)
Supervised College Teaching.
F. S, SS. Maximum of 10 credits allowed in course. Instruction and practice in laboratory instruction in lower-division departmental courses.

NR 387 010-0-0)
Internship I.
Preparation for field experience in natural resources management.

NR 400 03(2-0-1)
Public Relations in Natural Resources.
F.S. Effective public relations and public information programs applicable to natural resource professions.

NR 401 02(04-0)

Techniques In Public Relations.
F.S. Prerequisite: SP 200. Effective communications methods related to natural resource professions: preparation of graphics. organization of programs using slide show format.

NR 420 04(3-3-0)
Integrated Resource Management.
F.S. Natural resource management exercises; quantitative integration techniques. group dynamics.

NR 42103(3-0-0)
Natural Resources Sampling.
S. Prerequisite: ST 201 or ST 301. Designs. techniques, problems in sampling natural resource populations; analysis, interpretation of data.

NR 422 04(2-6-0)
GIS Applications in Natural Resource Management.
S. Prerequisite: NR 322. Capabilities and uses of GIS in natural resource management and planning.

NR 425 03(3-0-0)
Sustainability of Renewable Resources.
F. Prerequisite: F 325 or written consent of instructor. Aspects of the sustainability of managed renewable resources.

NR 432 01.
Foundations of National Forest Lands Program.
F, S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. History of U.S. public land law and evolution of National Forests. Nature. policy. trend. and needs of lands program; its integration into management.

NR 433 04.
Special Uses Management.
F.S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. Authorities, application. and administration; agriculture. aviation. community. public information. industrial. water. treasure trove. and cultural uses.

NR 434 03.
Linear Uses and FERC Licenses.
F.S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. Rights-of-way authorities and management; road and trail grants and easements; communication uses; Federal Energy Regulatory Commission licenses.

NR 435 05.
Valuation and Landownership Adjustment.
F.S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. Authorities. coordination. valuation. title; land purchase. donation, exchange. interchange. transfers. sales. condemnation. and negotiation.

NR 436 03.
Right-of-Way Acquisition.
F.S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. Need. authority, policy. planning. acquiring. negotiating. and managing rights-of-way; cost-share agreements.

NR 437 03.
Land Status. Claims. Withdrawals. and Boundaries.
F.S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. Administration of landownership status. title encumbrances. withdrawals. title claims. Native American rights and claims. property boundary management.

NR 440 03(2-2-0)
Land Use Planning.
F. Integration of natural resource. social. institutional factors in regional resource planning.

NR 487A-C Var.
Internship II.
Prerequisite: NR 387. A) Wildlife biology. B) Recreation resources. C) Natural resources management.

NR 492 Var.
Seminar on Environmental Conservation.

NR 493 01(0-0-0
Seminar on GIS and Remote Sensing Applications.
S. Prerequisite: NR 322. NR 323; or written consent of instructor. Techniques. use of remote sensing. GIS technologies for forest. range. wildfire. water. geology. recreation. and other resource management applications.

NR 495 Var.
Independent Study.

NR 496 Var.
Group Study.

NR 500 03(2-2-0)
Microcomputer Applications in Natural Resources.
F.S. Prerequisite: ST 301; NR 260 or CS 110. Use of microcomputer packages in natural resources management and analysis.

NR 503 03(2-3-0)
Remote Sensing for Resource Management.
F. Interpretation and analysis of photographic. multispectral scanner. and radar data; sensor systems; applications to resource management.

NR 504 04(2-6-0)
Computer Analysis of Remote Sensing Data.
S. Prerequisite: NR 323 or NR 503. Computer-aided analysis techniques for extracting resource information from aerial and satellite remote sensing data.

NR 505 020-6-0)
GIS Operations.
S. Prerequisite: NR 322. Development and implementation of GIS projects using widely available software.

+NR 510 030-4-0)
Geographic Information Systems.
S. Prerequisite: NR 500 or written consent of instructor. Special variable ($30-$50) fee determined by department. Theories and applications of geographic information systems in natural resources.

+NR 520 04(3-0-0
Wilderness Management.
F. Prerequisite: NR 320 or written consent of instructor. Special variable ($40-$50) fee determined by department. Management of wilderness resources and visitors.

°NR 521 02(2-0-0)
Natural Resource Administration.
F. Prerequisite: NR 320. Administration of forest and natural resource projects in developed and developing countries.

NR 522 03(0-6-0)
Wilderness Ecosystem Planning.
S. Prerequisite: NR 520 or written consent of instructor. Expertise developed in preparing effective implementation plans for park and wilderness ecosystems.

NR 525 03(3-0-0)
World Natural Resources.
S. Prerequisite: Written consent of instructor. Interdisciplinary approach to overview global problems and solutions in natural resources.

NR 555 02(2-0-0)
Preparation of Grant Proposals.
S. Prerequisite: ST 301. one course in ecology. Idea development. preparation. writing. and presentation of research proposals in natural resources.

NR 561 02(2-0-0)
Habitat Evaluation Procedures.
F.S. SS. Prerequisite: General biological. natural resources. or planning course work. Rationale. philosophy. and use of habitat as a mechanism for conducting environmental impact assessments.

NR 575 04(3-2-0)
Systems Ecology.
F. Prerequisite: CS 150. M 255. ST 304. RS 352.
Modeling and computer simulation for describing and integrating ecosystem concepts.

NR 592 Var.
Seminar in Natural Resources.

NR 600 020-0-0
Advanced Public Relations in Natural Resources.
S. Prerequisite: NR 400. Public relations aspects of current natural resource management programs; case history approach.

NR 621 03(0-4-0)
Design of Geographic Information Systems.
F. Prerequisite: NR 322 or NR 510; NR 260; CS 110 or CS 150 or CS 151. Algorithms. procedures. and applications of spatial data handling and spatial analysis.

+NR 622 03(2-2-0)
Analysis of Environmental Impact.
F. Prerequisite: Written consent of instructor. Special fee. $10. Preparation and evaluation of environmental impact statements.

NR 660 03(3-0-0)
Biogeochemical Cycling in Ecosystems.
S. Prerequisite: AG 240. C 245. and one course in advanced ecology. Biotic and abiotic processes responsible for distribution and fluxes of elements at ecosystem. landscape. and global scales.

NR 676 04(3-2-0)
Ecological Models.
S. Prerequisite: NR 575. Model development forecosystems. subsystems; deterministic. stochastic models; validation. sensitivity analysis.

NR 687 Var (3-6)
Natural Resources Internship.
Prerequisite: NR 525. Field experience and exercises in international natural resources management.

NR 784 Var.
Supervised College Teaching.
F.S.

SS. NR 793 01(0-0-0
Seminar on Remote Sensing and GI
S. Prerequisite: NR 322. NR 323; or NR 503; or written consent of instructor. Techniques, use of remote sensing. GIS technologies for forest. range. wildlife. water. geology. recreation. and other resource management applications.

NR 796 Var.
Group Study.

NATURAL SCIENCES COURSES

College of Natural Sciences

NS 192 01 (0-0-1)
Introductory Seminar.

NS 201 04(3-3-0)
Molecular Biosciences I.
S. Prerequisite: BY 102; concurrent registration in C 113. C 114. Basic molecular genetics and molecular aspects of development.

NS 202 04(3-3-0)
Molecular Biosciences II.
F. Prerequisite: NS 201; concurrent registration in C 245 or C 341. Molecular aspects of cellular and subcellular biology and introductory biochemistry.

NS 384 Var. (I-3)
Supervised College Teaching.
F, S. Prerequisite: Written consent of instructor. Supervised experience in computer lab.

NS 590A-B Var (1-3)
Workshop in Instruction.
Concurrent registration not allowed in NS 590A-B and ED 590C and ED 591B. A) Science instruction in rural Colorado. B) Mathematics instruction in rural Colorado.

OCCUPATIONAL THERAPY COURSES

Occupational Therapy Department College of Applied Human Sciences

OT 110 03(3-0-0)
Introduction to Occupational Therapy.
F, S. Roles and activities in occupational therapy.

OT 215 01(0-0-0)
Medical Terminology.
F, S. Definition and use of medical terms.

OT 305 03(3-0-0)
Sensorimotor Adaptation.
F. SS. Prerequisite: Admission to professional curriculum or written consent of instructor. Development of neuromuscular functions as related to sensorimotor actions of infancy and childhood.

OT 306 04(3-2-0)
Theory and Practice In Pediatrics.
S. Prerequisite: OT 305. OT 330. Theories and principles of pediatric evaluation and treatment.

OT 315 03(3-0-0)
Survey of Human Disease.
F.S. SS. Prerequisite: AY 300/PS 300. Pathology and management of human systems.

OT 330 04(2-2-0
Introduction to Treatment Planning.
F. Prerequisite: Admission to professional curriculum. Analysis. performance of self-care. work. and play/leisure activities. Teaching. leadership, assessment. goal setting. and implementation skills.

OT 335 03(3-0-0)
Purposeful Activity and Action.
S. Prerequisite: AY 301. Integrated approach to human movement and purposeful activity performance.

OT 350 02(2-0-0)
Concepts and Issues in Practice.
S. Prerequisite: OT 330. S 310 or ST 201 or ST 301 or ST 307/EH 307 or ST 311. Explore and critique clinical evaluation instruments and literature related to concepts and issues in contemporary OT practice.

OT 355 020-0-0
Handicapped Individual In Society.
F.S. Prerequisite: PY 100 or S 100. Description and exploration of handicapping conditions; review of support systems including legal and financial implications.

OT 384 Var (2-5)
Supervised College Teaching.
F.S. Maximum of 10 credits allowed in course.

+OT 386 01(0-2-0)
Practicum-Preparation for OT Practice.
S. Prerequisite: OT 306, OT 330. OT 350 or concurrent registration. Special fee, $40. Overview of OT practice areas. service systems, and Level I fieldwork.

OT 425 03(2-2-0)
Theory and Practice-Psychosocial Dysfunction I.
F. Prerequisite: OT 330. PY 320. PY 325. Theories of psychosocial functioning as applied to occupational therapy.

OT 430 04(3-2-0)

Theory and Practice-Psychosocial Dysfunction II.
S. Prerequisite: OT 425. OT 435.
Evaluation and treatment principles in practice of psychiatric occupational therapy.

OT 435 04(2-4-0)
Theory and Practice in Physical Dysfunction I.
F. Prerequisite: OT 315. OT 330. OT 335. Theories of physical functioning and evaluation as applied to occupational therapy.

OT 440 04(3-2-0)
Theory and Practice In Physical Dysfunction II.
S. Prerequisite: AY 445. OT 435. Evaluation and holistic treatment planning for practice of occupational therapy.

OT 465 02(2-0-0)
Theory and Practice in Gerontology.
F. Prerequisite: OT 330. Exploration of OT practice in hospital, home. and extended care facility for geriatric clients.

OT 475 02(0-0-0)
Administration and Professional Issues.
S. Prerequisite: OT 425. OT 435. Administrative practices applicable to occupational therapy personnel and situations.

OT 486A-E 01(0-2-0)
Practicum-OT Treatment. A) F. B-E)
F. S. SS. Prerequisite: OT 386. Overview of OT practice areas. A) On campus. B) Level IA. C) Level IB1. D) Level IB2. E) Level IB3.

OT 494 Var.
Independent Study.

OT 496 Var.
Group Study.

OT 498 Var.
Research.
Prerequisite: OT 350. S 310 or ST 311.

OT 560 03(2-0-0)
Related Services in Schools.
F.S. SS. Prerequisite: Bachelor's degree. Also offered as telecourse. Roles, functions of related service in public school setting. including current practice. regulations. and trends for future practice.

OT 570 03.
Community Integrated Service Delivery.
F. S, SS. Prerequisite: Admission to professional curriculum or written consent of instructor. Offered as telecourse only. Prepares human service personnel to integrate services for people with significant disabilities into community employment. living. and recreation environments.

OT 588A-H Var. (6-16)
Field Placement.
Prerequisite: Written consent of department head. A) Physical dysfunction. B) Psychosocial dysfunction. C) Pediatrics. D) Industrial rehabilitation. E) Gerontology.
F) Hand rehabilitation. G) Community transition. H) Nontraditional settings.

OT 590 Var (1-3)
Workshop.

OT 610 03(3-0-0)
Theories of Occupational Therapy Practice.
F. Prerequisite: O.T.R. or admission to professional master's program. Theory construction and critical evaluation.

OT 620 03(3-0-10
Purposeful Activity and Adaptation I.
F. Prerequisite: O.T.R. or admission 10 professional master's program.
Sensorimotor, cognitive. and psychosocial adaptation from infancy through adolescence.

OT 6311 03(3-0-0).
Purposeful Activity and Adaptation II.
S. Prerequisite: OT 620. Sensorimotor, cognitive, and psychosocial adaptation from early adulthood to senescence.

OT 650A-B 03(2-0-0
Research Methods.
Prerequisite: A) O.T.R. or admission to professional master's program. B) OT 650A. A) Research methods. F. B) Clinical research.

S. OT 660 02(0-0-2)
Leadership and Management in Allied Health.
S. Prerequisite: O.T.R. admission to professional master's program. or written consent of instructor. Leadership/management roles and responsibilities for health-related professions.

OT 684 Var.
Supervised College Teaching.
F.S.

OT 688A-H Var (6-16)
Field Placement.
Prerequisite: Degree in occupational therapy. A) Physical dysfunction. B) Psychosocial dysfunction. C) Pediatrics. D) Industrial rehabilitation. E) Gerontology. F) Hand rehabilitation. G) Community transition. H) Nontraditional.

OT 692A-1 Var.
Seminar. Prerequisite: OT 610.
A) Theory construction and critique. B) Topics in related theories 1. C)Topics in related theories II. D) Recent advances in occupational therapy. E) Instructional strategies.
F)Community-based service deli very. G) Technology and human resources. H) Health promotion. I) Disability and family dynamics.

OT 694 Var.
Independent Study.

OT 696 Var.
Group Study.

OT 698 Var.
Research.

OT 699 Var.
Thesis.

PATHOLOGY COURSES

Pathology Department College of Veterinary Medicine and Biomedical Sciences

PA 330 02(1-3-1).
Medical Helminthology and Protozoology.
F. Prerequisite: MB 300. Techniques used as an aid to diagnosis of helminth and protozoan parasites in humans.

PA 495A-D Var.
Independent Study.
A) Pathology. B) Clinical pathology. C) Veterinary parasitology. D) Biochemical pathology.

PA 555 03(3-0-0)
Principles and Mechanisms of Disease.
F. Prerequisite: AY 300/PS 300. Principles of disease processes; emphasis on reactivity of the diseased cell. tissue. organ. or organism.

PA 670 03(3-0-0)
Molecular Immunology and Immunogenetics.
F. Prerequisite: MB 651. Molecular basis and genetics of immune response. Biochemistry of immunologically mediated diseases.

PA 698 Var.
Research.

PA 699 Var.
Thesis.

°PA 700 03(2-2-0).
Pathology of Nutritional Diseases.
S. Prerequisite: VM 640. Functional and morphological changes accompanying nutritional diseases.

***PA 765 0311-4-0)**
Comparative Neuropathology.
F. Spontaneous diseases of nervous system of domesticated, laboratory. and wild animals.

PA 770 01 (0-3-0)
Monoclonal Antibodies.
S. Prerequisite: MB 425; written consent of instructor. Production and evaluation of monoclonal antibodies.

°PA 778 020-2-0)
Pathology of Laboratory Animals.
F. Prerequisite: VM 742. Specific disease problems 01' common laboratory animals emphasizing morphologic. clinical pathologic features of spontaneous. selected induced diseases.

PA 784 Var.
Supervised College 'reaching.
F. S,

SS. PA 786A-C Var.
Practicum.
A) Comparative gross anti histologic pathology. B) Surgical pathology. C)Clinical pathology.

PA 792A-E Var (1-3).
Seminar. Maximum of 3 credits allowed per subtopic.
A) Histopathology. B) Research. C) Toxicological pathology. D) Clinical pathology. E) Anatomic pathology.

PA 795A-D Var.
Independent Study.

A) Pathology. B) Clinical pathology. C) Veterinary parasitology. D) Biochemical pathology.

PA 796 Var.
Group Study.

PA 798 Var.
Research.

PA 799 Var.
Dissertation.

PLANT DISEASE COURSES

Plant Pathology and Weed Science Department College of Agricultural Sciences

PD 361 03(2-2-0).
Elements of Plant Pathology.
S. Prerequisite: B 120 or BY 103B. Diseases of economic plants.

PD 365/EN 365 04(3-3-0)
Integrated Forest Pest Management.
F. Prerequisite: B 1211 or BY 102. Credit not allowed for both PD 365 and EN 365. Social fee. $8. Insects and diseases in forest and urban ecosystems. Effects. diagnosis. prevention. and interactions.

***PD 424 02(2-0-0).**
Seed Technology.
F. Prerequisite: B 120 or BY 10313. Fundamentals of seed biology. quality determination. conditioning. and other practical related aspects.

PD 464 02 (2-0-0)
Plant Disease Control.
F. Prerequisite: B 440. PD 361. Exclusion, eradication. protection. and resistance; relation of epiphytology to control measures.

PD 495 Var. (1-3).
Independent Study.
Maximum of 7 credits allowed in course.

PD 496 Var. (1-3).
Group Study.
Maximum of 7 credits allowed in course.

***PD 510/EN 510 03(3-0-0)**
Insect-Plant Disease Relationships.
F. Prerequisite: One entomology or plant disease course. Credit not allowed for both PD 510 and EN 510. Relationships between insects and various plant pathogens as they affect survival and transmissions of pathogens.

***PD 511/EN 511 01 (0-2-0)**
Insect-Plant Disease Relationships Laboratory.
F. Prerequisite: PD 510/EN 510 or concurrent registration. Credit not allowed for both PD 511 and EN 511. Detailed studies of insect-plant interactions.

***PD 543/EN 543 03(3-0-0)**
International Crop Protection.
S. Prerequisite: Crop protection course and/or written consent of instructors. Credit not allowed for both PD 543 and EN 543. Insects. disease, and weed management strategies for developing countries. Emphasizes appropriate control measures for limited resource farmers.

***PD 550 02(2-0-0)**
Phytobacteriology.
F. Prerequisite: MB 300. PD 361. Plant pathogenic bacteria and bacterial di seases including pathogen biology. disease development and control.

PD 556/EN 556 03(3-0-0)
Biological Control of Plant Pests.
F. Prerequisite: Ten credits of biology. Credit not allowed for both PD 556 and EN 556. Management of insect pests of plants. plant pathogens, and weeds using biological control agents such as insects. bacteria. viruses. and fungi.

°PD 561 02(2-0-0).
Plant Hematology.

F. Prerequisite: PD 361. Nematodes causing plant disease including anatomical. morphological. and physiological characteristics; taxonomic status; disease causation; control.

PD 56:2 03(0-9-0)
Field Study of Plant Diseases.
F. SS. Prerequisite: PD 361. Field and laboratory study of local plant diseases.

°PD 563 03(3-0-0)
Genetics of Plant Parasitism.
S. Prerequisite: AG 330. B 333. PD 361. Mechanisms of plant pathogen variation. genetics of host-parasite interactions. host resistance in disease control.

°PD 565 03(2-2-0)
Advanced Forest and Shade Tree Pathology.
S. Prerequisite: PD 361. Current concepts and research methods related to biology and prevention of forest and shade tree disease and forest declines.

PD 568 02(2-0-0)
Plant Virology.
S. Prerequisite: PD 361. Plant viruses and plant virus diseases emphasizing virus as a pathogen.

PD 569 02(0-1-0)
Plant Virology Laboratory.
S. Prerequisite: PD 361. Purification. isolation. and characterization of plant viruses.

°PD 661 03(3-0-0)
Epidemiology of Plant Disease.
S. Prerequisite: PD 361. Interactions of host. pathogen. and environmental factors affecting plant disease development.

***PD 663 03(3-0-0)**
Physiology of Parasitism.
S. Prerequisite: B 440. PD 361. Plant disease development: host-parasite interactions, host metabolic responses. defense mechanisms.

PD 684 Var.
Supervised College Teaching.
F, S.

PD 695 Var (1-3)
Independent Study.

PD 696 Var. (1-3)
Group Study.
Maximum of 7 credits allowed in course.

PD 698 Var.
Research.

PD 699 Var.
Thesis.

PD 710/CM 710 03(0-4-0
Techniques in Molecular Biology and Genetics.
S. Prerequisite: AG 330 or B 350/Z 350 or BC 463 or MB 450 or Z 346. Credit not allowed for both PD 710 and CM 710. Genetic manipulation of bacteria. bacteriophage. and yeast including experiments in molecular cloning and gene expression.

PD 740/AG 740 03(3-0-0).
Plant Molecular Genetics.
F. Prerequisite: AG 330. BC 351. Credit not allowed fur both PD 740 and AG 740. Advances in study of organization and function of nuclear and organellar genomes. gene expression in higher plants. and plant-microbe interactions.

PD 792 01 (0-0-1)
Seminar.

PD 795 Var (1-3).
Independent Study.

PD 798 Var.
Research.

PD 799 Var.
Dissertation.

PHYSICS COURSES

Physics Department College of Natural Sciences

PH 110 03(3-0-0)
Descriptive Physics.
F. S S. Credit not allowed for both PHI 10 and PH 121. Conceptual aspects of physics applied to phenomena in everyday file and to problems in other fields of science.

PH 121 0513-2-1)
General Physics 1.
F. S S. Corequisite: M 125. Credit not allowed for both PH 121 and PH 110; or for both PH 121 and PH 141. Concepts of force. torque. energy. momentum, work used to cover fluids. waves. sound. temperature. heat; biological. physical examples (noncalculus).

PH 122 05(3-2-0
General Physics II.
S. Prerequisite: PH 121. Credit not allowed for both PH 122 and PH 142. Electricity including electrostatics and simple circuits; magnetism; optics; nuclear physics; radiation; biological. physical examples (noncalculus).

PH 141 05(3-2-1)
Physics for Scientists and Engineers I.
F.S. SS. Prerequisite: M 126; M 155 or M 160. Students who have had high school physics may enroll in M 155 or M 160 concurrently. Credit not allowed/'or both PH 141 and PH 121.
Forces. energy. momentum. angular momentum. oscillations. waves. heat. thermodynamics (calculus based).

PH 142 05(3-2-1)
Physics for Scientists and Engineers II.
F.S. Prerequisite: PH 141. concurrent registration in M 161 or M 255. Credit not allowed for both PH 142 and PH 122. Electricity and magnetism. circuits. light. optics (calculus based).

PH 160 03.
Basic Physics and Physical Worldview.
F.S. SS. Prerequisite: High school algebra or M 121. M 126. Offered as telecourse only.
Physics. cultural and historical background of physical thought. humans' relationship to physical world.

