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This bulletin contains general information and course descriptions. Students should consult the appropriate Schedule of Courses for day, time, and meeting place of classes as well as particular registration information.

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**General Information**

**UCD ACADEMIC CALENDAR**

<table>
<thead>
<tr>
<th>Deadline Dates for Applications for Admission</th>
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<tbody>
<tr>
<td>The application deadline dates indicated herein will be observed provided space is available for the term indicated. The University reserves the right to change these dates in accordance with prevailing enrollment patterns. Interested applicants are encouraged to apply as early as possible for the term desired. All credentials required in the admission process must be on file with the Office of Admissions and Records by the deadline date if consideration for admission is to be made for the term desired. Applicants who are unable to complete the filing of required credentials for one term may elect to have their admission consideration date moved forward to the next or any subsequent term. Transfer applicants should take into account the time involved in having official transcripts sent from collegiate institutions attended previously and apply sufficiently in advance of the application deadline to insure that these documents are on file by the required date. Foreign applicants are advised that 120 days are usually required for credentials to arrive in this office from most international locations.</td>
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</tbody>
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<table>
<thead>
<tr>
<th>New Undergraduate Students</th>
<th>Fall Semester 1976</th>
<th>Spring Semester 1977</th>
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<tr>
<td>Former University of Colorado students</td>
<td>June 15</td>
<td>Oct. 1</td>
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<td>Special students</td>
<td>July 15</td>
<td>Nov. 1</td>
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<tr>
<td>Special to degree student status change</td>
<td>June 15</td>
<td>Oct. 1</td>
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</tbody>
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<tr>
<th>Graduate Students</th>
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<tbody>
<tr>
<td>Please call the school in which you are planning to enroll for deadline dates.</td>
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<tr>
<td>Business</td>
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<tr>
<td>Education</td>
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<tr>
<td>Environmental Design</td>
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<tr>
<td>Public Affairs</td>
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</tbody>
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For information regarding all other programs in the Graduate School, call the Graduate School office, 892-1117, ext. 414.

(Note: Prospective students are advised that different academic calendars are used by each campus of the University of Colorado. Specific information must be obtained from the campus to which the individual expects to apply.)

The following academic calendar for 1976-77 is provided for planning purposes. Prospective students should refer to information on this page regarding dates all required credentials must be on file for consideration for admission. To register for courses for any selected term, students must have been officially admitted to the University of Colorado at Denver for that term.

**Fall Semester 1976**

Students should obtain a copy of the Fall Semester 1976 Schedule of Courses for complete calendar information and instructions for registration.  
Aug. 17, 18, 19 (Tues., Wed., Thurs.)—Registration (see note below).  
Aug. 23 (Mon.)—Classes begin. Late registration (see note below).  
Sept. 6 (Mon.)—Labor Day holiday. No classes. All offices closed.  
Nov. 25-27 (Thurs., Fri.)—Thanksgiving holiday. No classes. All offices closed.  
Nov. 29 (Mon.)—Classes resume.  
Dec. 8 (Wed.)—Classes end.

**Spring Semester 1977**

Students should obtain a copy of the Spring Semester 1977 Schedule of Courses for complete calendar information and instructions for registration.  
Jan. 25, 26, 27 (Tues., Wed., Thurs.)—Registration (see note below).  
Jan. 31 (Mon.)—Classes begin. Late registration (see note below).  
May 20 (Fri.)—Classes end. Commencement in Boulder.

**Summer Term 1977**

Calendar to be announced.

**Registration Notes**

*Registration. New applicants will not be considered for admission on the days of registration. Former students desiring to return to the institution should consult with the Office of Admissions and Records regarding readmission application procedures and deadlines.  
Late Registration. Because of limited space, eligible students who did not register during the days provided may have difficulty obtaining the classes desired. A late fee will be assessed.*
THE UNIVERSITY OF COLORADO AT DENVER

. . . AN URBAN UNIVERSITY CAMPUS

History
Beginning in 1912, courses were made available to residents of the Denver metropolitan area through the Extension Division of the University of Colorado in Boulder. Classes were held in scattered locations throughout the city until 1938, when they were gathered in one center. Increasing enrollment necessitated two moves to larger quarters, and the Denver Center came to its present location at 14th and Arapahoe Streets in 1957. In 1965, the Denver Center became a degree-granting institution, enabling students to complete full academic programs in Denver.

In January 1973, the Board of Regents adopted a resolution changing the names of the University’s centers because of an amendment to the Constitution of the State of Colorado which gave the centers legal status as separate branches of the University. The Denver Center was renamed the University of Colorado at Denver (UCD).