PH 245 04(3-3-0)
Introduction to Electronics.
F. Prerequisite: PH 142. M 161. AC circuits. physical bases and applications of electronic devices.

PH 298 Var. (1-6)
Introductory Research.

PH 314 04(4-0-0)
Introduction to Modern Physics.
S. Prerequisite: PH 142. concurrent registration in M 261. Relativity; quantum mechanics; atomic structure; applications to solid-state. nuclear. and elementary particle physics.

PH 315 02(0-4-0)
Modern Physics Laboratory.
S. Corequisite: PH 314. Experiments in modern physics.

PH 325 02(0-4-0)
Advanced Physics Laboratory.
S. Prerequisite: PH 315. concurrent registration in JT 300. Advanced experiments in electricity and magnetism. statistical physics and quantum mechanics.

PH 341 04(4-0-0)
Mechanics.

F. Prerequisite: PH 141, M 340. Particle dynamics. translation and rotation of rigid bodies. moving coordinate systems, Lagrangian mechanics. matrix and tensor methods.

PH 35104(4-0-0)
Electricity and Magnetism.
S. Prerequisite: M 340. PH 142. Electrostatics. magnetostatics. currents, time-dependent electric and magnetic fields, radiation.

PH 353 04(3-3-0)
Optics and Waves.
F. Prerequisite: M 261, PH 142. Geometrical optics; wave optics; interference. diffraction. and polarization; quantum optics.

PH 361 03(3-0-0)
Physical Thermodynamics.
S. Prerequisite: PH 142, M 261. Laws of thermodynamics; thermodynamic potentials; applications such as fluids, phase transitions. electrical and magnetic systems, binary mixtures.

PH 304 Var (1-5)
Supervised College Teaching.
F, S, SS, Prerequisite: PH 121 or PH 141, written consent of department head. Maximum of 10 credits allowed in course. Participation as a physics tutor.

PH 393 01(0-0-0
Seminar-Flying Circus of Physics.
F. Prerequisite: PH 122. Discussion of topics from everyday life.

PH 431 03(3-0-0)
Introductory Solid State Physics.
S. Prerequisite: PH 314. PH 361, Crystals, bonding. phonons. energy hands, semiconductors, optical properties, superconductivity, dielectric and magnetic properties, defects and dislocations.

PH 451 03(3-0-0)
Introductory Quantum Mechanics I.
F. Prerequisite: PH 314, M 340. Schrodinger's theory of wave mechanics, potential wells, harmonic oscillators, wave packets. operators, angular momentum.

PH 452 03(3-0-0)
Introductory Quantum Mechanics II.
S. Prerequisite: PH 451. Approximation techniques, perturbation theory. identical particles and spin, structure and spectra of atoms and molecules. hydrogen atom.

PH 462 03(3-0-0)
Statistical Physics.
F. Prerequisite: M 340, PH 314, PH 361. Maxwell-Boltzmann. Fermi-Dirac. and Bose-Einstein distribution functions; kinetic theory; applications to solids. metals, semiconductors, and gases,

PH 492 01(0-0-0
Seminar.
S. Preparation and presentation of seminars on selected modern topics.

PH 495 Var (1-6)
Independent Study.

PH 498 Var (1-6)
Research.

PH 521 03(3-0-0)
Introduction to Lasers.
S. Prerequisite: M 340. PH 314 or C 477, Stimulated emission; laser resonators; theory of laser oscillation; specific laser systems; applications.

PH 522 01(0-2-0)
Introductory Laser Laboratory.

S. Corequisite: PH 521, Experiments providing hands-on experiences with lasers.

PH 561 03(3-0-0)
Particle Physics.
F. Prerequisite: PH 314. Quark model, standard model, and scattering models. Physics of e+, e', and hadron colliders.

PH 571 0:3(3-0-0)
Methods of Mathematical Physics I.
F. Prerequisite: M 340. Application of vector and tensor analysis, complex variables. calculus of residues, matrices. infinite series, numerical methods to physical problems.

PH 572 03(3-0-0)
Methods of Mathematical Physics II.
S. Prerequisite: PH 571. Applications of partial differential equations, orthogonal functions, calculus of variations, Green's functions, integral transforms to physical problems.

PH 576/C 576 03(3-0-0)
Statistical Mechanics.
S. Prerequisite: PH 451, PH 462; or C 475. C 477. Credit not allowed for both PH 576 and C 576. Principles of statistical mechanics, applications to chemical and physical problems.

PH 62104(4-0-0)
Classical Mechanics.
F. Prerequisite:PH 341. Lagrangian and Hamiltonian mechanics, symmetry principles. central forces, canonical transformations, small oscillations, and continuous media.

PH 631 03(3-0-0)
Solid State Physics.
S. Prerequisite: PH 431, PH 451, Electronic band structure and conduction phenomena; cohesive energy; lattice dynamics and thermal properties; metals; insulators; semiconductors,

PH 641 03 (3-0-0)
Electromagnetic Theory I.
F. Prerequisite: PH 351, PH 572. Electrostatics; magnetostatics; time-varying fields; macroscopic theory; wave propagation; simple radiating systems.

PH 641 03(3-0-0)
Electromagnetic Theory II.
S, Prerequisite: PH 641. Wave guides; special relativity; radiation systems; interaction of radiation with matter; advanced topics.

PH 651 03 (3-0-0)
Quantum Mechanics I.
F. Prerequisite: PH 452. Basic concepts; Schrodinger equation and its application to simple systems; scattering theory; transformation theory; spin and angular momentum.

PH 652 03(3-0-0)
Quantum Mechanics II.
S. Prerequisite: PH 651. Symmetry properties; identical particles, atomic and molecular spectra; perturbation and variational methods, photons and matter, Dirac's equation.

PH 672/EE 672 03(3-0-0)
Principles of Semiconductors.
S. Prerequisite: PH 431 or EE 471. Credit not allowed for both PH 672 and EE 672. Electronic properties of semiconductors: band structure, statistics, transport properties. photoelectronic properties. potential barriers, interfaces.

PH 692 01(0-0-0
Seminar.

PH 699 Var.
Thesis.

PH 722 03(3-0-0)
Quantum Electronics.
S. Prerequisite: PH 451 or C 477 or PH 521. One- and two-photon spectroscopy; broadening mechanisms; nonlinear optics; coherent phenomena; experimental methods.

°PH 731 03(3-0-0)
Condensed Mattar Theory.
F. Prerequisite: PH 431, PH 462, PH 652. Second quantization; electrons; phonons; electron-phonon inter. action; superconductivity; magnetism; spin waves; density functional methods; symmetry,

°PH 761 03(3-0-0)
General Relativity.
S. Prerequisite: PH 641. Special relativity, gravitation, cosmology, astrophysical applications,

PH 770 03(3-0-0)
Quantum Theory.
F. Prerequisite: PH 652. Formal scattering theory; relativistic quantum mechanics, quantum theory of radiation, symmetries and statistics, many-body theory.

PH 704 Var (1-5).
Supervised College Teaching.
Supervised teaching of general physics laboratory and recitation sections.

PH 793A-D Var (1 -S)
Seminar.
Prerequisite: Written consent of instructor. A) Condensed matter physics. B) Laser spectroscopy/quantum electronics. C) Statistical mechanics. D) Mathematical physics.

PH 795 Var. (1-6)
Independent Study.

PH 799 Var.
Dissertation.

PHILOSOPHY COURSES

Philosophy Department College of Liberal Arts'

PL 100 03(3-0-0)
Appreciation of Philosophy.
F. S, SS. For students who expect to take only one course in philosophy. Basic problems and issues in philosophical thought.

PL 101 03.
Practical Thinking.
S. Credit not allowed for both PL 101 and PL 110. Offered as correspondence course only. Analyzing and judging passages of argument; identifying tacit assumptions; recognizing necessary/sufficient conditions.

PL 105 03(3-0-0)
Introduction to Philosophy.
F, S. Major philosophical issues from differing perspectives; their beating upon education, science, religion, an, personal conduct. social policy.

PL 106 03(3-0-0)
Wisdom of the East-Oriental Philosophy.
F, S. Major philosophical issues and world views of the orient.

PL 110 03(3-0-0)
Logic and Critical Thinking.
F, S, SS. Credit not allowed for both PL 110 and PL 101. Reasoning principles and techniques for critical analysis and evaluation of thought and discourse.

PL 112 03(3-0-0)
Reasoning and Problem Solving.
F. Creative and critical techniques in problem solving and decision making.

PL 120 03(3-0-0)
History and Philosophy of Scientific Thought.
F,S, SS. Philosophical issues in history of scientific theories.

PL 170 03(3-0-0)
Understanding Religion.
F, S. Contemporary religion, its nature. types, forms of expression.

PL 171 03(3-0-0)
Religions of the West.
F, S. Major religions of the Near East and West emphasizing their classical development; Judaism, Zoroastrianism, Christianity, Islam.

PL 17:1 03(3-0-0)
Religions of the East.
F, S. Major religions of India and the Far East emphasizing their classical development; Hinduism, Buddhism, Confucianism, Taoism.

PL 204 03.
Ethics in America.
F. S, SS. Offered as telecourse only. Ethical problems in contemporary society.

PL 205 03(3-0-0)
Introduction to Ethics.
F, S. Problems and theories concerning values and standards, right action, and the good life.

PL 206 03(3-0-0)
Knowledge and Existence-An Introduction.
F,S. Problems and theories concerning knowledge, being, nature of the world.

PL 210 03(3-0-0)
Introduction to Formal Logic.
F, S. Elementary principles. techniques in propositional and predicate logic.

PL 250 03(3-0-0)
Philosophy of Sex and Gender.
F. Conceptual and moral issues related 10 sex and gender; related social institutions of marriage and family.

PL 272 03(3-0-0)
Meaning and Truth in Religions Belief.
S. Nature of religious knowing and verification; concepts of creation, history, myth. incarnation, atonement; interrelations with philosophy.

PL 295 Var. (1-3)
Independent Study.

PL 297 Var (1-3)
Group Study.

PL 300 03(3-0-0)
History of Philosophy I.
F**.** Prerequisite: PL 105 or PL 205 or PL 206 or any upper-division course in philosophy. Philosophy of classical Western world emphasizing Plato and Aristotle.

PL 30103(3-0-0)
History of Philosophy II.
S. Prerequisite: PL 105 or PL 205 or PL 206 or any upper-division course in philosophy. Philosophy from the scientific revolution through Kant.

°PL 302 03(3-0-0)
19th-Century Philosophy.
F. Prerequisite: PL 206 or PL 300 or PL 301. Major figures, movements. concepts in Europe and America from about 1800 to early 20th century.

PL 305A-F 03(3-0-0)
Philosophical Issues in the Professions.
Philosophical problems, theories relevant to specific professions. A) Business ethics.
F.S. B) Medical-life science. F, S. *C) Caring professions. S. D) Engineering.
F. S, SS. E) Animal science. F. F) Information science. F,

S. PL 309 03(3-0-0)
Ideas in Oriental Art and Literature.
F. Prevalent philosophical ideas in the Chinese-Indian and Japanese-Korean art. literature selected from representative classics and modern works.

°PL 315 03(3-0-0)
Philosophy of Language.
S. Prerequisite: PL 105 or PL 205 or PL 206 or PL 210 or any upper-division course in philosophy. Basic concepts and principles in the theory of language.

PL 318 03(3-0-0)
Aesthetics-Visual Arts.
F, S. Central. traditional. and contemporary theories of the nature of visual arts.

PL 325 03(34-0)
Philosophy of Natural Science.
F. Prerequisite: PL 210. one course in natural sciences. Structure of theories; basic concepts and assumptions; methods of explanation and confirmation; emphasis varies between physical and life sciences.

PL 327 03(3-0-0)
Philosophy of Behavioral Sciences.

S. Pre-requisite: PL 105 or PL 120 or PL 205 or PL 206 or PL 210 or any upper-division course in philosophy. Structure of theories; basic concepts; explanation and confirmation; reductionism and values; emphasis varies between psychology and social sciences.

PL 345 03(3-0-0)
Environmental Ethics.
F. Scientific, philosophical, and religious concepts of nature as they bear on human conduct; an ecological perspective.

°PL 348 03(3-0-0)
Philosophy of Literature and the Arts.
F. Aesthetic and philosophical issues in literature and the ans.

PL 349 03(3-0-0)
Philosophy of Tao and Zen.
S. Philosophical view of China and Japan.

PL 350 03(3-0-0)
Social and Political Philosophy.
F, S. Prerequisite: PL 105 or PL 205 or PL 206 or PL 250 or any upper-division course in philosophy. Moral relationships between persons and institutions.

PL 351 03(3-0-0)
Interpreting the New Testament.
S. Contemporary methods of New Testament interpretation. May be repeated for credit with consent of department chair.

°PL 352 03(3-0-0)
Philosophy of History.
F. Prerequisite: PL 105 or PL 205 or PL 206 or any upper-division course in philosophy. Conceptions of human existence in its historical, social, cultural dimensions.

***PL 355 03(3-0-0)**
Philosophy of Religion.
F. Prerequisite: PL 105 or PL 205 or PL 206 or any upper-division course in philosophy. Philosophical analysis of .nature of religion and structure of meaning in religious discourse.

°PL 359 03(3-0-0)
Philosophy of Humans.
F. Prerequisite: PL 105 or PL 205 or PL 206 or any upper-division course in philosophy. Contrasting views of role of humans in the universe as drawn from science, literature. philosophy of modern period.

PL 360 03(3-0-0)
Topics in Oriental Philosophy.
S. Examination of major philosophical topics from ethics. socio-political philosophy, metaphysics, aesthetics.

PL 366 03(3-0-0)
Philosophy of Aging.
S. Philosophical problems related to experience of growing old.

PL 369 03(3-0-0)
Mind and Body in Eastern Thought.
S. Investigation of mind-body and mental activity in eastern tradition.

PL 370 03(3-0-0)
Contemporary Western Religious Thought.
F. Prerequisite: PL 170 or PL 171 or PL 172 or PL 272. Contemporary interpretations of significant Western religious traditions.

°PL 371 03(3-0-0)
Contemporary Eastern Religious Thought.
S. Transformation of Indian and Chinese religious thought in the modern period.

PL 375 03(3-0-0)
Science and Religion.
S. Encounter of religious belief with Western science, influences on each other, present relations.

PL 379 03(3-0-0)
Mysticism East and West.
F. Prerequisite: PL 170 or PL 171 or PL 172 or PL 272. Varieties of mystical experience in selected Eastern and Western representatives.

PL 384 Var (1-5)
Supervised College Teaching.
F, S. Maximum of 10 credits allowed in course. Teaching basic philosophy courses.

PL 407 03(3-0-0)
Phenomenology and Existentialism.
F. Prerequisite: PL 205 or PL 206 or PL 300 or PL 301. Methods, epistemology. metaphysics, axiology, ethics of 20th-century phenomenologists and existentialists.

PL 409 03(3-0-0)
20th-Century Philosophy.
S. Prerequisite: PL 300 or PL 301 or PL 3O2 or PL 3I5 or PL 325 or PL 327 or PL 359. Major trends in 20th-century philosophy: Marxism, analytic philosophy, process philosophy. phenomenology and existentialism.

PL 410 03(3-0-0)
Formal Logic.
F.S. Prerequisite:CS 155 or PL 210. Quantification theory; axiomatic systems; rigorous axiomatization of some logical or mathematical theory.

PL 415 03(3-0-0)
Logic and Scientific Method.
F, S. Approaches to analysis, assessment of scientific inference, problems of induction; applications to natural, behavioral, social sciences.

PL 425 03(3-0-0)
Epistemology.
S. Prerequisite: PL 300 or PL 301 or PL 302 or PL 315 or PL 325 or PL 327 or PL 359. Conceptual analysis of major epistemological problems and arguments.

***PL 435 03(3-0-0)**
Metaphysics.
F. Prerequisite: PL 300 or PL 301 or PL 302 or PL 315 or PL 325 or PL 327 or PL 359. Systematic approach to problems concerning nature, structure, basic constituents of reality.

°PL 438 03(3-0-0)
Philosophy of Mind.
S. Prerequisite: PL 300 or PL 301 or PL 302 or PL 315 or PL 325 or PL 327 or PL 359. Nature and status of mind. mental states, mental activity; the mind-body problem, mind and human sciences. mind and self, nature of human action.

PL 447 03(3-0-0)
Ethical Theory.
F. Prerequisite: PL 205 or PL 305A or B or C or D or E or F or PL 345 or PL 350. Fundamental problems and options in ethical theory.

PL 451 03(3-0-0)
Topics in Great Philosophers.
F. Prerequisite: PL 300 or PL 301 or PL 302. Thorough examination of one major philosopher's work.

PL 461 03(3-0-0)
Topics in Philosophical Problems.
S. Prerequisite: PL 300 or PL 301 or PL 302. Thorough examination of a major philosophical problem.

PL 462 03(0-0-3)
Seminar.
F, S, SS. Prerequisite: PL 300 or PL 301 or PL 302.

PL 463 03(0-0-3)
Seminar in Religious Studies.
F, S, SS.

PL 479 03(3-0-0)
Comparative Religions-Suffering and Evil.
F. Prerequisite: PL 170 or PL 171 or PL 172; 300-level religious studies course. Comparative study of experiences and concepts of suffering and evil in several world religions.

PL 495 Var. (1-9)
Independent Study.

PL 497 Var (1-9)
Group Study.

PL 499 03(0-0-3)
Thesis.
Prerequisite: Written consent of department head.

PL 501 03(0-0-3)
Seminar in Philosophical Methodology.
F. Nature of philosophical analysis; philosophical methodology; construction and analysis of philosophical arguments.

PL 505 03(0-0-3)
Seminar in Obligations to Future Generations.
S. Prerequisite: Written consent of instructor. Inquiry about basis and nature of moral duties to future generations.

PL 525 03(0-0-3)
Seminar In Epistemology.
F. Prerequisite: PL 425. Analysis of contemporary theories of knowledge.

PL 527 03(0-0-3)
Seminar in Philosophy of Science.
S. Prerequisite: PL 325 or PL 327 or PL 415. Systematic survey of major 20th-century philosophies of science.

°PL 545 03(3-0-0)
Concept of Natural Value.
S. Prerequisite: PL 345. Philosophical analysis of nature as a value carrier. Types of value associated with nature, their interrelations.

PL 547 03(0-0-3).
Seminar in Ethical Theory.
S. Prerequisite: PL 447. Systematic and historical overview of 20th-century theories of metaethics.

PL 550/IE 550 ***03(3-0-0)***
Ethics and International Development.
F. Prerequisite: Written consent of instructor. Credit not allowed for both PL 550 and IE 550. Ethical reflection applied to development goals, strategies of Third World countries; relations between developed and developing countries.

***PL 555 03(0-0-3)**
Seminar in Philosophical Models of Nature.
F. Prerequisite: Written consent of instructor. Comparative inquiry into the "nature" of nature as viewed by philosophers of the past and present.

PL 562 03(0-0-3)
Seminar in Philosophical Problems.

F, S, SS.

°PL 564 03(0-0-3)
Seminar In Animal Rights.
S. Prerequisite: Written consent of instructor. Contemporary issues concerning nature and moral status of nonhuman animals.

°PL 565 03(0-0-3)
Seminar in Environmental Philosophy.
F. Prerequisite: PL 345. Aesthetic appreciation of nature. duties concerning fauna. Flora, endangered species. ecosystem.

***PL 566 03(0-0-3)**
Seminar in Applied Philosophy.
S. Prerequisite: Written consent of instructor. Application of philosophical ideas and methods to analyze practical problems such as distributive justice. abortion, human rights conflicts.

PL 593 03(0-0-3)
Seminar.

PL 662 03(0-0-3)
Seminar.
F, S, SS.

PL 684 Var (1-5)
Supervised College Teaching.
F, S.

PL 695 Var (1-9)
Independent Study.

PL 697 Var (1-9).
Group Study.

PL 699 Var (1-9)
Thesis.

POLITICAL SCIENCE COURSES

Political Science Department College of Liberal Arts

PO 101 03(3-0-0)
American Government and Politics.
F, S, SS. Principles, structures, and processes of American national government.

PO 103 03(3-0-0)
State and Local Government and Politics.
F.S, SS. Principles, organization, and operation of American state and local government.

PO 131 03(3-0-0)
Current World Problems.
F. S, SS. Background and nature of international political events.

PO 232 03(3-0-0)
International Relations.
F, S, SS. Basic concepts and approaches in international relations.

PO 241 03(3-0-0)
Comparative Government and Politics.
F. S. SS. Major foreign political systems stressing cross-national comparison of political forces. parties. ideologies, and institutions.

PO 301 03(3-0-0)
Political Parties and Interest Groups.
F. Prerequisite: PO 101. Institutional and behavioral features of American political parties and interest groups.

PO 304 03(3-0-0)
Legislative Politics.
F, S. Prerequisite: PO 101. Structure, organization, behavior. processes. and policy implications of U.S. legislatures.

PO 305 03(3-0-0)
Judicial Politics.
F. Prerequisite: PO 101. Allocation of powers among judicial structures in American federal system.

PO 306 03(3-0-0)
Executive Politics.
Structure, organization, behavior. processes. and policy implications of U.S. executive leadership.'

PO 309 03(3-0-0)
Urban Politics.
F.S. Prerequisite: PO 103. Governmental structures and political processes in urban government.

PO 320 03(3-0-0)
Empirical Political Analysis.
F.S. Corequisite: PO 321. Methods of empirical political inquiry.

PO 321 01(0-2-0)
Empirical Political Analysis Laboratory.
F, S. Corequisite: PO 320. Laboratory applications of empirical research methods.

***PO 33103(3-0-0)**
Politics and Society Along Mexican Border.
F. Analysis of U.S.-Mexican relations and domestic politics as these affect regional characteristics and development of U.S.-Mexican border region.

PO 341 03(3-0-0)
Comparative Parliamentary Systems.

F. Prerequisite: PO 241. Institutions, processes. and issues associated with parliamentary government in such states as Britain, France. West Germany, Japan, and India.

PO 345 03(3-0-0)
Comparative Socialist Systems.
S. Prerequisite: PO 241. Political institutions and processes in socialist and formerly socialist states.

PO 35103(3-0-0)
Public Administration.
F, S. SS. Prerequisite: PO 101. Government organization and management; decision processes; political and intergovernmental relations in administration.

PO 361 03(3-0-0)
Politics and Natural Resources.
F, S, SS. Prerequisite: PO 101. Special fee, $20. Decision making in American polity and processes for aggregating public preferences into viable natural resource policies.

PO 371 03(3-0-0)
U.S. **Space Policy.**
F. Analysis of U.S. space politics, space law, and space policy making.

PO 410 03(3-0-0)
American Constitutional Law.
F. Prerequisite: PO 101. Allocation of powers among structures in American federal system.

PO 412/HC 412 03(3-0-0)
Civil Rights in America.
S. SS. Credit not allowed for both PO 412 and HC 412. Legal precepts and principles which discriminate by sex and race; relevant recent judicial and legislative actions.

PO 413 03(3-0-0)
Civil Liberties in America.
S. Prerequisite: PO 101. Constitutional doctrine related to first amendment freedoms and protections for criminally accused and economic liberties in American legal system.

PO 420 03(3-0-0)
Western Political Theory.
F. Origin, nature. and function of Western political theories.

PO 421 03(3-0-0)
Modern Political Theories.
S. Prerequisite: PO 420. Major political theories and ideologies of modern times.

PO 423 03(3-0-0)
American Political Theories.
S. Prerequisite: PO 101. Major American theories and ideologies: their development and present uses.

PO 431 03(3-0-0)
International Law.
F, S. Prerequisite: PO 232. Rules and obligations for conduct of relations among states and other international entities.

PO 433 03(3-0-0)
International Organization.
F, S. Prerequisite: PO 232. History, development, structure, process, and activity of selected public international organizations.

PO 435 03(3-0-0)
United States Foreign Policy.
F, S, SS. Prerequisite: PO 232. Institutions, responsibilities. processes, and issues in formulation and execution of U.S.
Foreign policy.

PO 437 03(3-0-0)
American Security Policy.
F.S. Formulation and execution of U.S. security policy.

PO 444 03(3-0-0)
Comparative African Politics.
S, SS. Prerequisite: F(3 241. African political systems focusing on precolonial. colonial influences; rise of nationalism; approaches to new political order; influences of development.

PO 445 03(3-0-0)
Comparative Asian Politics.
F. SS. Prerequisite: PO 241. East and South Asian political systems emphasizing issues of development. political culture, and institutional change.

PO 446 03(3-04))
Comparative Latin American Politics.
F.S. Prerequisite: PO 241. Latin American political systems concentrating on political institutions. actors. policy development. and contemporary processes of political change.

PO 460 03(3-0-0)
Public Policy Process.
F. S. Prerequisite: PO 101. Explanations of policy formation. implementation. and impact.

PO 486A-B.
Practicum.
+A) Legislative politics 06(0-8-2) Special fee. $150. B) Government Var (1-6)

PO 495 Var.
Independent Study.

PO 500 03(3-0-0)
Governmental Politics in the U.S.
F, S. Prerequisite: Three upper-division credits in American politics with grade of B or better. Selected primary source materials on performance of government officials and institutions at federal. state. and local levels.

PO 501 03(3-0-0)
Citizen Politics in the U.S .K
S. Prerequisite: Three upper-division credits in American politics with grade of B or better. Selected primary source materials on behavior of individuals and groups in American politics.

PC 520 03(3-0-1).
Theories of Political Action.
F, S. Prerequisite: PO *420* or PO 421 or written consent of instructor. Intensive review of primary material on Western political thought.

PO 530 03(3-0-0)
International Relations.
K S. Prerequisite: Nine credits in international relations or related studies. Theory and methodology utilized in different approaches to international relations.

PO 531 03(3-0-0)
Policy Making. Diplomacy. and World Politics.
KS. Prerequisite: Three upper-division credits in international relations with grade of B or better. Theories of policy making and bargaining in international politics as applied to different countries. organizations. and historical periods.

PO 540 03(3-0-0)
Comparative Politics.
F.S. Prerequisite: Three upper-division credits in comparative politics with grade of B or better. Theories. methods. and approaches to study of comparative politics.

PO 541 03(3-0-1))
Political Economy of Change and Development.

F. S. Prerequisite: Three upper-division credits in comparative politics with grade of B or better. Responses of the state and its institutions to political, economic. and social change.

PO 550 113(3-0-0)
Advanced Public Administration.
FS. Prerequisite: PO 351. written consent of instructor. Overview of study of public administration; recent developments in theory and practice.

PC 552A-C 03(3-0-0)
Topics in Public Administration.
KS. Prerequisite: PO 351 and GPA of 3.00 or better. A) Personnel. B) Budgeting and finance. C) Regulation.

PO 555 03(3-0-0)
Administrative Law in American Politics.
F. S. Prerequisite: PO 305 or PC 351 or PO 410 or PO 413. Regulation. adjudication. and implementation of statutes by government agencies as limited by U.S. Constitution.

PO 620 03(3-0-0)
Approaches to the Study of Politics.
F. Prerequisite: Fifteen credits in political science.

PO 625 03(3-0-0)
Quantitative Methods of Political Research.
S. Prerequisite: PO 320. Quantitative approaches and methods for study of political life.

PO 626 01(0-2-0)
Political Research Laboratory.
S. Prerequisite: PO 321. concurrent registration in PO 625.

PO 652 03(0-0-3)
Public Organization Theory.
F. Prerequisite: PO 351 or written consent of instructor.
Theories of behavior of individuals and organizations in government bureaucracies.

PO 660 03(3-0-0).
Advanced Policy Analysis.
S. Prerequisite: PO 625. PO 626 or concurrent registration. Recent developments in methods and models of policy analysis.

PC 670 03(3-0-0).
Politics of Growth and the Environment.
F. Prerequisite: Written consent of instructor. Domestic. international. and comparative dimensions of environment and natural resource politics and policy.

PO 695 Var.
Independent Study.

PO 699 Var.
Thesis.

PO 709 03(3-0-0)
Environmental Politics in the U.S.
F.S. Prerequisite: PO 500 or PO 501; PO 670. Selected primary materials on governmental performance. groups. and mass public in American environmental politics.

PO 739 03(3-0-0)
International Environmental Politics.
F.*S.* Prerequisite: PO 530. PO 670. Theories and methodologies used in analyzing international environmental politics and policy.

PO 749 03(3-0-0)
Comparative Environmental Politics.

F.S. Prerequisite: PO 670; PO 540 or PO 541. Application of comparative political theory. to analysis of environmental politics.

PO 759 03(3-0-0)
Environmental Policy and Administration.
F.S. Prerequisite: PC 670. Effects of regulation. intergovernmental relations, and resource availability on federal environmental programs in U.S.

PO 792 03(0-0-3)
Seminar in Environmental Politics and Policy.
F.S. Prerequisite: PO 709 and PO 759 or PO 739 and PO 749; concurrent registration in PC 795.

PC 795 Var.
Independent Study.

PO 799 Var.
Dissertation.

PHYSIOLOGY COURSES

Physiology Department College of Veterinary Medicine and Biomedical Sciences

PS 120 02(2-0-0).
Human Health and Disease.
F, S. Function of the human body in health and disease.

PS 122 02(2-0-0)
Drugs and the Human Body.
F.S. For non-science majors. Drugs effect on body functions; implications of drug usage in society.

PS 124 02(2-0-0).
Sexuality and Health.
F, S. Basic concepts of reproduction. contraception. pregnancy, abortion. and venereal disease; their relationship to health.

PS 230I AY 230 05(3-4-0).
Animal Anatomy and Physiology.
F. Prerequisite: BY 102. C 107. Credit not allowed for both PS 230 and AY 230. Comparative systemic anatomy and physiology of farm animals.

PS 300I AY 300 04(4-0-0)
Principles of Human Anatomy and Physiology.
F.S. SS. Prerequisite: C 103 or C 107 or C 111; BY 102 or Z 1 el or Z 110. Credit not allowed for both PS 300 and AY 300. Anatomy and physiology of mammalian systems with emphasis on humans.

PS 302 02(0-3-1)
Laboratory *in* Principles of Physiology.
F, S. Prerequisite: AY 300/PS 300 or PS 310/Z 310 or concurrent registration. Basic physiology lab exercises.

PS 310/Z 310 03(3-0-0)
Fundamentals of Physiology.
F. Prerequisite: One semester of organic chemistry or concurrent regis-trafion. Credit not allowed for both PS 310 and Z 310. Basic physiological mechanisms.

PS 410 03(3-0-0)
Physiological Responses to the Environment
S. Prerequisite: AY 300/PS 300. Acute and chronic physiological responses to various environmental factors.

PS 420 03(3-0-0)
Cardiopulmonary Physiology.
F. Prerequisite: AY 300/PS 300. Normal and pathophysiology of cardiovascular and pulmonary systems.

PS 430 03(3-0-0)
Endocrinology.
F. Prerequisite: AY 300/PS 300. Physiology of the glands of internal secretion.

***PS 432 02(2-0-0)**
Theory and Practice of Radioimmunoassay.
F. Prerequisite: AY 300/PS 300. Radioimmunological assay of chemical substances.

PS 450 03(3-0-0)
Pharmacology.
S. Prerequisite: AY 300/PS 300 or PS 310/Z 310 or written consent of instructor.
Pharmacologic principles, absorption. distribution. metabolism. excretion. side effects. and actions of drags.

***PS 455 03(2-3-0)**

Principles of Biomedical Ultrasound.
S. Prerequisite: AY 300/PS 300. Principles of ultrasonic theory and practice currently used in medical and biological ultrasound.

°PS 475 04(2-4-0)
Biomedical Instrumentation.
F, Prerequisite: M 155 or M 160. Principles and applications of biomedical instrumentation.
PS 495 Var. Independent Study.

PS 500 04(4-0-0)
Mammalian Physiology I.
F, Prerequisite: Six credits of biological science. Credit not allowed for both PS 500 and NB 501, Nervous, muscular. cardiovascular. and respiratory systems.

PS 501 04(4-0-0)
Mammalian Physiology II.
S. Prerequisite: Six credits of biological science, Renal, digestive, metabolic, endocrine, and reproductive function.

PS 520/AY 820 08(34-0)
Principles of Neural Science.
S. Prerequisite: AY 300/PS 300. Credit not allowed for both PS 520 and AY 520.
Neuroanatomy and neurophysiology.

***PS 616 020-2-0)**
Analog Signal Processing.
S. Prerequisite: M 255. Acquisition and processing of analog data from biological signals.

°PS 620 03(3-0-0)
Cardiovascular Physiology.
S. Prerequisite: PS 500. Physiology and biophysics of the circulatory system.

***PS 625 03(3-0-0)**
Pulmonary Physiology.
S. Prerequisite: PS 420 or PS 500. Structure, function, and pathophysiology of respiratory system.

PS 630 04(3-0-0
Cellular Endocrinology.
S. Prerequisite: PS 501. Physiology; neuroregulatory mechanisms and cellular basis of endocrine function.

°PS 650 03(3-0-0)
Andrology.
S. Prerequisite: PS 501 or written consent of instructor. Physiological principles and management techniques necessary for evaluation of reproductive function and exploitation of a breeding male.

PS 658 04(4-0-0)
Reproductive Physiology of Vertebrates.
F. Prerequisite: Course in endocrinology. Differentiation. gametogenesis, fertilization. embryonic development, reproductive cycles. and behavior; emphasis on mammals.

°PS 660/BC 660 03(3-0-0)
Receptor Biochemistry and Physiology.
S. Prerequisite: PS 500, BC 403; or written consent of instructor. Credit not allowed for both PS 660 and BC 660. Biochemistry and physiology of an array of biological receptors; receptor theory and mathematics; pharmacokinetics; pharmacodynamics.

PS 684 Var.
Supervised College Teaching.
F, S, SS.

PS 699 Var.
Thesis.

***PS 710 03(3-0-0)**
Renal Pathophysiology.
S. Prerequisite: AY 300/PS 300 or PS 501. Urine formation, acid-base balance and reninangiostensin-aldosterone system.

°PS 740 03(3-0-0)
Metabolism.
F. Prerequisite: PS 501. Applied pathophysiology of disorders of carbohydrate, lipid. protein, fluid, and electrolyte metabolism.

°PS 750 02(2-0-0)
Physiology or Ion Channels.
S. Prerequisite: PS 500, written consent of instructor. Physiological and structural analysis of membrane ion channels.

PS 792 Var (1-5)
Seminar.

PS 795A-E Var.
Independent Study.
A) Endocrinology. B) Neurophysiology. C) Cell physiology. D) Cardiopulmonary physiology. E) Reproductive physiology.

PS 796A-C Var.
Group Study.
A) Neurophysiology. B) Cardiopulmonary physiology. C) Reproductive physiology.

PS 799 Var.
Dissertation.

PSYCHOLOGY COURSES

Psychology Department College of Natural Sciences

PY 100 03(3-0-0)
General Psychology.
F. S, SS. Also offered as telecourse. Principles of psychology emphasizing empirical approaches; theories and research on learning, individual differences, perception, social behavior.

PY 121 0(0-0-0)
Health and the Mind.
F, S. Maintenance of positive mental health.

PY 175 HD 175 03.
Developmental Psychology Across the life Span.
F. S, SS. Credit not allowed for both PY 175 and HD 175. Offered as telecourse only.
Theory and research on physical, cognitive, and psychosocial human development across the life span.

PY 228 03(3-0-0)
Psychology of Human Sexuality.
F.S. Physiology, psychology of human sexuality; some reference to animal and cross-cultural data; eroticism, development. values, treatment of dysfunction.

PY 250A-B.
Experimental Psychology.
F, S. SS. Prerequisite: PY 100. Design. analysis. and reporting of psychological research; perception, learning, motivation, psychophysics. magnitude estimation. and signal detection. A) 04(3-2-0) Special fee. $20. B) 04(4-0-0).

PY 26003(34)-0)
Child Psychology.
F.S. SS. Prerequisite: PY 100. Description and explanation of development of human behavior emphasizing theory and research concerned with infant and child.

PY 295 Var (1-3)
Independent Study.
individual investigation of a special topic in psychology under direction of faculty.

PY 296 Var. (1-3)
Group Study.
Collective investigation of a special topic in psychology under direction of faculty.

PY 315 03(3-0-0)
Social Psychology.
F.S. SS. Prerequisite: PY 100. Social psychological theory and research findings emphasizing research methodology; applications to contemporary social problems.

PY 316 03(3-0-0)
Environmental Psychology.
F.S. SS. Prerequisite: PY 100. Also offered as correspondence course. Social psychological theory and research on effects of behavior on the environment; environmental influences on behavior.

PY 317 02(0-4-0)
Social and Environmental Laboratory.
F.S. SS. Prerequisite: PY 250A or B; PY 315 or concurrent registration or PY 316 or concurrent registration. Exercises in social and environmental research methodology and design. including computer simulations and applications to contemporary problems.

PY 320 03(3-0-0)
Abnormal Psychology.

F, S. SS. Prerequisite: PY 100. Also offered as telecourse. Definition and description of behavior pathology; theory and research on factors in etiology and treatment of behavior disorders.

PY 325 03(3-0-0)
Psychology of Personality.
S. Prerequisite: PY 100. Theory and research related to personality as a psychological concept; analytic, phenomenological, and behavioristic views.

PY 327 03(2-0-1)
Psychological Perspectives on Female Experience.
S. Prerequisite: PY 100. Contemporary theory and research focusing on emotional. cognitive biosocial and interpersonal contributions to female identity and sex role.

PY 340 03(3-0-0)
Organizational Psychology.
F. Prerequisite: PY 100. ST 201. concurrent registration in PY 341. Theories and research on interpersonal relations. work group processes. decision making. power. and change strategies within organizations.

PY 341 01(0-2-0)
Organizational Psychology Laboratory.
F. Corequisite: PY 340. Application of organizational psychology through simulations and field involvements.

PY 352 03(3-0-0)
Psychology of Learning.
F.S. SS. Prerequisite: PY 100 or written consent of instructor. Current research and theoretical issues on reinforcement. punishment, extinction. generalization. discrimination learning. transfer. and retention.

PY 353 02(0-4-0)
Psychology of Learning Laboratory.
F.S. Prerequisite: PY 250A or B; PY 352 or concurrent registration. Special fee. $25. Operant techniques emphasizing behavior theory. equipment. animal care. shaping; selected experiments in operant behavior.

PY 370 03(3-0-0)
Psychological Measurement and Testing.
F. S. Prerequisite: PY 100. ST 201. concurrent registration in PY 371. Measurement theory including scale properties. reliability. and validity; construction and evaluation of psychological tests.

PY 371 01(0-2-0)
Psychological Measurement and Testing Laboratory.
F.S. Corequisite: PY 370. Special fee. $5. Exercises and problems in test administration. norming. reliability. validity. and scale construction.

PY 384 Var (1-3)
Supervised College Teaching.
F.S. SS. Prerequisite: PY 100. written consent of department head. Maximum of 10 credits allowed in course. Supervised teaching. training. and discussion leadership in undergraduate courses.

PY 401 03(3-0-0)
History and Systems of Psychology.
F.S. Prerequisite: PY 100. 5 credits in psychology. PL 100 or PL 105 or PL 120. Philosophical and scientific underpinnings of psychology; major historical developments in psychology; schools of psychological thought.

PY 440 03(3-0-0)
Industrial Psychology.
S. Prerequisite: PY 100. ST 201. concurrent registration in PY 441. Problems and procedures in selection and classification of personnel; work motivation; job satisfaction; leadership.

PY 44101 (0-2-0)

Industrial Psychology Laboratory.
S. Corequisite: PY 440. Laboratory and field experiences in job analysis. selection strategies. performance appraisal. and criterion development.

PY 452 03(3-0-0)
Cognitive Psychology.
F.S. Prerequisite: PY 100 or written consent of instructor. Human thinking and information processing as related to attention. pattern recognition memory. totgetting. hypothesis testing, and problem solving.

PY 453 02(0-4-0)
Cognitive Psychology Laboratory.
S. Prerequisite: PY 250A or B; PY 452 or concurrent registration. Exercises in laboratory research in perceptual processes. attention. memory. language. problem solving, and decision making.

PY 454A-B 03.
Physiological Psychology.
F.S. Prerequisite: A) PY 100 or written consent of instructor. B) PY 250 A or B. Neuroanatomical and neurophysiological basis of behavior. relationships among anatomy and physiology and motivation. emotion, learning. memory. and sleep. A) 03(3-0-0) B) 03(2-0-1).

PY 455A-B 02(0-4-0)
Physiological Psychology Laboratory.
F.S. Prerequisite: PY 250A or B; PY 454A or concurrent registration or PY 454B or concurrent registration. Special fee. $50 per subtopic. A) Research techniques in physiological psychology with animal research emphasis; animal care. surgery. brain stimulation and recording. histology. B) Research techniques in physiological psychology with human research emphasis; functional neuro-anatomy (human brains) clinical neuropsychology.

PY 456 03(3-0-0)
Sensation and Perception.
F. Prerequisite: PY 454A or B.
Review of research on physiological substrates of sensation; methods of scaling sensory experience; role of perception in behavioral adaptation.

PY 457 02(0-4-0)
Sensation and Perception Laboratory.
F.S. Prerequisite: PY 250A or B; PY 456 or concurrent registration. Exercises in laboratory research techniques and methodology; independent research on sensory and perceptual processes.

PY 460 03(3-0-0)
Child Exceptionality and Psychopathology.
F.S. SS. Prerequisite: PY 100. Definition and description of child exceptionality and psycho-pathology; theory and research in etiology, educational implications. and treatment.

PY 465 03(3-0-0)
Adolescent Psychology.
F. SS. Prerequisite: PY 100. Contemporary theory and research on adolescence including physiological and psychological changes. social influences.

PY 486 Var (1-3)
Practicum.
Supervised work experience in approved psychological setting with periodic consultation of faculty.

PY 488 Var (1-3)
Field Placement.
F.S. SS. Supervised affiliation with and/or service work in approved psychological setting.
PY 492 Var (1-31. Seminar. Prerequisite: For psychology majors or written consent of instructor. Special topics in psychology; may include psychology of women. psychology of religion. and clinical psychology.

PY 495 Var (1-3)

Independent Study.
Individual investigation of a special topic in psychology under direction of faculty.

PY 496 Var (1-3).
Group Study.
Collective investigation of a special topic in psychology under direction of faculty.

PY 498 Var (1-3).
Research.
Independent research project culminating in formal research paper.

PY 499 Var (1-6).
Thesis.
Independent research project culminating in a thesis presented to a faculty committee.

PY 589A-E 02(2-0-0)
Special Topics In Psychology and Mental Health.
F, S, SS. A) Psychological management of difficult child. B) Psychology of communication patterns. C) Psychology of child abuse and child suicide. D) Psychology of and response to disturbed children. E) Psychology of divorce/loss/learning disturbance.

PY 595 Var.
Independent Study.
Individual investigation of a special topic in psychology under direction of faculty.

PY 596 Var.
Group Study.
Collective investigation of a special topic in psychology under direction of faculty. '

PY 600A-K 03(3-0-0)
Advanced Psychology.
F, S. Prerequisite: 15 credits in psychology. A) PY 401. B) and C) PY 454A or B. D) PY 456. E) PY 352. F) PY 452. G) PY 315. H) PY 260. 0 PY *325.* J) PY 340. K) PY 370. A) History. B) Physiological. C) Neuropsychology. D) Sensation and perception. E) Animal learning. V) Human learning and memory. G) Social. H) Developmental. I) Personality. J) Group and organizational. K) Measurement.

PY 610 03(3-0-0)
Counseling and Clinical Interviewing.
F. Prerequisite: Written consent of instructor. Basic interviewing skills for psychology: accurate observation, conceptualization. and response.

PY 640 03(3-0-0)
Industrial/Organizational Psychology.
F. Prerequisite: PY 340. PY 440. Theories and research on relationships between individuals and organizations.

PY 652 04(3-2-0)
Methods of Research In Psychology I.
F. Prerequisite: ST 201. Psychological research emphasizing hypothesis testing and simple research designs, introducing general linear model approach.

PY 653 04(3-2-0)
Methods of Research In Psychology II.
S. Prerequisite: PY 652. Advanced research designs emphasizing general linear model approach.

PY 655A-C 03(3-0-0)
Research Issues and Models In Psychology.
F. Prerequisite: PY 250A or B. Generation and development of research ideas, evaluating approaches. interpreting and reporting findings. A) Counseling. B) General-experimental. C) Industrial-organizational.

PY 67003(2-3-0)
Interpretation of Psychological Tests-Group.

F Prerequisite: PY 370. Special fee. $5. Construction, administration. and interpretation of objective measures of achievement, mental ability, special aptitude. interest. attitude. personality. Maximum of 12 credits allowed toward graduation for any combination of PY 295. PY 296. PY 384. PY 486, PY 488. PY 495. PY 496. PY 498. PY 499; enrollment limited to one per student per semester.

PY 672 03(2-2-0)
Psychodiagnostics-Intelligence.
S. Prerequisite: PY 610. PY 670. Use of test data to determine cognitive functioning and predict behavior; supervised test administration and interpretation.

PY 686A-D Var.
Practicum.
Prerequisite: PY 610 or PY 692B or PY 692C or PY 692D. ' A) Counseling and diagnosis I. B) Experimental I. C) Industrial-organizational 1. D) School 1.

PY 692A-E Var.
Seminar.
A) Counseling. B) General-experimental. C) Physiological. D) Social. E) Developmental.