Location
UCD is situated at the hub of a tremendous growth area. The downtown campus is accessible to both city dwellers and suburban commuters from an eight-county area with an estimated population of 1,506,000. Located across Cherry Creek from the Auraria Higher Education Center campus, UCD shares facilities with Metropolitan State College and the Community College of Denver in the Auraria complex while remaining a unique urban institution in itself. The UCD campus is close to major business establishments and government offices in downtown Denver, as well as to civic and cultural centers.

Enrollment
UCD is one of the largest state-supported institutions of higher education in Colorado in terms of enrollment. The average number of students enrolled for credit is about 8,000 during the fall and spring semesters and 4,000 during the summer term.

Academic Programs
Academic and public service programs are especially geared to the needs of the urban population and environment, as well as to traditional fields of study. Students may earn degrees in more than 50 undergraduate fields and some 20 graduate areas. These educational endeavors emphasize quality instruction, research, and professional training. Academic programs within the University are offered by colleges that admit freshmen, by professional schools that admit students who have completed at least two or three years of preprofessional study, and by the Graduate School. Colleges and schools at UCD are:

College of Liberal Arts and Sciences
College of Business and Administration and Graduate School of Business Administration
School of Education
College of Engineering and Applied Science
College of Environmental Design
College of Music
Graduate School
Graduate School of Public Affairs

Accreditation and Memberships
UCD is fully accredited by the North Central Association of Colleges and Secondary Schools and is a member of the Association of Urban Universities.
The College of Business and Administration and Graduate School of Business Administration is a member of the American Assembly of Collegiate Schools of Business. The School of Education is accredited by the National Council of Accreditation of Teacher Education and membership is held in the American Association of Colleges of Teacher Education.

The Engineers’ Council for Professional Development (ECPD) has accredited the programs in civil engineering and electrical engineering in the College of Engineering and Applied Science. The College of Environmental Design is accredited by the National Architectural Accrediting Board, and is a member of the Association of Collegiate Schools of Architecture and Collegiate Schools of Planning, and is recognized by the American Institute of Planners. The College of Music is a member of the National Association of Schools of Music.

The Graduate School of Public Affairs is a member of the National Association of Schools of Public Affairs and Administration.

Year-Round Operation
Classes at UCD are scheduled six days a week, both day and evening. Students may begin studies in most degree fields at the start of any one of the academic terms of the year, which include a fall semester of 16 weeks, a spring semester of 16 weeks, and an 8-week (half-semester) summer term. More than half of the courses at UCD are offered during evening hours, permitting students maximum flexibility in planning for both employment and educational goals.

Faculty
More than 230 highly qualified faculty members teach full time at UCD; 70 percent have earned doctoral degrees. The faculty is alert to the challenges of the urban scene and responsive to the needs of the urban student.

Students
Strongly motivated people from all walks of life make up the student body. The diversity of interests, knowledge, occupations, backgrounds, and age stimulates a unique learning experience for these men and women. Ages range from 16 to 70. About 60 percent of the students enrolled are at the junior, senior, fifth year, graduate, or special student-baccalaureate-degree levels.

Prospectus
As an urban university, UCD has a fundamental commitment to meet the needs of the metropolitan Denver community; it seeks to keep pace with the needs of the current city-oriented student and at the same time plan for the demands of the future. Programs are continually being enlarged and expanded, as additional funds and space are made available, to offer students a broad scope of educational opportunities, whether the student is seeking a general education or has a desire to study in a highly specialized area.

UCD’s primary role is to provide graduate, professional, and upper division education, with undergraduate programs designed especially for those students who plan to undertake graduate work or professional study.

Equal Opportunity Policy Statement
The University of Colorado at Denver follows a policy of equal opportunity in education and in employment. In pursuance of this policy, no UCD department, unit, or employee shall discriminate against an individual or group on the basis of race, color, national origin, sex, age, or physical handicap. This policy applies to all areas of the University affecting present and prospective students or employees.
A UCD Equal Opportunity/Affirmative Action program has been established to implement this policy. Complaints regarding possible discrimination at this University should be directed to either of the two people listed below, who will advise individuals of existing complaint procedures internal and external to the University.

Affirmative Action Director: Dr. Janet Moone, Room 806, ext. 355.
Title IX Coordinator: Alice Owens, Room M110B, ext. 385.

REQUIREMENTS FOR ADMISSION
UCD seeks to identify applicants who have a high probability of successful completion of an academic program. Admission decisions are based on evaluation of many criteria. Among the most important are:

1. Evidence of scholarly ability and accomplishment shown on national aptitude and achievement tests (ACT/ SAT).
2. General level of previous academic performance.
3. Ability to work in the academic environment of an urban, nonresidential campus.
4. Maturity, motivation, and potential for academic growth.