PY 699A-C Var.
Thesis.
A) Counseling. B) General-experimental. C) Industrial-organizational.

PY 720 03(3-0-0)
Psychopathology.
F. Prerequisite: PY 320. Adult and child behavior pathology; theory, research. and methods related to etiology. defining characteristics. and maintaining causes.

PY 717 03(3-0-0)
Theories of Vocational Development.
S. SS. Prerequisite: PY 325. Nature and current status of vocational development theory with implications for career counseling.

PY 728A-C 02(2-0-0)
Counseling and Psychotherapy I.
F, S. Prerequisite: PY 720. Basic theories of counseling and psychotherapy. A) Phenomenological. B) Behavioral. C) Analytic.

PY 729 03(3-0-0)
Counseling and Psychotherapy II.
S. Prerequisite: PY 728A. B. and C. Theory and practice of group psychotherapy and counseling.

PY 740 03(3-0-0)
Advanced Industrial Psychology.
S. Prerequisite: PY 640. Theory and methods in job analysis, criteria theory. and criteria development; selection. classification, and utility.

PY 748 03(3-0-0)
Advanced Organizational Psychology.
S. Prerequisite: PY 640. Psychological and social consideration of individuals in organizational settings emphasizing current theories of organizational behavior.

°PY 754 03(3-0-0)
Multivariate Analysis In Behavioral Sciences.
S. Prerequisite: PY 653. Multivariate analysis, including factor and component analysis. applied to psychological research.

PY 784 Var.
Supervised College Teaching.
F.S. Philosophy. approaches. and techniques of college-level instruction: supervised teaching with consultation of faculty.

PY 786A-F Var.
Advanced Practicum.
Prerequisite: PY 686A or B or C or D. A) Counseling and diagnosis II. B) Experimental II. C) Industrial-organizational II. D) School II. E) Clinical. F) Supervision.

PY 787 Var.
Internship.
Supervised work experience under departmental guidelines in approved psychological agency or setting.

PY 792A-F Var.
Advanced Seminar.
Prerequisite: PY 692A or B or C or D or E or F or G.
A) Counseling. B) General-experimental. C) Industrial-organizational. D) Learning. E) Physiological. F) Social.

PY 795 Var.
Independent Study.
Primarily for doctoral candidates in psychology. Individual investigation of a special topic under direction of faculty.

PY 799A-C Var.
Dissertation.
A) Counseling. B) General-experimental. C) Industrial-organizational.

RADIOLOGICAL HEALTH SCIENCES COURSES

Radiological Health Sciences Department College of Veterinary Medicine and Biomedical Sciences

R 300 03(3-0-0)
Introduction to Radiation Biology.
S. Prerequisite: BY 310. Genetic and somatic effects of radiation on cells, tissues, and the whole organism; tumor therapy;carcinogenesis;risks or. benefits of radiation.

R 400 03(2-3-0)
Radioisotope Techniques.
F.S. Prerequisite: C 112, PH 122. Properties of radioactivity and radiations, radiochemistry, radiobiology. dosimetry; use of radiotracers in experiments.

R 455 03(2-2-0)
Interactive Information Processing In Biology.
F. Prerequisite: ST 201. Data management and analysis for biologists via interactive terminals,

R 461 02(2-0-0)
Radiation Public Health.
S. Prerequisite: PH 122. Aspects of public health for students of radiation health: environmental health, occupational health. and public health administration.

R 530 03(3-0-0)
Radiological Physics and Dosimetry I.
F. Prerequisite: PH 122. Theory and detection of ionizing radiation; measurement and calculation of exposure and dose.

R 532 020-3-0)
Nuclear Instruments and Measurements.
F. Prerequisite: R 530 or concurrent registration. Instrument systems for measurement and identification of ionizing radiations.

R 550 05(5-0-0)
Principles of Radiation Biology.
S. Prerequisite: BY 310; R 300 or R 530. Dose-response relationships; physical. chemical. and biological modification of radiation damage; radiation oncology; radiation genetics and oncogenesis.

R 595A-K Var.
Independent Study.
A) Small animal radiology. B) Large animal radiology. C) Special techniques in radiology. D) Radiation therapy. E) Radiation physics. F) Dosimetry. G) Radiation chemistry. H) Radiation biology. 0 Radiological health. J) Radiation ecology. K) Microcomputer analysis.

R 630 02(2-0-0)
Radiological Physics and Dosimetry II.
S. Prerequisite: R 530. Calculations and measurement techniques for dosimetry shielding and protection from ionizing radiations.

R 632 020-3-0)
Techniques In Radiation Dosimetry.
S. Prerequisite: R 630 or concurrent registration. Techniques for determining the absorbed dose in tissue from ionizing radiations.

R 633 01(0-3-0)
Radiation Detection Methods in Radiobiology.
S. Prerequisite: R 630 or concurrent registration. Detection and measurement of ionizing radiation appropriate for radiobiologists.

R 665 03(2-3-0)

Radiochemistry.
F. Prerequisite: C I 14, M 155; R 530 or concurrent registration. Theory and application to physical and biological systems.

+R 670 03(2-3-0)
Radioecology.
S, SS. Prerequisite: R 400 or R 530. Special fee, $35. Environmental radioactivity. radionuclide transport in ecosystems; radiation effects on plant and animal populations.

R 699 Var.
Thesis.

R 701 Var.
Radiographic Technique.
F. S, SS. Prerequisite: VM 786A or B or C or D. Radiographic techniques and special procedures.

R 711 Var.
Radiographic Interpretation.
F, S, SS. Prerequisite: VM 786A or B or C or D. Radiographic interpretation of disease processes of all major systems in large and small animals.

R 721 Var (1-3)
Radiation Oncology.
F. S, SS. Management of spontaneous and experimental tumors with emphasis on radiation therapy.

***R 751 03(3-0-0)**
Advanced Radiation Biology I.
F. Prerequisite: R 550. Molecular and cellular mechanisms of radiation damage and repair; mammalian radiation genetics.

***R 753 03(3-0-0)**
Advanced Radiation Biology II.
S. Prerequisite: R 550. Perturbations in cell cycle and cell population growth kinetics by radiation; radiation effects on normal tissues; radiation oncogenesis.

***R 763 02(2-0-0)**
Radionuclide Kinetics.
S. Prerequisite: R 400 or R 530 and M 255. Modeling and simulation of radionuclide transport in biological and ecological systems.

R 770 01(0-0-0
Radiation Biology Basic to Tumor Therapy.
F, S, SS. Prerequisite: Written consent of instructor. Current aspects of radiation biology pertinent to improvements in radiation therapy.

R 784 Var.
Supervised College Teaching.
F. S,

SS. +R 786 Var.
Practicum.
Prerequisite: R 530. Special fee, $15.

R 792 01(0-0-0
Seminar.

R 795A-M Var.
Independent Study.
A) Small animal radiology. B) Large animal radiology. C) Special techniques in radiology. D) Radiation therapy. E) Radiation physics. F) Dosimetry. G) Radiation chemistry. H) Radiation biology. I) Radiological health. J) Radiation ecology. L) Hyperthermia. M) Space radiation health.

R 796 Var.
Group Study.

R 799 Var.
Dissertation.

RESTAURANT/RESORT MANAGEMENT COURSES

Food Science and Human Nutrition Department Colleges of Agricultural Sciences and Applied Human Sciences

RM 101 03(3-0-0)
Hospitality Industry.
F, S. Food service, lodging, and tourism industries; exploration of various industry segments and career opportunities.

RM 20003(3-0-0)
Resort Operations.
S. Prerequisite: RM 101 or written consent of instructor. Front office and housekeeping management as related to resorts and hotels. Computer application, financial controls, employee and guest relations.

RM 350 03(3-0-0)
Restaurant and Resort Marketing.
F. Prerequisite: RM 101. Restaurant and resort operations marketing, including planning, promotion. and special industry considerations.

RM 415 03(2-2-0)
Catering Techniques and Culinary Arts.
F. Prerequisite: FN 311. Management of advanced techniques in culinary technique; catering of food and beverages for special functions.

RM 492 03(0-0-3)
Seminar on Restaurant and Resort Management.
Prerequisite: RM 350 or written consent of instructor. Applying knowledge of planning. organizing. and controlling in restaurants and resorts.

RECREATION RESOURCES COURSES

Recreation Resources Department College of Natural Resources

+RR 200 03(3-0-0)
Introduction to Recreation Resources.
F. Special fee, $6. Role of recreation and leisure time activities in American society emphasizing suppliers of leisure time opportunities.

RR 320 03(3-0-0)
International Tourism and Recreation.
S. Parks. preserves. historical sites. and tourism in America and other selected countries; historical development and international preservation.

RR 330 03(3-0-0)
Social Aspects of Natural Resource Management.
S. Visitor behavior in recreation environments applied to planning management and interpretive services in outdoor recreation.

RR 350 03(2-2-0)
Wilderness Leadership.
F. Practical and philosophical aspects of wilderness usage including safety. group dynamics. and backcountry skills.

RR 351 03(2-2-0)
Wilderness Instructors.
S. Prerequisite: RR 350 or written consent of instructor. Preparation to safely lead and instruct groups in outdoor wilderness programs; further refine skills including judgement and leadership.

RR 361 03(2-2-0)
Environmental Interpretation.
F. Prerequisite: RR 200. Principles for utilizing interpretation as a tool for managing natural. historical. and cultural resources.

RR 363 03(2-2-0)
Tourism and Recreation Management.
S. Prerequisite: RR 200. Develop administrative and program planning ski Ils for private. public. and nonprofit recreation/tourism organizations.

RR 370 03(2-2-0)
Tourism and Commercial Recreation.
F. Tourism and private commercial outdoor recreation industry in America.

RR 375 03(2-2-0)
Budgeting and Revenue Resources.
F. Prerequisite: RR 200. Budget development. presentation, types. techniques; computer-aided budgeting using spread sheets; revenue generating sources.

RR 376 03(2-2-0)
Recreation Measurements.
F. Prerequisite: NR 220. ST 204. Recreation measurement techniques.

RR 377 020-0-0
Recreation Resources Administration.
S. Prerequisite: RR 200. Concepts. theory. and principles applied to administrative concerns of recreation resources organizations.

RR 431 03(0-6-0)
Park and Protected Area Management.
S. Prerequisite: RR 200. RR 330. Park management practices; preparation of park operation plans.

RR 432 01.
Foundations of Forest Recreation.
F.S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. History. philosophy. role. and sources of information of the Forest Service and National Forest System.

RR 433 04.
Meeting Needs of Recreation Users.
F.S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. Visitor behavior. communications and conflicts. working with volunteers. programs. partnerships. quality service. and role of interpretive services.

RR 434 03.
Recreation Special Uses and Appeals.
ES. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. Special use benefits. authorities. planning. terms and conditions. administration and kinds. appeal review. discretionary review and decisions.

RR 435 03.
Trails. Facility Design. Operation. Maintenance.
F.S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. Trail planning. development. maintenance; recreation site planning. design operation. maintenance; visitor and resource protection.

RR 436 02.
Recreation, Visual, Cultural Resource Management.
F.S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. Economic analysis. recreation opportunity spectrum. visual and cultural resource management.

RR 437 02.
Off-Road Vehicle. River. and Winter Recreation.
F,S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. History. authorities. planning. management. and coordination of off-road. river. and winter recreation.

RR 438 02.
Management of Wilderness.
F.S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. Forest Service role. management principles. legislative differences. components. public education. visitor management. and wilderness management skills.

RR 442 030-4-0)
Tourism Planning.
F. Prerequisite: RR 370. RR 375. Planning for regional tourism resources and programs.

RR 450 03.
Wilderness Philosophy and Ethic Development.
E S. SS. Offered as correspondence course only. History, philosophical origin. ethics. and international context of wilderness; history of conservation movement.

RR 45103.
National Wilderness Preservation System.
F.S. SS. Prerequisite: RR 450. Offered as correspondence course only. Early history and key components of the Wilderness Act. wilderness legislation since 1964. and related natural systems.

RR 452 04.
Management of the Wilderness Resource.
F.S. SS. Prerequisite: RR 451. Offered as correspondence course only. Ecosystem characteristics. basic principles of wilderness management. and management of specific resources and nonconforming uses..

RR 453 03.
Management of Recreation Resources.

F.S. SS. Prerequisite: RR 451. Offered as correspondence course only. Managing for quality visitor experiences and for minimal recreation impacts; techniques for wilderness education/information.

RR 454 03.
Wilderness Management Planning.
F.S. SS. Prerequisite: RR 451. Offered as correspondence course only. Agency differences in planning. basic planning concepts. and the Limits of Acceptable Change.

RR 455 03.
Wilderness Management Skills and Projections.
F, S, SS. Prerequisite: RR 451. Offered as correspondence course only. Using primitive means to achieve management objectives. no-trace camping methods and volunteers, and expectations for the future.

#+RR 461 03(2-2-0)
Interpretation Techniques.
S. Prerequisite: RR 361. Special variable ($25-$40) fee determined by department.
Application of interpretive concepts to communicate natural. historic, and cultural resource values to the public.

RR 470 03(2-2-0)
Tourism Impacts.
S. Prerequisite: RR 370. Social, cultural. physical. and economic impacts of tourism; techniques for assessing impacts.

RR 472 03(3-0-0)
Resort and Concessions Management.
S. Prerequisite: BA 210, BK 300, BN 300. RR 370; or written consent of instructor. Applications of business fundamentals to commercial outdoor recreation enterprises.

RR 486 03(0-9-0)
Recreation Resource and Landscape Practicum.
F. Prerequisite: NR 220. LA 364 or RR 330. On-site (Colorado State Forest) application of recreation landscape and integrated resource management practices.

RR 495A-C Var.
Independent Study.
A) Administration. B) Management. C) Interpretation.

RR 503 02(0-0-2)
Leisure and Recreation Theory.
F. Changing attitudes toward work and leisure and effects on human relationships with natural environment.

RR 504/ER 504 02(2-0-0)
Water-Based Recreation.
S. Prerequisite: Written consent of instructor. Credit not allowed for both RR 504 and ER 504. identify issues and management strategies for recreation utilization of water resources.

+RR 531 030-4-0)
Recreation Resource Management Field Studies.
F. Prerequisite: S 310 or ST 311, and written consent of instructor. Special fee. $21. Application of problem-solving techniques to resolve current recreation management problems.

RR 570 03(0-6-0)
Regional and Community Tourism Development.
S. Prerequisite: RR 370. Analysis of planning principles for improving tourism potential for a selected region.

#+RR 604 02(2-0-0)
Administration of Recreation Arens.
S. Prerequisite: N R 320. Special variable ($50-$ 100) fee determined by department. Case studies of current problems facing public park and recreation area administrators.

RR 605 03(3-0-0)
Recreation Behavior Theory.
F. Prerequisite: RR 330. Application of theories and conceptual approaches from social sciences to study of recreation behavior and natural resource issues.

RR 665 03(2-0-0)
Research Issues Seminar.
F. Prerequisite: RR 503 or concurrent registration. Major current issues and problem areas in management of natural resources for recreation.

RR 670 03(2-2-0)
Research Methods.
S. Prerequisite:ST 301. Design. implementation. and reporting of scientific studies related to the human interlace with natural resources.

RR 692A-B Var.
Seminar.
A) Administration. B) Interpretation.

RR 695A-D Var.
Independent Study.
A) Administration. B) Management. C) Interpretation. D) Landscape planning.

RR 698 Var.
Research.

RR 699 Var.
Thesis.

RR 798 Var.
Research.

RR 799 Var.
Dissertation.

RANGE SCIENCE COURSES

Rangeland Ecosystem Science Department College of Natural Resources

RS 289 020-2-0)
Range-Watershed Survey.
SS. Prerequisite: Written consent of instructor. Offered only through Division of Continuing Education. Field course in integrated natural resource management emphasizing range-watershed management and field measurement techniques.

RS 300 03(3-0-0)
Principles of Range Management.
F, S, SS. Prerequisite: BY 102. BY 103A and B; or B 120. Management principles for private and public rangelands; important plants and rangeland communities.

RS 320/AG 320 04(3-2-0)
Forage and Range Management.
S. Prerequisite: One course in biological sciences. Credit not allowed for both RS 320 and AG 320. Biology and management of introduced and native forage crops including production, preservation, and utilization.

+RS 331 020-3-0)
Range Ecogeography.
F. Prerequisite: B 223 or F 210 or NR 220. Special fee. $5. Production characteristics and ecological niches of important plants and their rangeland communities.

+RS 332 020-3-0)
Range Measurements.
F. Prerequisite: ST 201; NR 220 or RS 331 or concurrent registration. Special fee. $20. Field measurements of abiotic. producers. consumers. and decomposer ecosystem components.

RS 351 03(3-0-0)
Range Plant Production and Decomposition.
F. Prerequisite: AG 240. Biotic and abiotic factors affecting primary production, decomposition. and biogeochemical cycling in rangeland ecosystems.

RS 352 03(3-0-0)
Range Animal-Habitat Interactions.
S. Prerequisite: AN 220 or AN 320; BY 220. Ecosystem function and dynamics of interactions between producers and consumers.

RS 400 02(2-0-0)
Rangeland Improvements.
F. Prerequisite: RS 300 or RS 320/AG 320. Improvement of rangelands through biological and cultural methods; management of improved rangelands.

RS 470 02(2-0-0)
Range Economics and Analysis.
F. Prerequisite: EA 340/EC 340 or EC 306 or F 322. NR 260. RS 300. Economics of range resource use; analytical techniques for allocation of range resources.

RS 472 040-6-0)
Range Ecosystem Planning.
S. Prerequisite: RS 470. Range allotment and ranch planning.

***RS 478 03(3-0-0)**
Restoration Ecology.
F. Prerequisite: AG 240: B 450 or BY 220 or F 311. Analysis of environmental factors influencing restoration ecology and restoration practices to restore disturbed ecosystems.

RS 495 Var.
Independent Study-Rangeland Ecosystem.

RS 496 Var.
Group Study-Rangeland Ecosystem.

RS 501 03(3-0-0)
Range Habitat Manipulation.
F. Prerequisite: RS 300 or RS 320/AG 320. Improvement of range habitats and effects on ecosystem components.

RS 531 03(2-3-0)
World Grassland Ecogeography.
F. Prerequisite: B 223. Distribution. climate. and structure of the world's major grass-lands with emphasis on North America.

+RS 532 03(2-3-0)
Range Ecosystem Sampling.
F. Prerequisite: ST 301. ecology course. Special fee. $20. Measurement. analysis techniques for rangeland vegetation. Applications to management emphasized.

RS 552 04(3-0-0
Range Animal Production and Management.
S. Prerequisite: One course in ecology and one course in animal or wildfire management. Biological and ecological basis for production of meat from rangelands.

RS 570 03(3-0-0)
Economics of Range and Pastoral Management
F. Prerequisite: EC 306 or EA 340/EC 340. RS 300. Analysis of range management decisions in developing countries utilizing economic theory.

°RS 578 03(3-0-0)
Ecology of Disturbed Lands.
F. Prerequisite: AG 240. BY 220. Analysis of basic and applied ecological principles involved in reclamation of drastically disturbed western lands.

RS 630 03(3-0-0)
Ecology of Grasslands and Shrublands.
F. Prerequisite: One course in ecology. Distributions and climatic controls on grassland and shrubland plant communities.

***RS 640 03(3-0-0)**
Vegetation-Environment Analysis.
F. Prerequisite: ST 301. Multivariate analyses and ecological interpretations of vegetation communities.

RS 65104(3-2-0)
Primary. Production and Decomposition.
F. Prerequisite: One course in plant physiology; one course in soils. Energy transformations within primary producer compartment; dissipation of ecosystem biomass by decomposers. mineralization.

RS 652 04(3-2-0)
Secondary Production in Rangeland Ecosystems.
S. Prerequisite: One course in ecology; one course in animal nutrition. Energy transfer from primary to secondary producers; nutritional balances and biological efficiency of consumers.

RS 693 010-0-0)
Seminar.

RS 695 Var.
Independent Study-Rangeland Ecosystem.

RS 696 Var.
Group Study-Rangeland Ecosystem.

RS 698 Var.
Research.

RS 699 Var.
Thesis.

RS 793 01 (0-0-I)
Seminar.

RS 795 Var.
Independent Study-Rangeland Ecosystem.

RS 798 Var.
Research.

RS 799 Var.
Dissertation.

SOCIOLOGY COURSES

Sociology Department College of Liberal Arts

S 100 03(3-0-0)
General Sociology.
F.S. SS. Analysis of human societies; their major institutions. organizations. and interaction patterns from the sociological perspective.

S 105 03(3-0-0)
Social Problems in Contemporary Society.
F. S. Analysis of global and domestic social problems.

S 205 03(3-0-0)
Contemporary Race-Ethnic Relations.
F. Blacks. Hispanics. Native Americans. and other ethnic groups in the U.S.A.

S 253 03(3-0-0)
Introduction to Criminal Justice.
S. Prerequisite: S 100 or S 105. Criminal justice as system and academic discipline. History. philosophy. and components of criminal justice.

S 301 03(3-0-0)
Development of Sociological Thought.
F.S. Prerequisite: S 100 or S 105. Central themes in sociological thought from Enlightenment to present.

S 310 03(3-0-0)
Quantitative Sociological Analysis.
F.S. Prerequisite: S 100 or S 105. and 3 credits of mathematics. Application of quantitative concepts and methodology of investigation of social problems.

S 311 03(3-0-0)
Methods of Sociological Inquiry.
F.S. Prerequisite: S 100 or S 105. Application of sociological concepts to sociological problems including problem formulation. data gathering. and research design.

S 320 03(3-0-0)
Population-Natural Resources and Environment.
F. Prerequisite: S 100 or S 105. Population studies; world growth patterns and their relationship to natural resources and environment.

S 330 03(3-0-0)
Social Stratification.
F. Prerequisite: S 100 or S 105. Theories of social inequality and mobility and their ramifications in American society.

S 331 03(3-0-0)
Community Dynamics and Development.
F. Prerequisite: S 100 or S 105. Nature of community: its institutions. problems and processes. including growth. disintegration. and development.

S 332 03(3-0-0)
Comparative Majority-Minority Relations.
S. Prerequisite: S 100 or S 105. Discrimination. ideology. power. policy issues in the U.S. and selected societies; application of basic concepts in student's self appraisal.

S 333 03(3-0-0)
Gender Roles in Society.
F. Prerequisite: S 100 or S 105. Analysis of social organization of gender in contemporary society. emphasizing roles and institutional linkages.

S 340 03(3-0-0)

Bureaucracy and Modern Organizations.
S. Prerequisite: S 100 or S 105. Structure and function of large-scale organization: coordination of activities between organizations and society.

S 341 03(3-0-0)
Sociology of Rural Life.
S. Prerequisite: S 100 or S 105. Also offered as telecourse. Rural life in U.S. and third world societies: analysis of sociocultural systems. social differentiation, social institutions. and problems of social change.

S 342 03(3-0-0)
Leisure and Society.
F.S. SS. Nature and purpose of leisure and work in society:influences of culture and social structure on leisure values and behavior.

S 343 03(3-0-0)
Sport and Society.
F.S. Sport as a microcosm of American society foe using on sport and values. socialization. institutions. stratification. race. and gender.

S 352 03(3-0-0)
Criminology.
F.S. SS. Prerequisite: S 100 or S 105. Nature of crime in contemporary society: causation. prevention. treatment. and administration of criminal justice system.

°S 354 03(3-0-0)
Law Enforcement and Society.
S. Prerequisite: S 253. Rise and development of law enforcement as a societal reaction to crime.

***S 356 03(3-0-0)**
Public Opinion in Mass Society.
S. Prerequisite: S 100 or S 105.. Role of mass media in serving information needs of various publics.

S .360 03(3-0-1)
Political Sociology.
S. Prerequisite: S 100 or S 105. Analysis of power as a sociological concept, emphasizing competing theories of the state and power.

S 362 03(3-0-0)
Social Change.
S. Prerequisite: S 100 or S 105. Sources of stability and stress in changing societies. consequences of planned and unplanned change; future trends.

S 364 03(3-0-0)
Agriculture and Global Society.
S. Prerequisite: S 100 or S 105. Analysis of relationships between global agriculture and social change.

°*S 366* 03(3-0-0)
Peoples and Institutions of Latin America.
F. Prerequisite: S 100 or S 105. Change in the cultures and institutions of contemporary Latin America.

S 371 03(3-0-0)
Symbolic Interaction.
F.S. Prerequisite: S 100 or S 105. Basic concepts and issues in sociological perspective of social action and interactionism.

S 372 03(3-0-0)
Sociology of Deviance.
F, S, SS. Prerequisite: S 100 or S 105. Description. comparison. and analysis of theories and research of deviance.

°S 374 03(3-0-0)
Sociology of Occupations and Professions.
F. Prerequisite: S 100 or S 105. Sociological analysis of various occupations. professions; overview of organization, processes, relationships. implications of work as a social activity.

S 375 03(3-0-0)
Sociology of Religion and Medicine.
F. Prerequisite: S 100 or S 105. Descriptions and analyses of the roles and relationships of religion and medicine as modern social institutions.

S 400 03(3-0-0)
Contemporary Sociological Theory.
F. Prerequisite: S 101 or S 105. Theoretical approaches and models in sociology.

***S 402 03(3-0-0)**
Marxian Social Theory.
S. Prerequisite: S 100 or S 105.
Basic concepts used in Marxian social analysis; recent developments in Marxian social theory.

S 403 03(0-0-3)
Capstone Seminar.
F.S. Prerequisite: S 310. S 311; S 301 or S 40). Student demonstration of central concepts and procedures currently employed in sociology discipline.

***S 42103(3-0-0)**
Sociology of Natural Resource Utilization.
S. Prerequisite: S 100 or S 105. Social aspects of natural resource utilization; interface of social organization with physical environment.

°S 429 03(3-0-0)
Comparative Urban Studies.
S. Prerequisite: S 100 or S 105. World urbanization and metropolitan development. measurement of growth and change in cities. and sociological perspective, planning.

S 461103(3-0-0)
Technology, Culture, and Society.
F. Prerequisite: S 100 or S 105. Technology as a social phenomenon interacting with organizational and institutional structures and cultural values.

S 463 03(3-0-0)
Sociology of Disaster.
S. Prerequisite: S 100 or S 105. Determinants and consequences of behavior and response to environmental extremes including floods. earthquakes, wind. severe storms. and technological emergencies.

S 487 03(3-0-0)
Internship.
Prerequisite: S 301, S 310, S 311. Academic-based work experience with selected organizations or agencies. Supervised application of sociological principles and seminar participation.

S 492 01(0-0-1)
Seminar.

S 495 Var.
Independent Study.

S 500 01(0-0-0)
The Sociological Profession I.
F. Prerequisite: Fifteen credits in sociology. Examination of issues and values affecting sociology as a profession.

***S 501 03(3-0-0)**
The Sociological Profession II.

S. Prerequisite: Fifteen credits in sociology. Examination of the activities and procedures critical to the socialization of professional sociologists.

°S 502 03(3-0-0)
Foundations of Theoretical Sociology.
F. Prerequisite: S 500 or concurrent registration. Contributions of major sociological theorists prior to mid-20th century.

***S 510 03(3-0-0)**
Sociological Methods I.
F. Prerequisite: S 310 or S 311. Linkage of sociological theory and conceptual models; case studies; data-gathering techniques.

***S 511 03(3-0-0)**
Sociological Methods II.
S. Prerequisite: S 510. Linkage of sociological theory and conceptual models; case studies; data-gathering techniques.

°S 566/EA 566 03(3-0-0)
Contemporary Issues of Developing Countries.
S. Prerequisite: Two or more courses in sociology and/or economics. Credit not allowed for both S 566 and EA 566. Social, economic, and technological factors in dove loping countries.

°S 602 03(3-0-0)
Contemporary Sociological Theory.
S. Prerequisite: S 502. Contributions of major sociological theorists since mid-20th century.

S 610 03(0-0-3)
Seminar in Methods of Qualitative Analysis.
F. Prerequisite: S 311. Examination and application of qualitative techniques of analysis.

***S 612 03(0-0-3)**
Seminar in Methods of Evaluational Research.
S. Prerequisite: S 511. Quantitative and qualitative techniques of evaluating social action programs.

°S 613 03(0-0-3)
Seminar in Multiple Regression and Path Analysis.
F. Prerequisite: S 511. Analysis and application of techniques for multiple regression and path analysis.

***S 614 03(3-0-0)**
Comparative Sociology.
S. Prerequisite: S 500. Examination of problems and prospects in extending and carrying out sociological research across social systems.

°S 620 03(3-0-0)
Demographic Analysis.
S. Prerequisite: S 500. Major theoretical assumptions and research techniques and methods in modeling and interpreting populations.

***S 630 03(3-0-0)**
Social Stratification.
S. Prerequisite: S 500. Theory and research on class structure, status attainment. ideology. and social change.

***S 63103(3-0-0)**
Sociology of Rural Development.
F. Prerequisite: S 500. Rural social organization and development. modernization. and social change as it relates to rural social systems; underdeveloped regions of world.

°S 633 03(3-0-0)
Theories of Modern Organizations.

S. Prerequisite: S 340. Comparison of various theoretical perspectives on functioning of modern large-scale organizations.

***S 639/CE 639 03(3-0-0)**
Technology Assessment and Social Forecasting.
F. Prerequisite: S 500. Credit not allowed for both S 639 and CE 639. Interrelationship between technology and society emphasizing procedures for evaluating impacts and forecasting alternatives.

***S 660 0;3(3-0-0)**
Theories and Issues in Developmen and Change.
F. Prerequisite: S 500. Central concepts. issues, and approaches in sociology of development.

S 662 03(0-0-3)
Seminar In Sociological Policy Analysis.
S. Prerequisite: S 500. Examination of sociological perspectives on formulation and impact of policies to deal with social problems.

S 665 03(3-0-0)
Sociology of Science and Technology.
F. Prerequisite: Ten credits of undergraduate natural sciences; S 100. Examination of connections among science, technology, and social development in national and global context.

S 671 03(0-0-3)
Metatheoretical Issues In Sociology.
F. Prerequisite: S 502. Analysis of metatheoretical concepts and issues in sociological theory.

°S 674 03(0-0-3)
Seminar In Social Movements and Collective Behavior.
S. Prerequisite: S 500. Theory and research on causes, organizational structure. and outcomes of social movements and collective behavior.

S 695 Var.
Independent Study.

S 696 Var (1-3).
Group Study.
Maximum of 8 credits allowed in course.

S 699 Var.
Thesis.

***S 708 03(0-0-3)**
Seminar in Theory Construction I.
F. Prerequisite: S 602; S 610 or S 612 or S 613. Techniques of integrating theory and research methods for macrosociological analysis.

***S 709 03(0-0-3)**
Seminar In Theory Construction II.
S. Prerequisite: S 708. Techniques of integrating theory and methods for macrosociological analysis.

'S 750 03(0-0-3)
Seminar In Strategies of Applied Social Change.
F. Prerequisite: S 660. Review and critique of intervention strategies.

°S 751 03(0-0-3)
Seminar In Theories of Autonomous Change.
S. Prerequisite: S 660. Review and critique of selected theories of autonomous change.

°S 752 03(0-0-3)
Seminar In Utopian Thought.
F. Prerequisite: S 602. Sociological analysis of major utopian writings.

***S 761 03(3-0-0)**
Social Choice.
S. Prerequisite: Two graduate-level courses in social science. Evaluation of adequacy of traditional policy models as a basis for social action.

°S 763 03(0-0-3)
Seminar In Social Conflict and Development..
F. Prerequisite: S 660. Critique of planning. social conflict. and development theories.

°S 768 03(3-0-0)
Directed Social Change.
S. Prerequisite: S 500. Issues of directed social change.

S 784 Var.
Supervised College Teaching.
F, S. SS.

S 787 Var.
Internship.

S 795 Var.
Independent Study.

***S 797 0;3(0-0-3)**
Group Study in Developmental Change.
Prerequisite: S 660. Critique of selected theories in developmental change.

S 799 Var.
Dissertation.

SPEECH COMMUNICATION COURSES

Speech Communication Department College of Liberal Arts

SP 208 03(3-0-0)
'Public Speaking and Discussion.
F, S. SS. Fundamentals of public speaking emphasizing content, organization. delivery. audience response; introduction to public discussion.

SP 201 03(3-0-0)
Rhetoric in Western Thought.
F.S. Major concepts of rhetoric from Greece to modern times and their relations to present-day approaches to communication.

SP 203 03(3-0-0)
Speech Style and Delivery.
S. Prerequisite: SP 200. Theory and practice of stylistic and presentational skills in oral communication.

SP 205 03(;3-0-0)
Group Communication.
F.S. Prerequisite: SP 200. Principles and methods of group communications emphasizing problem solving and decision making.

SP 207 03(3-0-0)
Rhetoric and Argumentation.
F, S. Principles of logical reasoning in speeches of advocacy including analysis, use of evidence. inductive and deductive reasoning.

SP 215 01(0-2-0)
Intercollegiate Forensics.
F, S. Maximum of 4 credits allowed in course. Principles of debating and practice in intramural. local, and/or novice intercollegiate debates.

SP 217 0;3(3-0-0)
Nonverbal Communication.
S. Nonlanguage symbols in communication: systems and functions of nonverbal communication behaviors.

SP 231 03(3-0-0)
Oral Reading.
F, S. Analysis and reading of rhetorical and poetic writing leading to understanding. appreciation, and expressive communication.

SP 241 03(3-0-0)
Television and Radio in Society.
F.S.
Survey of broadcasting: history. structure, regulation. various usages. and impact upon society.

SP 243 0;3(1-2-1)
Television and Radio Speaking.
F. Prerequisite: SP 200. Primarily for nonbroadcast majors. Principles and practice in television-radio speaking; information. persuasion. interviewing. demonstration via television-radio facilities.

SP 255 0;30-4-0)
History and Appreciation of Film.
F.S. Special fee. $20. Screening and evaluation of landmark fiction and nonfiction films; assessment of cinema as an art form and a social force.

SP 287 010-0-0)
Communication Internship.
Prerequisite: SP 200, SP 201. SP 207. SP 241; 2.0 GPA.

SP 300 0;30-0-2)
Advanced Public Speaking.
F, S. SS. Prerequisite: SP 200. Advanced technique in public speaking; emphasis on argument construction and refutation. style. and manuscript delivery.

SP 303 03(3-0-0)
Business and Professional Speaking.
S. Prerequisite: SP 200. Principles, practice of speech communication in business. professional settings; emphasizing interviews, group conferences, and personal presentations.

SP 305 03(3-0-0)
Intercultural Communication.
S. Cultural influences on face-to-face communication processes; communication rules and norms in specific cultures and sub-cultures; cultural adaptation.

SP 311 03(3-0-0)
Historical Speeches on American Issues.
F. Significant speeches and speakers as they reflected and affected American issues from colonial period through early 20th century.

SP 315 01 (0-2-0)
Public Discussion and Debate.
F.S. Prerequisite: SP 215. Maximum of 4 credits allowed in course. Advanced debating principles and practice in intercollegiate debates.

SP 341 03(3-0-0)
Evaluating Contemporary Television.
F. Application of critical standards to artistic. ethical. and content aspects of American television and radio.

SP 343 03(0-6-0)
Radio Production.
F. Special fee. $10. Production, delivery, and voice development; script and program execution.

SP 345 03(0-6-0)
Television Production 1.
F.S. Special fee. $20. Beginning production. in laboratory setting. of specialized program types.

SP 349 03(3-0-0)
Freedom of Speech.
F. Historical and philosophical precedents to freedom of speech; development of free speech principles *in* the U.S.; ethical obligations of speakers.

SP 355 03(2-2-0)
Evaluating Contemporary Film.
S. Prerequisite: SP 255. Special fee. $45. Theory and development of film criticism; application of individual standards to current fiction and nonfiction films.

SP 384 Var. (1-3)
Supervised College Teaching.
F.S. SS. Maximum of 10 credits allowed in course. Open only to undergraduate students who are invited to assist in teaching selected courses.

SP 401 03(3-0-0)
Rhetoric in Contemporary Social Movements.
F. Major contemporary theories of discourse with attention 10 antecedents. purpose. scope, and implications.

SP 405 03(3-0-0)
Interpersonal Communication.
F, SS. Theories of communication in development. maintenance. and deterioration of friendship. couple. Family, group. and business relationships.

SP 409 03(3-0-0)

Studies in Persuasion.
S. Theory and practice of persuasion to motivate human conduct.

SP 411 03(3-0-0)
Contemporary Speeches on American Issues.
S. Prerequisite: SP 311. Significant speeches and speakers as they reflect and affect issues. 1930 to present.

SP 417 03(3-0-0)
Communication, Language. and Thought.
S. Symbols in communication; influence of language upon thought and behavior.

SP 443 03(3-0-0)
Radio-Television Writing.
S. Development of basic script-writing skills for radio-television settings.

SP 445 03(0-6-0)
Television Production II.
S. Prerequisite: SP 345. Special lee. $40. Application of television production principles to specialized program types. Planning and executing operational settings.

SP 447 03(3-0-0)
Television-Radio Programming and Management.
F. Prerequisite: SP 241. Organizational. legal. economic. personnel. and programming problems in television and radio station operation and management.

SP 449 03(3-0-0)
Legal Issues in Broadcasting.
F. Constitutional guarantees; statutory and administrative law; policy relating to radio, television. and cable communications.

SP 450 02(0-0-2)
Capstone Seminar.
F.S. Application of rhetorical and communication principles; student demonstration of speech communication theory and skills.

SP 487 Var.
Television-Radio Internship.
Prerequisite: Speech majors only by written application for selection; 3.0 minimum GPA; SP 201. SP 207. SP 241. SP 345. Supervised study. experience. and on-the-job training in cooperating commercial and noncommercial broadcasting organizations.

SP 495 Var.
Independent Study.

SP 496 Var.
Group Study.

SP 527 03(3-0-0)
Communication in Organizations.
SS. Types. operation, and problems of communication in organizations.

SP 601 03(3-0-0)
Ancient and Medieval Rhetoric.
F. Prerequisite: Fifteen 300-400 level credits in speech and/or English. Rhetorical theories: Greek. Roman. and medieval times.

SP 603 03(3-0-0)
Renaissance and Modern Rhetoric.
S. Prerequisite: SP 601. Rhetorical theories in Renaissance and in modern Britain and America.

SP 612 03(3-0-0)
Rhetorical Criticism.

F. Prerequisite: Fifteen 300-400 level credits in speech and/or English. Traditional and contemporary methods for analyzing persuasive discourse.

SP 614 03(3-0-0)
British Origins of American Discourse.
S. Prerequisite: SP 612. Major British speakers from 18th. 19th..'red 20th centuries who significantly influenced American discourse.

SP 620 03(3-0-0)
Communication Theory.
F. Prerequisite: Fifteen 300-400 level credits in speech and/or English. Examination of communication philosophies and perspectives; analysis of modern theories of communication.

SP 623 03(3-0-0)
Contemporary Theories of Discourse.
S. Prerequisite: Fifteen 300-400 level credits in speech, English. or philosophy. Contemporary perspectives on discourse and human communication; post-modern rhetorical theory.

SP 630 03(3-0-0)
Communication Research Methods.
S. Prerequisite: SP 620. Historical and philosophical context of communication research: relationship between theory and method; dominant forms of communication research.

SP 641 03(3-0-0)
Broadcasting in the Public Interest.
F. Prerequisite: Fifteen 300-400 level credits in broadcasting. Public interest concept: origin; effects on program standards; self-regulation; government regulation.

SP 643 03(3-0-0)
Broadcast Analysis.
S. Prerequisite: SP 641. Analysis of organizational. economic. and social realities in commercial and public broadcasting; decision making and audience impact.

SP 684 Var (1-3).
Supervised College Teaching.
F. S,

SS. SP 692 Var.
Seminar.
Prerequisite: SP 603. SP 620. SP 643.

SP 695 Var.
Independent Study.

SP 696 Var.
Group Study.

SP 699 Var.
Thesis.

STATISTICS COURSES

Statistics Department College of Natural Sciences

ST 192 01(0-0-0
Introductory Seminar.

ST 201 03(2-0-0
General Statistics.
F, S. SS, Prerequisite: M 121 or two years high school algebra. Maximum of 3 credits allowed for ST 201 and ST 204. Sample statistics. confidence intervals. hypothesis tests. one-way AOV. chi-square tests, linear regression and correlation.

ST 204 0:10-:1-0)
Statistics for Business Students.
F, S, SS. Prerequisite: M 121 or two years high school algebra. Maximum of 3 credits allowed for ST 204 and ST 201. Data collection and display. sampling principles, probability. distribution. estimation, confidence intervals,

ST 220 02(2-0-0)
Elementary Probabilistic Modeling.
S. Prerequisite: Knowledge of computer language, Probabilistic models of real phenomena; distributions. expectations. correlations; averages and extremes; simple Markov chains and random.walks.

ST 301 03(3-0-0)
Introduction to Statistical Methods.
F, S. SS. Prerequisite: M 120, M 121. Credit allowed for only one course: ST 301, ST 307/EH 307, ST 309, ST 311. Techniques in statistical inference; confidence intervals. hypothesis tests. simple correlation and regression, one-way analysis of variance.

ST 302 03(3-0-0)
Design of Experiments.
F. S, SS. Prerequisite: ST 301 or ST 307/EH 307 or ST 309 or ST 311. Analysis of variance, covariance: randomization; completely randomized, randomized block. latin-square, split-plot. Factorial and other designs.

ST 303/EE 303 0/(2-0-0)
Introduction to Communication Principles,
F, Prerequisite: M 261. Credit not allowed for both ST 303 and EE 303. Basic concepts in design and analysis of communication systems.

ST 304 03(3-0-0)
Multiple Regression Analysis.
F. S, SS. Prerequisite: M 229, ST 301 or ST 307/EH 307 or ST 309 or ST 311. Estimation and testing for linear, polynomial, and multiple regression models; analysis of residuals; selection of variables; nonlinear regression.

ST 305 02(2-0-0)
Sampling Techniques.
S. Prerequisite: ST 301 or ST 307/EH 307 or ST 309 or ST 311. Survey designs; simple random, stratified. systematic random. cluster samples; methods of estimation and sample size determination.

ST 307/EH 307 03(3-0-0)
Introduction to Biostatistics.
F, S. Prerequisite: M 121, Credit allowed for only one course: ST 301, ST 307/EH 307. ST 309. ST 311. Biostatistical methods: confidence intervals. hypothesis tests. simple correlation and regression. one-way analysis of variance.

ST 309 03(3-0-0)
Engineering Statistics.

F. S, SS. Prerequisite: M 161. Credit allowed for only one course: ST 301. ST 307/EH 307, ST 309. ST 311. Probability and distribution theory, estimation and testing. correlation and regression. applications to engineering and manufacturing.

ST 311 03(3-0-0)
Statistics for Behavioral Sciences I.
F. Prerequisite: M 121. Credit allowed for only one course: ST 301, ST 307/EH 307, *ST* 309, ST 311. Introductory statistics for social research. Classification, quantitative descriptive statistics: inference. testing, estimation; measures of association.

ST 312 03(3-0-0)
Statistics for Behavioral Sciences II.
S. Prerequisite: *ST* 301 or ST 307/EH 307 or ST 309 or ST 311, Bivariate association; ANOVA and nonparametric counterparts; multivariate association; path analysis.

ST 375 02(2-0-0)
Nonparametric Statistical Methods.
F. Prerequisite: ST 301 or ST 307/EH 307 or ST 309 or ST 311. One, two, and multi-sample tests for location. dispersion, randomness. distributional differences and association.

ST 420 03(3-0-0)
Probability and Mathematical Statistics I.
F. Prerequisite: M 255 or M 261, Probability. random variables, distribution functions. and expectations; joint and conditional distributions and expectations; transformations.

ST 430 03(3-0-0)
Probability and Mathematical Statistics II.
S. Prerequisite: ST 420. Theories and applications of estimation. testing, and confidence intervals; sampling distributions including normal. gamma, beta X2. t. and F.

ST 460 03(3-0-0)
Applied Multivariate Analysis.
S. Prerequisite: ST 304. Principles for multivariate estimation and testing; multivariate analysis of variance, discriminant analysis; principal components. Factor analysis.

ST 486 Var.
Practicum.
Prerequisite: ST 301. Use of computer programs; statistical consulting.

ST 495 Var.
Independent Study.
Prerequisite: ST 301. written consent of instructor.

ST 500 01(0-2.0)
Statistical Computer Packages.
S, Prerequisite: ST 302, ST 304. Comparison, evaluation, and use of computer packages for univariate and multivariate statistical analyses,

ST 511 03(2-2.0)
Design and Data Analysis for Researchers I
F, Prerequisite: ST 301 or ST 307/EH 307 or ST 309 or ST 311 or written consent of instructor, Statistical methods for experimenters and. researchers emphasizing design and analysis of experiments.

ST 512 03(2-2-0)
Design and Data Analysis for Researchers II.
S. Prerequisite: ST 511. Model building and decision making,: communication of statistical information.

ST 520 04(4-0-0)
Introduction to Probability Theory.
F. Prerequisite: M 340. Probability. random variables. distributions, expectations. generating functions. limit theorems. convergence, random processes.

ST 521 03(3-0-0)
Stochastic Processes I.
S, Prerequisite: ST 520. Characterization of stochastic processes. Markov chains in discrete and continuous time. branching processes. renewal theory. Brownian motion.