An applicant who is granted admission to UCD must reflect in a moral and ethical sense a personal background acceptable to the University. The University reserves the right to deny admission to applicants whose total credentials indicate an inability to assume those obligations of performance and behavior deemed essential by the University and relevant to any of its lawful missions, processes, and functions as an educational institution.

High School Concurrent Enrollment
High school juniors and seniors of proved academic ability may be admitted to UCD for courses which supplement their high school programs. Credits for University courses taken in this manner may subsequently be applied toward a University degree program. Interested high school students may contact the Office of Admissions and Records for complete information and application instructions (telephone [303] 623-1181).

Admission of Freshmen (Those Who Have Not Had Prior Collegiate Experience)
New freshmen may apply for admission to the Colleges of Business and Administration, Engineering and Applied Science, Music, and Liberal Arts and Sciences.

1. General Requirements. The applicant must be a high school graduate or have been awarded a High School Equivalency Certificate as a result of the completion of the General Educational Development Test (GED). Applicants who present the High School Equivalency Certificate of the GED must score at or above the 60th percentile on each section of the test to be eligible for consideration for admission. Individuals applying for admission to UCD who have completed the Spanish Language General Educational Development Test (GED) must also submit scores from Test VI, "English as a Second Language."

All applicants must present 15 units of acceptable secondary school credit. While the College of Liberal Arts and Sciences does not specify particular units, the Colleges of Business and Administration, Engineering and Applied Science, and Music have the following requirements:

<table>
<thead>
<tr>
<th>College of Business and Administration</th>
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<tbody>
<tr>
<td>College of Engineering and Applied Science*</td>
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</tr>
<tr>
<td>College of Music</td>
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</tbody>
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It is expected that all students will have had previous experience in an applied music area. Two years of piano training are recommended. The College of Music requires an audition of all entering freshmen and undergraduate transfer students. In lieu of the personal audition, applicants may substitute tape recordings (about 10 minutes in length on 7½ ips monaural) or a statement of excellence by a qualified teacher. Interested students should write to the College of Music, UCD, for audition or interview applications.

2. Colorado Resident Applicants.† Colorado resident applicants who meet the above general qualifications are divided into three categories:

a. Applicants who ranked in the upper one-half of their high school graduating class and have a composite score of 23 or higher on the American College Test (ACT) or a combined score of 1000 or higher on the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board are given preferred consideration.

b. Applicants who ranked in the upper two-thirds of their high school graduating class and who have an ACT composite score from 18 to 22 or a combined score of 800 or higher on the SAT will be considered for admission on an individual basis. These applicants cannot be assured admission.

c. Applicants who ranked in the lower one-third of their high school graduating class, or who have a composite ACT score below 18 or a combined SAT score below 800 will be considered for admissions on an individual basis by the Admissions Committee.

3. Nonresident Applicants.† Nonresident applicants must meet the general requirements stated above, and, in addition, must rank in the upper one-half of their high school graduating class and present an ACT composite score of 24 or higher or a combined SAT score of 1050 or higher to be considered for admission.

*Also see College of Engineering and Applied Science general information section of this bulletin.
†See page 9 for definition of "resident" and "nonresident" classification.
Nonresident applicants are advised that UCD does not maintain residence facilities. Housing is available in the Denver metropolitan area, but must be obtained by the individual without dependence on University services.

How To Apply for Admission

1. Applicants may apply for the fall semester, the spring semester, or the summer term. A schedule of application deadline dates for the various semesters and terms is noted on page 1, and will be supplied with the application form. Deadline dates are subject to change. An application received after the stated deadline for one semester or term will be considered for the next semester or term if the applicant notifies the Office of Admissions and Records.

2. An Application for Admission may be obtained by contacting:
   Office of Admissions and Records
   University of Colorado at Denver
   1100 Fourteenth Street
   Denver, Colorado 80202
   Telephone (303) 623-1181

A Colorado resident may also obtain this form from the office of his high school principal or counselor.

3. The application for admission must be completed in total and submitted to the above address prior to the stated application deadline for the term of enrollment desired. All applications for admission must be accompanied by a check or money order in the amount of $10. This application fee is nonrefundable.

In the event the applicant is granted admission but is prevented from enrolling during the term indicated on the application, the application fee will be valid for one full year (12 months) from the date of the term for which the applicant was applying; however, the applicant must notify the Office of Admissions of his intentions.

4. The applicant must request that a high school transcript, including his rank-in-class, be mailed to the above address by his high school.

5. The applicant must take either the American College Test (ACT) or the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board on one of the national testing dates. The student must request that test scores be sent to UCD (ACT code 0533, or SAT code R-4875).