ST 52:1 03(3-0-0)
Stochastic Processes II.
F. SS. Prerequisite: ST 521. Martingales and applications. random walks. Fluctuation theory. diffusion processes. point processes, queueing theory.

ST 5:15 03(;1-0-0)
Analysis of Time Series I.
F. Prerequisite: ST 430. Trend and seasonality, stationary processes. Hilbert space techniques. spectral distribution function. Fitting ARIMA models. linear prediction.

ST 526 03(3-0-0).
Analysis of Time Series II.
S, SS. Prerequisite: ST 525. Spectral analysis; the periodogram; spectral estimation techniques; multivariate time series; linear systems. optimal control; Kalman filtering. prediction.

***ST 527 02(2-0-0)**
Quantitative Genetics.
S. Prerequisite: ST 420, AG 330 or Z 346. Mathematical theories of evolution: population genetics: statistical methods in genetic research,

ST 530 03(3-0-0)
Mathematical Statistics.
S. Prerequisite: ST 520. Sampling distributions. estimation, testing. confidence intervals; exact and asymptotic theories of maximum likelihood and distribution-free methods.

ST 544/EH 544 03(3-0-0)
Biostatistical Methods for Quantitative Data.
S. Prerequisite: EH 307/ST 307 or ST 301. Credit not allowed for both ST 544 and EH 544. Methods for analyzing results of studies with quantitative response variable including epidemiologic and toxicologic studies.

ST 570 03(3-0-0)
Nonparametric Statistics.
S, SS. Prerequisite: ST 430, written consent of instructor. Distribution and uses of order statistics; nonparametric inferential techniques. their uses and mathematical properties.

ST 586 01(0-2-0)
Practicum in Consulting Techniques.
Attend consulting sessions of faculty. Computing on elementary research problems for beginning student through planning and designing experiments.

ST 592 01(0-0-0
Seminar.

ST 605 03(3-0-0)
Theory of Sampling Techniques.
F. Prerequisite: ST 301 or ST 307/EH 307 or ST 309 or ST 311. ST 430. Survey designs; simple random. stratified. cluster samples; theory of estimation; optimization techniques for minimum variance or costs.

ST 640 03(3-0-0)
Linear Statistical Models I.
S. Prerequisite: M 369. ST 304. ST 430. Multivariate normal; properties of quadratic forms; noncentral F.t. X. Gauss-Markov theory; full rank. multiple and polynomial regression models.

ST 641 03(3-0-0)
Linear Statistical Models II.
F. Prerequisite: ST 302. ST 640.

Design. regression, fixed-effects. random-effects. and mixed-effects linear models; multivariate extensions including growth-curve, discriminant analysis.

ST 645 03(3-0-0)
Categorical Data Analysis and GLIM.
S. Corequisite: ST 640. Generalized linear models. binary and polytomous data. log linear models. quasi likelihood models. survival data models.

ST 650 03(3-0-0)
Design of Experiments.
F. Prerequisite: ST 640. 'Treatment arrays. experimental units. blocking. covariates, incomplete blocks. Factorial experiments, response surface methodology.

ST 675A-J Var (1-3)
Topics in Statistical Methods.
F.S. SS. Prerequisite: ST 430. written consent of instructor. A) Sampling. B) Design. C) Multivariate analysis. D) Statistical computing. E) Statistical graphics. F) Robustness. G) Nonlinear regression. H) Bootstrap and jackknife. I) Quality control. J) Reliability.

ST 684 Var (1-2).
Supervised College Teaching.
F, S. SS. Prerequisite: Enrollment in MS. degree program in statistics, Techniques for effective preparation and execution of teaching college statistics courses.

ST 695 Var.
Independent Study.

ST 699 Var.
Thesis.

ST 700 03(3-0-0)
Statistical Computing.
F, S, SS. Prerequisite: ST 640. Monte Carlo theory applied to integral evaluation and distribution-free inference; computations for linear models; optimization algorithms.

ST 720 04(4-0-0)
Probability Theory.
S. Prerequisite: ST 520. M 518.
Measure theoretic probability, characteristic functions: convergence; laws of large numbers; central limit, extreme value, asymptotic theory.

ST 721 03(3-0-0)
Applied Probability and Stochastic Processes I.
S. SS. Prerequisite: ST 720. General theory of processes; Markov processes in discrete. continuous time; review of martingales, random walks; renewal and regenerative processes.

ST 722 03(3-0-0)
Applied Probability and Stochastic Processes II.
F. SS. Prerequisite: ST 720. Brownian motion. diffusion. stochastic differential equations; weak convergence. central limit theorems. Applications in engineering, natural sciences.

ST 730 04(4-0-0)
Advanced Theory of Statistics I.
F. Prerequisite: ST 530. ST 720. Minimal sufficiency. maximal invariance; Neyman-Pearson theory; Fisher. Kullback-Leibler information; asymptotic properties of maximum-likelihood methods.

ST 731 03(3-0-0)
Advanced Theory of Statistics II.
S. SS. Prerequisite: ST 730. Decision-theory model; Bayes. t-Bayes. complete. and admissible classes; applications to sequential analysis and design of experiments.

ST 741 03(3-0-0)
Theory of Multivariate Statistics.

F. SS. Prerequisite: ST 640. concurrent registration in ST 730. Theory of multivariate normal; maximum-likelihood inference. union-intersection testing for single sample; theory of a multivariate linear model.

ST 742 03(3-0-0)
Stationary Processes.
S. SS. Prerequisite: ST 720. concurrent registration in ST 730. Spectral theory of multivariate stationary processes; estimation, testing for spectral. linear. AR-MA representations; best linear predictors. Filters.

ST 750 03(3-0-0)
Statistical Planning.
F. Prerequisite: ST 640. Semicontrolled experiments. sequential methods. stopping rules. design and information theory. design evaluation. Factorial designs and optimal designs.

ST 751 03(3-0-0)
Design of Experiments.
S. Prerequisite: M 601, ST 750. Orthogonal and balanced arrays; optimal block-treatment and balanced discrete factorial designs; optimal designs with continuous factors.

ST 792 Var.
Seminar.

ST 795 Var.
Independent Study.

ST 796 Var.
Group Study.
Methodology. stochastic processes. experimental design. multi-dimensional statistics.

ST 799 Var.
Dissertation.

SOCIAL WORK COURSES

Social Work Department College of Applied Human Sciences

SW 110 03(3-0-0)
Contemporary Social Welfare.
F.S. Development of social welfare institutions in U.S. and selected countries.

SW 150 04(4-0-0)
Introduction to Social Work.
F.S. Also offered as telecourse. Historical development of social welfare. Knowledge, values. intervention skills. settings. and groups served by social workers.

SW 233 03(3-0-0)
Systems Perspective for Social Work.
F.S. Prerequisite: SW 150. Systems perspective as a framework for social work practice knowledge.

SW 286A-B 03(0-9-0)
Practicum.
Prerequisite: SW 286A and SW 286B must be taken in sequence. SW 150 or concurrent registration. Maximum of 6 credits allowed in course. Development of beginning helping relationships. A) Communication skills. B) Applied helping skills.

SW 320 03(3-0-0)
Interviewing Methods.
F.S. Prerequisite: SW 150 or PY 100. Variables involved in interviewing; practice of communication and other skills used in social work.

SW 321 03(3-0-0)
Generalist Social Work Perspective.
F.S. SS. Prerequisite: SW 233. concurrent registration in SW 322. Presentation of a methodological model for response to client/ system needs *at* the most appropriate and effective systems level.

SW 322 03(3-0-0)
Generalist Activities and Skills for Practice.
F.S. SS. Corequisite: SW 321. Examination of activities and skills used by social workers in direct practice to operationalize the planned change process with multilevel systems.

SW 330 03(3-0-0)
Human Diversity Practice Issues.
F.S. Prerequisite: SW 150. Knowledge about human differences essential for social work practice.

SW 350 03(3-0-0)
Agency-Based Social Work Practice.
F.S. Prerequisite: SW 233. SW 286B. Linkages and issues among personal. professional. and bureaucratic functioning. Preparation for entry into social agency settings.

***SW 365 03(0-0-3)**
Exploring Hispanic Identity.
S. Prerequisite: PY 100. S 100. Development and implications of Hispanic identity in Amen-can society.

SW 370A-C 0(3-0-0)
Social Work Practice Settings.
Application of practice processes in various settings. A) Health and medical. F. B) Mental health. S. C) Schools.

SS. SS. SW 371A-H 03(3-0-0)
Social Work with Selected Populations.
Application of practice processes with selected populations. A) Children and families.

F.S. B) Juvenile offenders. F. C) Adult offenders. S. D) Developmentally disabled.
S. E) Substance abusers. S. F) Social gerontology. F.S. G) Ethnic/racial.
F. H) Women's issues.

S. SW 384 Var II-5)
Supervised College Teaching.
F.S. SS. Maximum of 10 credits allowed in course. Assist instructor in teaching selected classes. group training. or discussion group leadership.

SW 410 03(3-0-0).
Social Welfare Policy.
F.S. SS. Prerequisite: SW 150. Issues and processes shaping social welfare institutions; definitions of social welfare policy; analytical framework for policy analysis.

SW 470 03(3-0-0)
Generalist Social Work Practice Application.
F.S. SS. Prerequisite: SW 322. Multilevel system case application experience in the generalist framework.

SW 488 Var (5-10).
Field Placement.
F.S. Prerequisite: SW 470. Application of knowledge. values. skills. methods. and processes of practice including individuals. Families. groups. organizations. and communities.

SW 490A-F Var (1-3)
Workshop.
A) Case management. B) Community work. C) Crisis intervention. D) Dysfunctional relationships. E) Grant writing. F) Group work.

SW 492 03(3-0-0)
Seminar.
Corequisite: SW 488. Integrative seminar to field experience and social work knowledge. values, skills. methods. and processes.

SW 495 Var. (1-12)
Independent Study.

SW 496 Var (1-12)
Group Study.

SW 500 03(3-0-0)
Principles and Philosophy of Social Work.
F.S. SS. Prerequisite: Eighteen credits of socio/behavioral sciences. Also offered as telecourse. Knowledge. values. history. and philosophy of social work.

SW 510 03(3-0-0)
Behavior, Environment, and Practice.
F. Corequisite: SW 500. Understanding of behavior and environment. Primary concepts, strategies. and skills underlying social work practice.

SW 520 03(3-0-0)
Social Welfare Policy Analysis.
F. Prerequisite: Eighteen credits of socio/behavioral sciences. Historical concept analysis and impact of social welfare policy.

SW 588 04(0-12-0)
Field Placement.
Corequisite: SW 510. Supervised professional practice.

SW 590 Var (1-6).
Workshop.

SW 600 03(3-0-0)
Methods of Research I.

F. Prerequisite: ST 201, concurrent registration in SW 520. Social work research: role of practitioners as consumers and initiators of research.

SW 601 03(3-0-0)
Methods of Research II.
S. Prerequisite: SW 600. Data analysis, computer processing in social work research. and methods for evaluating one's own practice.

SW 610 03(3-0-0)
Behavior in Primary Group Contexts.
S. Prerequisite: SW 510. Bases for social analysis of client systems in rural communities and communities in transition.

SW 61103(3-0-0)
Practice in Rural/Transitional Contexts.
S. Prerequisite: SW 510. Central concepts and approaches for advanced locality-relevant generalist practice.

SW 614 02(2-0-0)
Individual/Family-Centered Direct Practice.
F. Prerequisite: SW 611, concurrent registration in SW 688. Clinical social work skills for work with children and families.

SW 615 02(0-0-2)
Community-Centered Direct Practice.
F. Prerequisite: SW 614. Intervention strategies and techniques in work with intermediate systems.

SW 616 02(2-0-0)
Advanced Generalist Case Applications.
S. Prerequisite: SW 615. Use of examples and specialized case material to explore complex intervention strategies.

SW 620 03(3-0-0)
Advanced Social Welfare Policy Analysis.
S. Prerequisite: SW 520. Application of social welfare policy analysis models; nonnative aspects of policy analysis. program evaluation. and assessment skills.

SW 688 05.
Field Placement.
F, S. Prerequisite: SW 601, SW 610. SW 611. SW 620. Maximum of 10 credits allowed in course. Supervised professional practice.

SW 692 Var. (1-3).
Seminar.
Corequisite: SW 688. Maximum of 4 credits allowed in course. Examination of practice; discussion of relevant practice issues.

SW 695 Var.
Independent Study.

SW 696 Var.
Group Study.

SW 698 03.
Research.
Corequisite: SW 688. Maximum of 6 credits allowed in course.

SW 699 03.
Thesis.
Maximum of 6 credits allowed in course.

THEATRE COURSES

Music, Theatre, and Dance Department College of Liberal Arts

TH 141 03(2-0-0)
Introduction to Theatre.
F. S, SS. Theatre as an *art* form through dramatic literature. lecture. and active participation.

TH 151 030-5-0)
Acting I.
F, S. Basic theories and techniques; practical experience through classroom performance.

TH 160 02(0-4-0)
Graphic Expression for the Theatre.
F. Techniques of graphic communication for the theatre.

TH 16103(2-3-0)
Technical Theatre 1.
F.S. Basic theory and techniques of executing settings, lighting. properties for stage.

TH 255 030-5-0)
Directing I.
F. Prerequisite: TH 151. Basic principles of directing; experience in directing scenes.

TH 264 02(0-4-0)
Theatrical Makeup.
F. Basic theory and technique for visualization of characters through theatrical makeup.

TH 265 030-5-0)
Design I.
S. Theory and techniques of designing scenery and lighting for stage.

TH 286 01(0-3-0)
Practicum.
F.S. SS. Maximum of 4 credits allowed in course. Practical experience in mounting theatrical productions.

TH 341 03(3-0-0)
History of Theatre I.
F. History of theatre: origins to closing of London theatres, 1642.

TH 342 03(3-0-0)
History of Theatre II.
S. History of theatre, Restoration to present.

***TH 351 030-5-0)**
Acting II.
S. Prerequisite: TH 151. Scene work and other appropriate training for acting students.

***TH 355 030-5-0)**
Directing II.
S. Prerequisite: TH 255. Intensive practical experience in direction of scenes focusing on specific directorial problems posed by various types of plays.

°TH 361 030-5-0)
Technical Theatre II.
F. Prerequisite: TH 161.
Theory and practice of advanced scenic techniques.

TH 363 030-5-0)
Theatrical Costume Design.
S. Prerequisite: TH 141 or TH 161. Basic theory and techniques of theatrical costume design and execution.

***TH 365 030-5-0)**
Design II.
F. Prerequisite: TH 265. Theory and practice of scenic design and lighting emphasizing individual projects and readings.

TH 475 03(2-0-0
Playwriting.
S. Prerequisite: E 210 or TH 355. Special techniques of writing for the .stage.

TH 486 01(0-3-0)
Practicum.
F, S. SS. Prerequisite: TH 286. Maximum of 4 credits allowed in course. Practical experience in the supervisory capacities involved in mounting theatrical productions.

TH 491 Var.
Repertory Theatre Workshop.
Prerequisite: Audition only. Principles and practice of repertory theatre operation; practical experience offered.

TH 495 Var.
Independent Study.

TH 695 Var.
Independent Study.

VOCATIONAL EDUCATION COURSES

Occupational and Educational Studies School College of Applied Human Sciences

VE 300 02(0-0-2)
Principles of Vocational Education.
F, SS. History, purpose, administration, funding, programs and .services. delivery system; relationship to total educational system including needs of exceptional students in vocational classrooms.

VE 370 03(3-0-0)
Laboratory Management, Safety, and Liability.
S, SS. Organization and management of learning laboratories. Approved principles and practices of classroom and laboratory safety including impact of accidents.

VE 386 Var.
Practicum.
Prerequisite: VE 300 or concurrent registration; admission to teacher certification program.

VE 387 Var.
Internship.
Coordinated and supervised experiences in business, industry, or agriculture selected to strengthen the intern's specialty through experience.

VE 40102(0-0-2)
Instructional Aids In Vocational Education.
F, S. Credit not allowed for both VE 401 and VE 400. Instructional aids including microcomputer, audiovisual techniques, and evaluation of instructional aids and materials used in vocational education.

VE 402 02(0-0-2)
Student Organizations in Vocational Education.
F, SS. Skills and techniques necessary for advising vocational student organizations.

VE 403 02(0-0-2)
Coordination Techniques of Cooperative Programs.
F, SS. Techniques and methods employed in organization. development, and maintenance of a cooperative program.

VE 408 04(0-0-4)
Methods and Evaluation of Instructors.
F. S. Prerequisite: ED 355, admission to teacher certification program. Strategies for teaching: planning, evaluation, classroom management, legal responsibilities.

VE 409 01(0-2-0)
Microteaching Laboratory.
F. Corequisite: VE 408. Microteaching and audiovisual laboratory to apply teaching skills.

VE 420 03(0-0-3)
Agricultural Experience and Adult Education.
S. Developing secondary agriculture experience programs. Organizing and teaching adult education classes in agriculture.

VE 425 03(0-0-3)
Methods/Materials in Agricultural Education.
F. Prerequisite: Admission to teacher certification program or written consent of instructor. Methods and materials in teaching agricultural education in classroom, shop. or laboratory.

VE 431 03(3-0-0)
Methods/Materials in Business Education.
F. Prerequisite: ED 355. admission to teacher certification program. Methods for teaching business education.

VE 441 03(0-0-3)
Methods/Materials-Vocational Marketing Education.
F. Prerequisite: Admission to teacher certification program. Instructional methods and resource materials development for vocational marketing education.

VE 451 03(0-0-3)
Methods/Materials in Home Economics Education.
F. Corequisite: VE 408. Teaching methods, processes, and materials for home economics/occupational education.

VE 461 02(0-0-2)
Advisory Committees and Accountability.
SS. Use. role. and function of advisory committees integrated with methods of improving accountability for teachers.

VE 465 03(0-0-3)
Competency-Based Curricula.
F. SS. Development of competency-based curricula using job analysis and identified performances.

VE 466 03(0-0-3)
Innovative Teaching and Materials.
SS. Innovarive teaching techniques and materials including computerized. individualized. and programmed instruction.

VE 471 02(2-0-0)
Orientation and Assessment of New Teachers.
F.S. SS. Orientation to teaching and individual assessment of teaching skills: development and implementation of professional growth plan.

VE 485 Var.
Student Teaching.
F. S,

SS. VE 486A-F Var (1-6).
Practicum.
Prerequisite: Admission *to* teacher certification program. A) Agricultural education. B) Business education. C) Vocational marketing education. D) Home economics education. E) Technical education. F) Trade and industrial education.

VE 492 Var.
Seminar.

VE 494 Var.
Independent Study.

VE 496 Var.
Group Study.

VE 500 02(0-0-2)
Career and Employment Concepts.
F. SS. Prerequisite: Bachelor's degree. Career planning and employment issues laced by students and adults: use of advising techniques and education-business-community cooperative efforts.

VE 505 02(0-2-0)
Microcomputers for Educators.
S. SS. Prerequisite: M 120. Use of the microcomputer as an instructional management tool.

***VE 5116 03(3-0-0)**
Human Resource Development.
S. Prerequisite: Written consent of instructor. Human resource development foundations and techniques related to vocational training and development for industry. business. education. and government.

VE 520 Var.
Teaching Agricultural Education.
SS. Prerequisite: VE 425. Methods of teaching recent developments in the field of agriculture and allied industries.

VE 548 02(0-0-2)
Methods in Small Business Entrepreneur-ship.
SS. Prerequisite: VE 441. Small business entrepreneurship: principles. operations. and employee training.

VE 570 03(0-0-3)
Teaching Students with Special Needs.
F. SS. Prerequisite: Teacher certification. Principles and practices of teaching students with special needs including curriculum design and transition planning.

VE 571 03(0-0-3)
Vocational Assessment for Special Needs.
S. SS. Information and techniques regarding vocational assessment of special needs students including traditional and curriculum-based strategies.

VE 573 02(0-0-2)
Supplemental Services Delivery.
SS. Prerequisite: VE 570. information and techniques regarding delivery of support services to special needs students enrolled in vocational settings.

VE 574 02(0-0-2)
Transition and Community-Based Instruction.
SS. Prerequisite: VE 570. Development and implementation of functional curricula within a variety of integrated settings.

VE 590 Var.
Workshop.

VE 601 03(041-3)
Philosophy and Organization of Occupational Education.
F.S. SS. Prerequisite: Ten credits in education or industry training.
Need. purposes. programs. administration. and delivery systems of occupational programs in secondary and postsecondary institutions and other settings.

WE 604 03(0-0-3)
Occupational Career Counseling.
F. Prerequisite: VE 601. Appraisal of individuals' training potential and personal data; administration. scoring. and interpretation of the GATB.

VE 610 03(0-0-3)
Principles of Supervision and Evaluation.
F. SS. Prerequisite: VE 601. Supervision and evaluation of instruction including required Colorado evaluation training.

VE 611 03(0-0-3)
Introduction to Educational Administration.
S. SS. Prerequisite: ED 485A or B. Structure. organization. administrative organization of public education and the educational administrator.

VE 612 03(0-0-3)
Vocational Administrative Strategies.
S. SS. Prerequisite: VE 601. Basic educational systems; the scientific method as a basis for analysis; systems as a tool for planning and decision making.

VE 613 03(0-0-3)
Postsecondary School Management.
S. SS. Prerequisite: VE 601. Principles and concepts for business operation in postsecondary schools.

VE 614 03(0-0-3)
Planning and Administering School Facilities.
S. SS. Prerequisite: VE 601. Determination of facility and equipment needs; translation of these needs into effective educational plans and specifications.

VE 617 03(0-0-3)
School Finance.
F. SS. Prerequisite: VE 611. Sources of revenue. budgeting; management of internal accounts.

VE 618 03(0.-0-3)
School Law.
S. SS. Prerequisite: VE 611. Legal framework for operation and management of public and private schools emphasizing legal responsibilities for administrators and teachers.

°VE 620 02(0-0-2).
Advanced Teaching of Vocational Agriculture.
SS. Prerequisite: VE 425. Course construction related to agricultural enterprises and occupations as applied to yearly plans. longtime job outlines. job analysis.

***VE 622 02(0-0-2)**
Supervising FFA Activities.
SS. Prerequisite: VE 402. Principles. practices. and innovations in all phases of the organization emphasizing leadership training and ways and means of improving local FFA chapter.

***VE 623 02(0-0-2)**
Program Planning in Vocational Agriculture.
SS. Prerequisite: VE 425. Procedures in planning and evaluating a community program of agricultural education in secondary schools.

***VE 630 02(0-0-2)**
Organization of Business and Office Education.
SS. Prerequisite: VE 300. Procedures for organizing new programs and for managing or modifying existing programs.

WE 631 02(0-11-2)
Management of Business-Office Departments.
SS. Prerequisite: VE 300. Preparation of teachers and administrators for implementation of vocational business and office education programs.

***VE 640 02(0-0-2)**
Methods In Vocational Marketing Education.
SS. Prerequisite: VE 441. Instruction and curricula for secondary and postsecondary vocational marketing education.

°VE 641 02(0-0-2)
Programs in Vocational Marketing Education.
SS. Prerequisite: VE 441. Techniques used in determining need for and implementations of new or additional programs of vocational marketing education.

°VE 650 02(0-0-2)
New Directions In Home Economics Education.
SS. Prerequisite: Experience in teaching home economics. Analysis and study of current issues in teaching home economics.

VE 656 03(0-0-3)
Tests and Assessment.
S. SS. Prerequisite: ED 600. Use of tests in educational and vocational assessment.

VE 665 03(3-0-0)
HRD Consultation and Analysis of Organizations.
F.S. Prerequisite: ED 600. Identify and evaluate human resource development and organization change needs and strategies in response to organization performance issues.

WE 666 03(3-0-0).
Program Evaluation.
F.S. Prerequisite: ED 600. Models and practices of program evaluation in both public and private sector organizations.

VE 684 Var.
Supervised College Teaching.
F. S,

SS. VE 687 Var.
Internship.

VE 692A-E Var.
Seminar.
A) Trends and issues. B) Human resource development. C) Leadership development. D) Staff development. E) Counseling.

VE 693 Var.
Seminar.

VE 694 Var.
Independent Study.

VE 696 Var.
Group Study.

VE 698 Var.
Research.

VE 699 Var.
Thesis.

VE 700 03(0-0-3)
Advanced Research Methods.
S. Prerequisite: ED 606. Design. data analysis. interpretation of results. and evaluation of educational research studies.

VE 70102(0-0-2)
Analytic Designs in Vocational Research.
F. S. Prerequisite: VE 700. Design and interpretation of vocational education surveys. evaluations. economic analysis. and curriculum research.

VE 702 03(0-0-3)
Teacher Education.
S. Prerequisite: VE 601. Development. organization. and administration of teacher education programs.

***VE 703 03(0-0-3)**
Staff Development Administration.
F. Prerequisite: ED 635 or written consent of instructor. Organization and administration of staff development: goals. approaches. evaluation. potential benefits and problems. current research. needs and trends.

VE 706 03(0-0-3)
Analysis of Relationships.
S. SS. Prerequisite: ED 600. Inferential and correlational data analysis.

VE 708 031.0-0-3)
Trends and Issues in Education and Training.
S, SS. Prerequisite: VE 601. Identification. analysis, and implications of current trends and issues.

VE 709 03(0-0-3)
Leadership Development.

F.S. Prerequisite: VE 601. Principles. theories. attributes. and skills related to individual leadership development.

VE 711 03(0-0-3)
Postsecondary School Personnel Administration.
S. SS. Prerequisite: VE 611. Postsecondary staff recruitment, selection. orientation, in-service and preservice program. and staff evaluation.

VE 712 02(0-11-2)
State Administration of Vocational Education.
SS. Prerequisite: VE 611. Duties and responsibilities of vocational state department personnel in relation to federal. regional. state. and local policies.

VE 713 03(0-0-3)
Alternative Instructional Delivery Systems.
SS. Prerequisite: VE 601. Managing nontraditional postsecondary instructional delivery systems including cooperative education. customized training, and distance education.

VE 765 03(0-0-3).
Strategic Planning of Education for Work.
F.S. Prerequisite: EC 504, VE 665. Human capital as component of strategic planning of education; training and development at national. regional. and organizational levels.

VE 766 03(0-0-3)
HRD and Adult Life-Span Learning Policy Making.
F, S. Prerequisite: AD 624. VE 506. Public and private sector policy development processes and issues relating to human resource development and adult life-span learning program development.

VE 767 03(0-0-3)
Cross-Culture and International Training.
F, S. Prerequisite: AD 624. Vt. 506. Issues, models. techniques of development and delivery of human resource development and training programs across cultural, interregional, national barriers.

VE 786 Var.
Practicum.

VE 792A-K Var.
Seminar.
A) Human resource development. B) Leadership development. C) Trends and issues. D)Vocational research. E) Postsecondary. F) Teacher education/staff development. H) Counseling. 11 Data analysis/interpretation. J) Survey research methods. K) Qualitative research.

VE 793 Var.
Seminar.

VE 799 Var.
Dissertation.

VETERINARY MEDICINE COURSES

College of Veterinary, Medicine and Biomedical Sciences

VM 601 02(2-0-0)
Perspectives in Veterinary Medicine I.
F. Prerequisite: Admission to professional curriculum in veterinary medicine. Identification and development of personal. professional. and leadership skills and orientation to PVM program and veterinary profession.

VM 602 02(2-0-0)
Perspectives in Veterinary Medicine II.
S. Prerequisite: Admission to professional curriculum in veterinary medicine. Overview of professional activities and career choices.

VM 606 02(2-0-0)
Veterinary Immunology.
F. Prerequisite: Admission to professional curriculum in veterinary medicine. Basic components and principle regulatory mechanisms of immunity.

VM 616 07(3-9-0
Functional Anatomy.
F. Prerequisite: Admission to professional curriculum in veterinary medicine. Comparative anatomy. histology. and physiology of musculoskeletal system; basic concepts of histology. cell biology. and embryology.

VM 618 07(5-6-0)
Organ Systems-Anatomy and Physiology.
F. Prerequisite: Admission to professional curriculum in veterinary medicine. Gross. microscopic anatomy and physiology of gastrointestinal, cardiovascular, respiratory. hemopoietic, urinary systems in selected domestic animals.

VM 619 04(3-34)
Veterinary Neurobiology.
S. Prerequisite: Enrolled in professional veterinary medicine program. Structural and functional foundations of nervous system activity; introduction to clinical neurology.

VM 623 02(2-0-0)
Veteran, Nutrition and Metabolism.
S. Prerequisite: Enrolled in professional veterinary medicine program. Intermediary/metabolism. nutrients. and animal nutrition.

VM 624 03(2-2-0)
Veterinary Feeds and Feeding.
S. Prerequisite: VM 623. Description. advantages. and limitations of feedstuffs fed to domestic livestock; nutrient requirements and formulation of rations for various needs.

VM 625 01044)
Principles of Diagnostic Imaging.
S. Prerequisite: Admission to professional curriculum in veterinary medicine. Diagnostic radiography. computed tomography. ultrasound. magnetic resonance. and nuclear medicine.

VM 638 05(44-0
Biology of Disease Agents.
S. Corequisite: VM 640. Biology of principle infectious disease agents of importance to veterinary medicine.

VM 640 05(3-0-2)
Biology of Disease I.
S. Corequisite: VM 638. Introduction to mechanisms of subcellular, cellular, tissue, and organ response to injury and associated pathological processes.

VM 643 01(04-0
Tissues in Disease.
F, S. Prerequisite: VM 640 or concurrent registration. Macroscopic and microscopic tissue changes in spontaneously occurring disease processes.

VM 704 01044)
Veterinary Ethics.
F. Prerequisite: Admission to professional curriculum in veterinary medicine. Moral and ethical issues affecting the veterinary profession.

VM 705 01044)
Veterinary Jurisprudence.
F. Prerequisite: Admission to professional curriculum in veterinary medicine, Legal and professional issues affecting the practice of veterinary medicine.

VM 710 02(244)
Practice of Veterinary Medicine.
F, S. An and business aspects of veterinary practice; practice management techniques.

VM 711 02(244)
Applied Dairy Nutrition.
S. Credit not allowed for both VM 711 and VS 711. Nutrient requirements of dairy animals; feedstuffs in dairy rations: computer ration formulation.

VM 714 04(2-0-2)
Epidemiology and Environmental Health.
F. Prerequisite: VM 638, VM 640. Principles of epidemiology and environmental health hazards in veterinary medicine.

VM 722 04(4-0-0)
Veterinary Pharmacology.
F. Prerequisite: VM 619. Basic and clinical pharmacology. therapeutic practice. and pharmacy management.

VM 724 06(4-0-2)
Bioanalytical Pathology.
F. Prerequisite: VM 640. Mechanisms. interpretation. and applications of laboratory analyses for solving diagnostic problems.

VM 726 0204-0
Principles of Imaging Interpretation.
S. Prerequisite: VM 625. Clinical indications and interpretation for imaging modalities in examination of body systems.

VM 735 03(3-0-0)
Principles of Anesthesia and Surgery.
S. Prerequisite: VM 722. Surgery principles and terminology. and anesthesia principles and techniques.

VM 741 02(2-0-0)
Biology of Disease II.
F. Prerequisite: VM 638. VM 640. Pathogenesis of toxicologic/metabolic. and immune-mediated diseases; systemic pathology.

VM 742 0J(2-24)
Biology of Disease III.
S. Prerequisite: VM 741. Pathogenesis of disease in organ systems, systemic pathology.

VM 744 04(3-2-0)
Theriogenology.
S. Prerequisite: VM 619. Reproductive function and disease. including mammary gland and endocrine regulation of reproduction and lactation.

VM 745 04(4-0-0)

Introduction to Clinical Sciences I.
S. Corequisite: VM 742. Diagnostic approaches to common medical problems of cardio-vascular. urinary. and digestive-hepatic systems.

VM 746 03(3-0-0)
Nondomestic Animal Medicine.
S. Prerequisite: VM 640. Handling, diagnosis, and treatment of diseases of nondomestic animals.

VM 747 03(3-0-0)
Introduction to Clinical Sciences II.
S. Prerequisite: VM 745. Diagnostic approaches to common medical problems of neurologic. respiratory. and musculoskeletal systems.

VM 748 02(2-0-0)
Food Animal Management and Herd Health.
F. Prerequisite: VM 714. Basic orientation to food animal production units; introduction to herd health concepts in various species.

VM 749 02(244)
Introduction to Clinical Sciences III.
F. Prerequisite: VM 747. Diagnostic approaches to common medical problems of the endocrine-metabolic. integumentary. and ophthalmic systems.

VM 750 020-0-0
Population Health Management.
F. Prerequisite: VM 714. Prevention. economics, surveillance, and management of disease on a herd or population basis.

VM 757 OS(540)
Food Animal Medicine and Surgery I.
F. Prerequisite: VM 747. Health management, and diagnosis and treatment of diseases of food animals.

VM 759 05(5-0-0)
Food Animal Medicine and Surgery II.
S. Prerequisite: VM 749. Health management. and diagnosis and treatment of diseases of food animals.

VM 763 05(5-0-0)
Equine Medicine and Surgery I.
F. Prerequisite: VM 747. Health management. and diagnosis and treatment of diseases of horses.

VM 765 05(5-0-0)
Equine Medicine and Surgery II.
S. Prerequisite: VM 749. Health management, and diagnosis and treatment of horses.

VM 773 05(5-0-0)
Small Animal Medicine and Surgery I.
F. Prerequisite: VM 747. Health management, and diagnosis and treatment of diseases of dogs and cats.

VM 774 05(544)
Small Animal Medicine and Surgery II.
S. Prerequisite: VM 749. Health management, and diagnosis and treatment of diseases of dogs and cats.

VM 775 04(0-0-4)
Small Animal Clinical Problems I.
F. Prerequisite: VM 747. Medical and surgical problems of dogs and cats.

VM 776 04(0-0-4)
Small Animal Clinical Problems II.
S. Prerequisite: VM 749. Medical and surgical problems of dogs and cats.

VM 778A-D 01(04)-0
Special Animal Medicine.
F.S. Prerequisite: VM 747. Diagnosis and treatment of diseases of selected species of animals. A).Avian medicine. B) Rodent. rabbit. and primate medicine. C) Captive wildfire medicine. D) Camelid medicine.

VM 786A-G Var.
Practicator
Prerequisite: A) Completion of second year of professional veterinary medicine curriculum. Maximum of 12 credits allowed in course. B-D) VM 786A. A) Junior practicum. Var. (5-7) B) Senior practicum-equine clinical block. C) Senior practicum-small animal medicine block. D) Senior practicum-clinical service block. E) Senior practicum-small animal surgery block.
F) Senior practicum-food animal clinical block. G) Senior practicum-alternative track block.

VM 792 Var (1-2).
Seminar.

VM 795 Var (1-5)
Independent Study.
Prerequisite: VM 786A or B or C or D or concurrent registration.

VM 796A-W.
Group Study.
Prerequisite: VM 786A or concurrent registration. A) Food animal infertility and embryo transfer 02(2-0-0) B) Topics in clinical pathology 01(0-0-0) C) Equine lameness 02(2-0-0) D) Diseases of wildfire 01(0-0-0) E) Equine reproduction management and AI 02(2-0-0) H) Advanced clinical oncology 01(0-0-0) I) Applied animal behavior 02(2-0-0) J) Applied swine diagnostics 01(0-0-0) K) Arian medicine and surgery: clinical approaches 01(0-0-0) L) Equine medicine and diagnosis 01(0-0-0) M) Feline medicine 01(0-0-0) N) Food animal anesthesia and surgery 02(2-0-0) 0) Medical and surgical aspects of ophthalmology 0(0-0-0) P) Ophthalmic examination techniques 01(1-0-0) Q) Pet loss and client grief 01(1-0-0) T) Topics in small animal surgery 01(0-0-0). U) Topics in equine neonatology 01(1-0-0) V) Equine clinical procedures 01(1-0-0) W) Clinical pharmacology 01(1-0-0).

CLINICAL SCIENCES COURSES

Clinical Sciences Department College of Veterinary Medicine and Biomedical Sciences

VS 300 03(3-0-0)
Prevention and Control of Livestock Diseases.
F. Common ailments of livestock; sanitation and disease prevention and control.

VS 602 020-0-0
Critical Evaluation of Scientific Literature.
F. Prerequisite: EH 307/ST 307 or ST 301. Method of evaluating scientific literature. Students present critiques of papers they have chosen.

***VS 605 02(2-0-0)**
Comparative Anesthesiology.
S. Prerequisite: PS 450. Techniques in anesthesia for large and small animals.

***VS 606 01(0-3-0)**
Comparative Anesthesiology Laboratory.
S. Prerequisite: VS 605 or concurrent registration. Techniques in anesthesia for large and small animals.

VS 612 02(2-0-0)
Plastic and Reconstructive Surgery.
F. Prerequisite: VM 786B or C or D. Advances in surgical patient care, surgical instrumentation. and reconstruction.

VS 613 01(0-3-0)
Plastic and Reconstructive Surgery Laboratory.
F. Prerequisite: VM 786B or C or D. Advances in surgical patient care, surgical instrumentation. and reconstruction.

***VS 626 02(2-0-0)**
Infertility and Genital Disease.
F. Prerequisite: PS 500. Infectious and noninfectious causes of reproductive failure in food animals.

WS 630 03(3-0-0)
Orthopedic Surgery.
F. Techniques, devices. and prosthetic materials in rehabilitating musculoskeletal problems.

WS 631 01(0-3-0)
Orthopedic Surgery' Laboratory.
F. Prerequisite: VM 786A or B or C or D; VS 630 or concurrent registration. Procedures applied to skeletal preparations and living animals.

VS 642 05(4-2-0)
Ophthalmology.
F. Prerequisite: Written consent of instructor. Instrumentation. ocular therapeutics. and clinical ophthalmology.

***VS 645 03(2-3-1)**
Surgery of the Eye.
S. Prerequisite:VS 642. Techniques. indications! ,red complications.

***VS 650 03(3-0-0)**
Comparative Abdominal Surgery.
F. New techniques in surgery of abdominal viscera.

***VS 651 01(0-340**
Comparative Abdominal Surgery Laboratory.

F. Prerequisite: VM 786A or B or C or D; VS 650 or concurrent registration. Reparative and reconstructive abdominal surgical procedures.

***VS 660 03(3-0-0).**
Neurology and Neurosurgery.
S. Diagnostic and surgical techniques 1 or the nervous system.

***VS 661 01(0-3-0)**
Neurology and Neurosurgery Laboratory.
S. Prerequisite: VM 786A or B or C or D; VS 660 or concurrent registration. Production and correction of surgically amenable lesions in central and peripheral nervous system; electrodiagnosis.

VS 662/EH 662 03(2-0-0
Applied Research-Planning/Design/Analysis.
S. Prerequisite: EH 307/ST 307. Credit not allowed for both VS 662 and EH 662. Guidelines for conducting applied research through use of epidemiologic methods.

***VS 673 03(3-11-0)**
Thoracic and Cardiovascular Surgery.
F. Surgical approaches to the thorax and the central and peripheral cardiovascular system.

***VS 674 01(0-3-0)**
Thoracic and Cardiovascular Surgery Laboratory.
F. Prerequisite: VM 786A or B or C or D; VS 673 or concurrent registration. Surgical procedures applied to the chest, heart. and vessels.

VS 699 Var.
Thesis.

***VS 701 Var. (1-3).**
Postgraduate Medicine I.
F. Prerequisite: D.V.M. or written consent of department head. Comprehensive review. update of immunology. emergency medicine. dermatology. and endocrinology.

***VS 702 Var. (1-3).**
Postgraduate Medicine II.
S. Prerequisite: ().VM. or written consent of department head. Comprehensive review update of neurology. gastroenterology, and ophthalmology.

VS 703 Var (1-3).
Postgraduate Medicine III.
F. Prerequisite: D.V .M. or written consent of department head. Comprehensive review. update of oncology. cardiology. reproduction. ophthalmology, and radiology.

'VS 704 Var (1-3).
Postgraduate Medicine IV.
S. Prerequisite: D.VM. or written consent of department head. Comprehensive review. update of hematology, nephrology, urology. respiratory. hepatic. and pancreatic.

VS 716 02(2-11-0)
Advanced Studies in Reproduction.
S. Prerequisite: PS 655. Biochemical and physiological basis for problems in reproduction.

VS 744 04(3-2-0)
Theriogenology.
S. Prerequisite: PS 501. Credit not allowed for both VS 744 and VM 744. Reproductive function and disease. including mammary gland and endocrine regulation of reproduction and lactation.

VS 784 Var.
Supervised College Teaching.
F. S,

SS. VS 792 Var.
Seminar.

VS 795A-S Var (1-5)
Independent Study.
Maximum of 5 credits allowed per subtopic. A) Small animal medicine. B) Large animal medicine. C) Small animal surgery. D) Equine surgery. E) Food animal surgery.
F) Small animal orthopedics. G) Equine orthopedics. H) Large animal reproduction. 0 Anesthesiology. 0 Cardiology. K) Neurology. L) Dermatology. N) Ophthalmology. O) Herd health management. P) Equine lameness. Q) Comparative surgery. S) Epidemiology.

VS 796 Var.
Group Study-Medicine.

VS 798 Var.
Research.

VS 799 Var.
Dissertation.

WEED SCIENCE COURSES

Plant Pathology and Weed Science Department College of Agricultural Sciences

W 308 04(2-2-0)
Biology and Control of Weeds.
F. Prerequisite: B 120 or BY 103B; C 245. Classification, characteristics. reproduction. identification. ecology of weeds; weed control by cultural. biological. and chemical means; herbicides.

W 495 Var. (1-3)
Independent Study.
Maximum of 7 credits allowed in course.

W 496 Var. (1-3)
Group Study.
Maximum of 7 credits allowed in course.

***W 808 03(3-0-0)**
Environmental Fate of Herbicides.
S, Prerequisite: W 308. Processes that affect fate of herbicides and their metabolites in the environment with emphasis on soil and water.

W 509 03(3-0-0)
Herbicide Selectivity and Action.
S. Prerequisite: B 440, W 308. Selectivity of major photosynthetic and growth inhibitor herbicides based on herbicicle transport. metabolism. and mode of action.

W 684 Var.
Supervised College Teaching.
F. S.

W 696 Var (1-3)
Group Study.
Maximum of 7 *credits* allowed in course.

W 698 Var.
Research.'

W 699 Var.
Thesis.

W 792 01(0-0-0
Seminar.

W 796 Var.
Research.

W 799 Var.
Dissertation.

WOMEN'S STUDIES COURSES

COLLEGE OF LIBERAL ARTS

WS 200 03(3-0-0)
Introduction to Women's Studies.
F. Examination of gender roles in work. education. spirituality. relationships. health. institutions. and organizations.

WS 397 03(3-0-0)
Group Study.

WS 472A-C 03(3-0-0)
Seminar in Women's Studies.
F, 8, Prerequisite: Enrolled in Women's Interdisciplinary Studies Program or written consent of instructor. A) Humanities. B) Social sciences. C) Natural sciences.

WS 495 Var (1-3).
Independent Study.
Prerequisite: Approval of Women's Studies Director and relevant department head(s).

WS 687 Var (1-3)
Internship In Women's Studies.
Supervised work experience in an approved agency or setting.

WS 692 03(0-0-3)
Seminar In Women's Studies.
Prerequisite: One semester of enrollment in Women's Interdisciplinary Graduate Studies Program or written consent of instructor.

WS *695* Var (1-3)
Independent Study.
Prerequisite: Approval of Women's Studies Director and relevant department head.

WS 699 Var. (3-6)
Thesis.
Prerequisite: Approval of Women's Studies Program Board.

ZOOLOGY COURSES

Biology Department College of Natural Sciences

Z 100 03.
Introduction to Biology.
F, S, S 5. Offered as telecourse only. Basic concepts in biology. including genetics. the human body. and interactions with their environment.

Z 101 03(3-0-0)
Humans and Other Animals
F, S. SS. Credit not allowed for students who have already taken BY 102 or BY 103A and B or Z 110. Characteristics of animals. their evolution and diversity; humans considered as an animal.

Z 110 04(3-2-0)
Principles or Animal Biology.
F.S. General features and relationships of major phyla of animals.

Z 212 04(3-3-0)
Animal Biology-Invertebrates.
F.S. SS. Prerequisite: BY 103A. General biology of invertebrates; their characteristics. classification. and adaptations.

+Z 214 04(3-3-0)
Animal Biology-Vertebrates.
F. S. SS. Prerequisite: BY 103A. Special fee, $15. General biology of vertebrates; their characteristics. classification. and adaptations.

Z 279 01(0-2-0)
Biological Information Processing.
F, S. SS. Introduction to the computer for data accumulation. management. processing, searching, graphing, and telecommunications,

Z 309 03(3-0-0)
Animal Behavior.
F. SS. Prerequisite: BY 102, BY 103A;orZ 110. Principles of ethology, behaviors of infrahuman animals emphasizing their adaptive significance and phylogenetic relationships.

+*Z 301 02(04-0)
Animal Behavior Laboratory.
S. Prerequisite: Z 300. Special fee. $15. Laboratory experiments in animal behavior; demonstrations and independent investigations.

Z 305 01 (0-2-0)
Computer Graphing and Modeling for Biologists.
F. Prerequisite: Z 279. Computer drawing. plotting. graphing, and modeling.

Z 306 02(04-0)
Biological Software Authoring.
S. Prerequisite: Z 305. Creating programs on the computer for use in courses in biological sciences.

Z 3101PS 310 03(3-0-0)
Fundamentals of Physiology.
F. Prerequisite: One semester of organic chemistry or concurrent registration. Credit not allowed for both Z 310 and PS 310. Basic physiological mechanisms.

Z 315 03(2-0-1)
Marine Ecology.
S. Prerequisite: BY 103A and B. C 245. Unique aspects of various ecosystems of the world-ocean and its borders.

+*Z 329 03(2-3-0)

Herpetology.
S. Prerequisite: BY 102, BY 103A; or Z 110. Special fee. $8. Biology of amphibians and reptiles.

Z 330 03(2-2-0)
Mammalogy.
F. Prerequisite: BY 102, BY 103A; or Z 110. Evolution. classification, and biology of mammals; practice in identifying and preparing specimens,

+Z 335 030-4-0)
Ornithology.
S,SS. Prerequisite: BY 103A or Z 110. Special fee. $7. Biology of birds. especially behavior. ecology, and identification in the laboratory and field.

Z 346 03(3-0-0)
Evolution and Heredity.
F. Prerequisite: BY 102. BY 103A; or Z 110. Evolutionary theories and hi story; heredity mechanisms that are basis for variation, evolution, and biological communication between generations.

Z 350/B 350 03(3-0-0)
Molecular and General Genetics.
S. Prerequisite: BY 102; concurrent registration in organic chemistry. Credit not allowed for both Z 350 and B 350. Primarily for students in biological sciences, Mendelian genetics. molecular genetics, and population genetics, emphasizing molecular basis of genetics.

Z 384 Var (1-3)
Supervised College Teaching.
F.S. SS. Maximum of 6 credits allowed in course.

***Z 40103(3-0-0)**
Comparative Physiology.
F. Prerequisite: BY 102, BY 103A; or Z 110. Physiological mechanisms of digestion. metabolism, osmoregulation. excretion, circulation, and respiration in vertebrate and invertebrate animals.

Z 402/B 402 03(3-0-0)
Chromosomes of Eukaryotes.
S. Prerequisite: BY 310. Credit not allowed for both Z 402 and B 402, Structure, function, and behavior of normal eukaryotic chromosomes during interphase, mitosis, and meiosis.

°Z 403 03(3-0-0)
Comparative Endocrinology.
F. Prerequisite: BY 310, BY 311. Comparison of integrative mechanisms, primarily endocrine and neuroendocrine systems in vertebrate and invertebrate animals.

°Z 405 03(3-0-0)
Fish Physiology.
S. Prerequisite: BY 103A, C 113, PH 110. Physiology of jawless, cartilaginous, and bony fishes, with emphasis on maintaining homeostasis.of the internal environment.

***Z 424/EN 424 03(3-0-0)**
Principles of Systematic Zoology.
F, Prerequisite: BY 102, BY 103A; or Z 110. Credit not allowed for both Z 424 and EN 424. Principles and methods of classification. zoological nomenclantre, taxonomic decisions regarding species and higher categories.

Z 425 02(2-0-0)
History of Biology.
S. Prerequisite: B 120. Z 110. History of biological concepts from prehistoric to modern times.

Z 430 03(2-0-0
Biology of Aging.
F. Prerequisite: One course in biology. Aging as a basic phenomenon of animal life.

***Z 433 03(3-0-0)**

Behavioral Genetics.
F. Prerequisite: One course in genetics. Genetics of behavioral characteristics in human and intrahuman species.

Z 440 04(2-4-0)
Freshwater Biology.
S. Prerequisite: BY 102, BY 103A: or Z 110. Collection, identification, ecology, and evolution of freshwater organisms,

+°Z 441 03(2-2-0)
Stream Biology.
F. Prerequisite: BY 220 or Z 440. Special fee, $13. Biology of running waters including field and laboratory techniques.

+*Z 443 03(2-2-0)
Limnology.
F. Prerequisite: BY 220 orZ 440. Special fee, $13. Biology. chemistry. and physics of lakes including limnological methods.

Z 455 03(3-0-0)
Human Heredity and Birth Defects.
S. Prerequisite: BY 102, BY 103A; or Z 110. Human heredity and its individual and social implications; causes of congenital defects.

Z 462/MB 462 05(3-4-0)
Parasitology and Vector Biology.
F. Prerequisite: BY 102, BY 103A; or Z 110. Credit not allowed for both Z 462 and MB 462. Protozoa. helminths. and insects and related arthropods of medical importance; systematics. epidemiology, host damage and control.

+Z 475 04(3-3-0)
Animal Ecology.
F. Prerequisite: BY 102, BY 103A; or Z 110. Special fee, $15. Population, community, and habitat ecology as related to animals.

+Z 477 05(2-6-0)
Field Biology. S,
SS. Prerequisite: B 120, Z 110; or BY 102, BY 103A and B. Credit not allowed for both Z 41 ID and Z 477. Special fee, $11. Techniques useful in analysis of natural populations including field experience.

Z 478 03(3-0-0)
Evolution.
S. Prerequisite: One course in genetics. Biological mechanisms of evolutionary change in populations and results of their operation.

Z 492A-D Var. (1-3)
Seminar.
A) Behavior. B) Ecology. C) Genetics. D) Ornithology.

Z 495 Var.
Independent Study.

***Z 505 03(2-3-0)**
Ecology of Parasitism.
S. Prerequisite: Z 462. Host, parasite. and environment as interacting systems.

°Z 507 03(2-3-0)
Parasitic Protozoa.
S. Prerequisite: Z 462. Protozoa as disease agents: classification. identification, transmission, and host-parasite relations.

Z 510 03(3-0-0)
Zoo physiological Ecology.

S. Prerequisite: One course in physiology, one course in ecology. Concepts. principles. and examples of adaptive physiological strategies used by animals.

Z 535 03(3-0-0)
Behavioral Ecology.
S. Prerequisite: Z 110 or BY 103A; Z 300, M 155. one course in ecology. Integrative approach to ecology, animal behavior. evolution; emphasis on foraging, social organization. communication in birds and mammals.

Z 536 03(3-0-0)
Cellular Basis of Behavior.
F. Prerequisite:AY 300/PS 300. Z 300; or written consent of instructor. Exploration of how nerve cells produce behavior in multi-cellular animals.

Z 545 02(2-0-0)
Presenting Research In Biology.
F. Prerequisite: Written consent of instructor. Procedures for preparing and presenting results of biological research in scientific journals and at professional meetings,

°Z 560 030-0-2)
Ethological Methods.
S. Prerequisite: Z 300. Ethological methods used in both descriptive and experimental studies of animal behavior.

Z 562/MB 562 050-8-0)
Field Ecology of Disease Vectors.
SS. Prerequisite: Z 462/MB 462 or MB 300: EN 302. Credit not allowed for both Z 562 and MB 562. Evolution, morphology, life cycles, and field biology of disease vectors; field techniques and experience in surveillance of arthropods and pathogens.

Z 576 03(2-2-0)
Biophysical Ecology.
S. Prerequisite: Z 475 or B 450; M 155. PH 110, CS 150. Interactions of organisms with their environments to exchange energy and mass; physiological. behavioral, and ecological implications.

Z 584 Var (1-3)
Supervised College Teaching .
F. S, SS. Maximum of 6 credits allowed in course.

Z 587 Var.
Internship.

Z 594 Var.
Independent Study.

Z 596 Var.
Group Study.

Z 692A-F Var (1-3)
Seminar.
A) Behavior. B) Development. C) Ecology. D) Genetics. E) Ornithology. F) Limnology.

Z 698 Var.
Research.

Z 699 Var.
Thesis.

Z 784 Var (1-31.
Supervised College Teaching.
F.S. SS. Maximum of 6 credits allowed in course.

Z 794 Var.
Independent Study.

Z 798 Var.
Research.

Z 799 Var.
Dissertation.

FACULTY AND STAFF

STATE BOARD OF AGRICULTURE

Name Address	Term Expires
A. Gary Ames Denver	1995
Duane C. Boes, Ph.D Fort Collins	1994
Owen "Brad" Butler Denver	1995
Dave Coffman 2 Durango	1994
Wiley Y, Daniel Denver	1993
James R. Isgar Hesperus	1996
Patricia D. Kelly Pueblo	1994
Chuck Mabry Fort Collins	1996
Romaine Pacheco Denver	1993
Roger Peters, Ph.D. Durango	1994
Chris Piper Fort Collins	1994
Walter L. Price Boulder	1993
John R. Stulp, Jr., D.V.M Lamar	1994
Ron Vigil Pueblo	1994
Will Wright. Ph.D Pueblo	1994

Officers

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A. Gary Ames Third Executive Committee Member
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Beverly Michoski Assistant Secretary Executive Committee
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John Bliss Vice Chancellor. Administrative Affairs
Lee Combs Associate General Counsel
Judith Schmidt Deputy General Counsel
Ardy Ornno. Staff Assistant
Brian Snow, General Counsel
Richard Tusa Director, Internal Auditing
Gary Ames
James Isgar
1 Faculty and student representatives from Colorado State University.
2 Faculty and student representatives from Fort Lewis College.
3 Faculty and student representatives from University of Southern Colorado.

COLORADO STATE UNIVERSITY ADMINISTRATION

President

Yates, Albert C., B.S. (Memphis State University). Ph.D. (Indiana University).

President's Cabinet

Bomotti, Gerald J., B.S. (Oregon State University), M .A. (Washington State University), Vice President for Administrative Services.

Gilfoyle, Elnora M., B.S., O.T.R. (University of Iowa), Sc.D. (Hon.) (Colorado State University). Provost and Academic Vice President.

Harper, Judson M., B.S., M.S., Ph.D. (Iowa State University of Science and Technology). Vice President for Research.

Katsimpalis, Melissa A., B .A. (Northwestern University), A .P.R., Executive Director. Public Relations.

Miller, Jack H., B.B .A. (Washburn University of Topeka), M .A. (Eastern Michigan University), Vice President for University Advancement.

Miser, Keith M., B.S., M.S., Ed.D. (Indiana University), Vice President for Student Affairs.

Powers, Myra L., B.S. (City University of New York, City College). M.Ed. (City University of New York, Hunter College), Assistant to the President.

Snow, Brian A., B.S.B.A., M.A. (University of Arkansas). J.D. (Duke University), General Counsel.

College Deans

Aunon, Jorge I., B.S., M.S., Sc.D, (George Washington University), Interim Dean, College of Engineering.

Crabtree, Loren W., B.A., M.A., Ph,D, (University of Minnesota), Dean. College of Liberal Arts.

Dyer, A. Allen, B.S. (University of California, Berkeley), M.S., Ph.D. (Utah State University), Dean, College of Natural Resources.

Heird, James C., B.S., M.S. (University of Tennessee), Ph,D. (Texas Tech University), Interim Dean, College of Business.

Knox, Kirvin L., B.S. (California State University), M.S. Ph.D. (Colorado State University). Dean. College of Agricultural Sciences/Associate Provost for Agriculture and Public Service.

Oltjenbruns, Kevin A., B.S., M.H.Ec. (Colorado State University). Ph.D. (University of Colorado), Interim Dean. College of Applied Human Sciences.

Raich, John C., B.S., Ph.D. (Iowa State University of Science and Technology), Dean. College of Natural Sciences.

Voss. James L., B.S., D.V.M., M .S. (Colorado State University), Dean. College of Veterinary Medicine and Biomedical Sciences.

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Omi. Philip N., B.A., M.S., Ph.D. (University of California. Berkeley). Interim Associate Provost for Undergraduate Studies.

Presley. Cheryl L., B.A., M.Ed. (Colorado State University). M.A., Ph.D. (University of Michigan). Assistant Vice President for Student Affairs.

Smilie. Mollie W., B.S. (Colorado State University). C.P.A. Assistant Vice President for Business and Financial Services.

Smith. Ralph E., B.S. (Colorado State University). Ph.D. (University of Colorado Health Sciences Center). Associate Vice President *lot* Research.

DEPARTMENTS OF ADMINISTRATION

Academic Advancement Program
Aragon. Geraldine J., B .A. (Adams State College of Colorado). M.A. (University of Northern Colorado). Director.

Academic Computing and Networking Services
Kateley. Julian. Jr., B.S., M.S. Ph.D. (Michigan State University). Director.

Administrative Services
Bomotti. Gerald J., B.S. (Oregon State University). M.A. (Washington State University). Vice President for Administrative Services.

Admissions and Records
Jacks. G. Kay. B.S.E. (University of Arkansas). M.Ed. (Xavier University). Executive Director. Enrollment Services.
Arevalos, Anna Dean. B.A., M.A. (Colorado State University). Assistant Director. Admissions.
Bauer, Keith. B .S. (Colorado State University). Counselor. Admissions,
Beal. Brett. B.A. (Scripps College). Assistant Director. Admissions.
Bennan. Hedy. B.A. (The City University of New York. Brooklyn College). M.A. (New York University). Assistant Director. Admissions.
Berwick. Paul W..Jr., B.S.Ed. (Northeastern University). M.S.Ed. (Westfield State College). Assistant Registrar.
Dahl. Stephen 0. B.S. (Colorado State University). Assistant Registrar.
Eddy. D. Allan. B .S . M.S. (Colorado State University). Director. Student Data Control.
Gao, Lily. B.A., M.A. (Northeast Missouri State University). Counselor. Admissions.
Kapp. J. Fred. B.S. (Colorado State University). M.A. (University of Northern Colorado). Associate Director. Admissions.
Lujan. Neal. B.A. (Colorado State University). Assistant Director. Admissions.
Maldoando, Alvaro. B.A. (University of Colorado). Assistant Director. Admissions.
Ontiveros. Mary R., B.S. M.Ed. (Colorado State University). Director. Admissions.
Ralford. Tracey. B .A., M.S. (Colorado State University). Counselor, Admissions.
Schmidt. Louise. B.S. (William Smith College). M.S. (Colorado State University). East Coast Representative. Admissions.
Stearns. Kathleen. B.A. (University of Rochester). M.S. (State University of New York. College at Brockport). Assistant Director. Admissions.
Toilman. Don. B.A. (University of Colorado). Assistant Director. Admissions.
Trujilllo. Tillle. B.A. (Colorado State University). Associate Director. Admissions.

Advocacy Services
Ahuna. Linda M., B.S. (University of California. Irvine). M.Ed. (Colorado State University). Director. Services for Asian American Students.
Fiscus. Carolyn K., B.S., M.S. (South Dakota State University). Ed. Sp. (Northwest Missouri State University). Ed.D. (Northern Arizona University). Director. Native American Student Services.
Hughes. Blanche M., B.A. (Earlham College). MA. (Colorado State University). Director. Black Student Services.
Kreston. Rosemary. B .A. (Wayne State University). M.A. (University of Northern Colorado). Director. Resources for Disabled Students.
Salazar. Guadalupe. B.S., B.A. (University of Northern Colorado). Director. El Centro/Hispanic Student Services.
Wedge. Karen J., B.S. (University of Arizona). M.S. (Indiana University). Director. Women's Programs and Studies.

Armed Forces Services Division
Nanez. Jose A., Jr., Major. United States Army. B.S. (Southern Methodist University). Department of Military Science.
Tellborg. Edwin R., Colonel. United States Air Force. B.S. (Colorado State University). M.A. (Texas Christian University). Department of Aerospace Studies.

Budgets and Institutional Analysis
Ickes. Keith L., B.A. (Baldwin-Wallace College). M .A. (Indiana University). Director.

Business and Financial Services
Smilie, Mollie W., B.S. (Colorado State University). C.P.A., Assistant Vice President for Business and Financial Services.
Conner, Gary D., B.S. (University of Colorado). C.P.A., Treasurer.
Goss, Elbert G., B.S. (Colorado State University). M.B.A. (University of Denver). Controller.
Schneider, John R., B.A. (University of Northern Colorado). C.P.M . Director. Purchasing.

The Career Center
Daniel. Mary E., B.S. (Michigan State University). M.S. (Eastern Michigan University). M.Ed. (Colorado State University). Interim Director.
Bornholt, Melissa R., B.A. (Colorado State University). Recruiting Coordinator. Center for Applied Studies in Ethnicity
Fowler. Carolyn. B.A., M.A. (University of California. Berkeley), Ph.D. (University of Pennsylvania). Director.

Colorado Water Resources Research Institute
Ward. Robert C., B.S. (Mississippi State University). M.S., Ph.D. (North Carolina State University at Raleigh). Professional Engineer, Director.

Community Services
Keller. Victoria. B.A. M .A. (Colorado State University). Director.

Conference Services
Sommer, Craig, B.S. (Colorado State University), M.A. (American International College), Associate Director, Marketing and Scheduling.
Haak, Tina, B.A., M.S. (Colorado State University). Assistant Director. Operations.
Williams, Beverly, B.S., M.Ed. (Colorado State University), Assistant Director. Programs.

Continuing Education Division
Bankirer. Marcia W., B.S.M.Ed. (Colorado State University). Ph.D. (University of Wyoming). Associate Provost for Extended Studies.

Cooperative Extension Service
Rowerts, Milan A., B.S. (University of Illinois). M.Ed. (Colorado State University). Director.

Drug and Alcohol Education
Conway, S. Maureen. B.S. (University of Wyoming). Director.

Educational Access and Outreach Center (Upward Bound/Talent Search)
Thayer. Paul B., B .A. (Williams College). M.P.A. (University of Colorado at Denver). Director.

Environmental Health Services
Johnson. Janet A., B.S. (University of Massachusetts). M.S. (University of Rochester). Ph.D. (Colorado State University). Associate Director for Environmental Health Services.

Equal Opportunity
Hiatt. Dana S., B .A. (Langston University). J.D. (The University of Kansas). Director.

Experiment Station
Laughlin. Charles W. B.S. (Iowa State University of Science and Technology). M .S. (University of Maryland). Ph.D. (Virginia Polytechnic Institute and State University). Director.

Facilities Development
Baker. Ronald A., B.S., B.S. (University of Colorado), Interim Director of Facilities Development.

Facilities Operations
Grip. Thomas M., B.S. (University of Wisconsin-Eau Claire). M.B.A. (University of Michigan).

Interim Director of Facilities Operations.

Financial Aid/Student Employment

Jacks, G. Kay. B.S.I'. (University of Arkansas). M.Ed. (Xavier University). Director.
Calhoun. Sandra N., B.S. (Miami University), M.S. (Colorado State University). Associate Director, Systems and Processing.
Dunkle. Marvin N., B.A. (Tarkio College). M.Ed. (Colorado State University). Associate Director.
Smith. Donald L., B.A. (University of Northern Colorado), M.Ed. (Colorado State University). Associate Director. Client Services and Student Employment.
Hahn. Joyce. Assistant Director. Processing.

HELP/Success Center

Shang. Paul. B .A. M .A., Ph.D. (Florida State University). Director.
DiGregorio. Gaye Golter. B.S. (Colorado State University). M.A. (Bowling Green State University). Assistant Director.
Larkins. Randy. B.S. M.S. (Colorado State University). WAN Manager/Academic Counselor.
McCasland. Jayna, B.S. (Colorado State University). Assistant to the Director for Orientation Services.
Nededog. Arlene. B.S. M.F.d. (Colorado State University). Assistant Director.

Housing and Food Services

Sherwood. Grant P., B.A. (The College of Wooster). M.A. (Michigan State University). Ph.D. (University of Northern Colorado), Director.
Bertschy, William J., B.S., M.Ed. (Colorado State University), Ph.D. (University of Northern Colorado). Director, Pingroe Park.
Dunning, Thomas M., B .S.M.A. (Brigham Young University), Ph.D. (Colorado State University). Director. Conference Housing/Environmental Services.
Flores, Alfred, B.S. (New Mexico State University), M.B.A. (Colorado State University), Director. Apartment Life.
McCormick. Michael J., B.S. (Kent Slate University). Director. Operations Management.
McKelfresh. David. B.A. M.Ed. (Colorado State University). Ph.D. (University of Northern Colorado), Director. Residence Life.
West, Charles J., B.S. (University of Denver), Director, Food Services.

Human Resource Services

Liley, William B., Jr., B.S., M.S. (Colorado State University), Director.

Information Systems

Hesser, Don M., B.A. (Wichita State University), Director.

Instructional Services

Linck, A.J., B.S., MS. Ph.D. (The Ohio State University), Interim Director.
Herr. Kay U., B.A. (Valparaiso University). M.A., Ph.D. (University of Colorado). Associate Director. Intercollegiate Athletics
Johnson. Corey. B.S. (Augustana College). Director. International Programs
Jaros. Doan. B.A. (Lawrence College). M.A., Ph.D. (Vanderbilt University). Director. International Programs.
Smith. Freeman M.B.S., M.S. (University of Arizona). Ph.D. (Colorado State University). Associate Director. International Programs.
Niehaus. Merle H., B.S., M.S. (Oklahoma State University). Ph.D. (Purdue University). Director. International Research and Development.
Griswold. Jean S., B .A. (Occidental College). M.A. (Colorado State University). Director. International Student Services.
Barber. Louise M.B.S., M.S. (Florida State University). Study Abroad Adviser. International Education and Training.
Deuney, Martha A.B.S. (University of Missouri. Columbia). M.Ed. (Colorado State University). Coordinator. International Education and Training.
Flannery. Cynthia L.B.S. (Colorado State University). Director. U.S. Center for Australian Universities. International Education and Training.
Harms, Patricia C., B .A. (University of Tulsa). Assistant Foreign Student Adviser. International

Student Services.
Shoemaker. Betty F., B.A. (University of Northern Colorado). Foreign Student Adviser. International Student Services.
Warner. Lynne P., B .A. (Colorado State University). Coordinator. Sponsored Degree Programs. International Student Services.

Judicial Affairs
Hadgem. Anne G.B.A., Ed.S. (University of Northern Colorado). Director.

Laboratory Animal Resources
Maul. Donald H., B.S., D.V.M. (Colorado State University). Director.

Nontraditional Student Office
Lopez. Harold. B.A. (Loma Linda University). M.A. (California State University. Long Beach). Director.

Public Relations Department
Kalsimpalis. Melissa A.B.A. (Northwestern University). Executive Director of Public Relations.

Recreational Sports
Ellis, H. William, B.S., M.Ed. (Colorado State University), Director.

Research Administration
Harper, Judson M., B.S., M.S., Ph.D. (Iowa State University of Science and Technology). Vice President for Research.
Brown. James F., B.Ed. (University of Wisconsin-Whitewater). M.S. (Colorado State University). Assistant Vice President for Research.
Matzdorff. LaVina I. Administrator. Regulatory Committees.
Mohney. James A., B.S. (Colorado State University). Manager of General Operations Funds and Facility Security Officer.
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