If the applicant took one of these tests prior to his application for admission to the University of Colorado and did not designate UCD to receive a score report, he must request the testing agency to send the score to UCD. This is accomplished on a Request for Additional Score Report form available at test centers or from the appropriate office listed below.

Information regarding these tests may be obtained either from the applicant's high school counselor, the UCD Office of Admissions and Records, or from one of the following offices of the national testing agencies:

Registration Department
American College Testing Program (ACT)
P.O. Box 414
Iowa City, Iowa 52240

College Entrance Examination Board (SAT)
P.O. Box 1025
Berkeley, California 94704

College Entrance Examination Board (SAT)
P.O. Box 592
Princeton, New Jersey 08540

All credentials presented for admission become the property of the University of Colorado and must remain on file.

When a complete application (application form, transcript of high school work completed, statement of rank-in-class, required entrance test scores, counselor recommendation, and the nonrefundable $10 application fee) is received by the Office of Admissions and Records, a decision of admission eligibility will be made, and the applicant will be notified.

Admission of Transfer Students

New transfer students may apply for admission to the Colleges of Business and Administration, Engineering and Applied Science, Music, and Liberal Arts and Sciences.

1. Colorado Resident Applicants.* Colorado resident applicants are divided into the following three categories:

   a. Applicants who hold a collegiate record of more than 12 semester credits (18 quarter credits) from an institution of university rank, have a 2.0 cumulative grade-point average or higher (calculated on all work attempted), and are eligible to return to all institutions previously attended are given preferential consideration for admission. Applicants who have completed less than 12 semester credits (18 quarter credits) of collegiate work acceptable to the University of Colorado must meet requirements for admission as freshmen.

   b. Applicants who hold a collegiate record of at least 45 semester credits (68 quarter credits) from a college, have a 2.0 cumulative grade-point average (calculated on all work attempted), and are eligible to return to all institutions previously attended also are given preferential consideration for admission.

   c. Applicants who hold a collegiate record of less than 45 semester credits (68 quarter hours) from a college, have a 2.0 cumulative grade-point average or higher (calculated on all work attempted), and are eligible to return to all institutions previously attended will be considered for admission on an individual basis. Primary factors affecting the admission decision in such cases are: (a) the UCD college or school to which admission is desired; (b) quality of previous work attempted; (c) age, maturity, and noncollegiate achievements; and (d) time since the last collegiate attendance.

2. Nonresident Applicants.* Nonresidents must meet the general requirements stated above, and, in addition, must have a transferable grade-point average of 2.5 in order to be admitted to the Colleges of Business and Administration, Engineering and Applied Science, and Music. The above general requirements are sufficient for admission as a nonresident to the College of Liberal Arts and Sciences.

Nonresident applicants are advised that UCD does not maintain residence facilities. Housing is available in the Denver metropolitan area, but must be obtained by the individual without dependence on University services.

Applicants should consult the appropriate college or school section of this bulletin to determine specific entrance requirements.

When To Apply

Interested applicants who are currently enrolled in a collegiate institution should submit their applications for transfer admission after they have registered for the final term at

*See page 9 for definition of "resident" and "nonresident" classification.
the current institution. Evaluation of transfer credits will be based on an official transcript of record indicating work completed up to that last term of enrollment. An official transcript, indicating the grade results of the final term, will then be required in addition to the transcript furnished with the application.

Credentials Required for Transfer Admission
1. A University of Colorado transfer application.
2. The application fee of $10 in check or money order. (This fee is nonrefundable.)
3. An official transcript of record from each collegiate institution attended previously. If the applicant is currently enrolled at a collegiate institution and is submitting a transcript listing all courses except for the final term of enrollment, another official transcript must be submitted after completion of the final term.
4. An official high school transcript. If the applicant is a GED graduate, a GED Certificate of High School Equivalency, GED test scores, and a transcript of any high school work completed must be submitted. Individuals applying for admission to UCD who have completed the Spanish Language General Educational Development Test (GED) must also submit scores from Test VI, “English as a Second Language.”

All credentials presented for admission become the property of the University of Colorado and must remain on file.

Transfer of College Level Credit
The Office of Admissions and Records and the various deans’ offices cannot make an evaluation of credits from another collegiate institution or give specific degree advisement until complete and official credentials are on file and the applicant has been admitted. In general, transfer credits from other accredited collegiate institutions will be accepted insofar as they meet the degree, grade, and residence requirements of the student’s chosen program of studies at UCD.

College level credit may be transferred to the University of Colorado if it has been earned at a college or university of recognized standing, from Advanced Placement Examinations, or in military service or schooling as recommended by the Commission on Accreditation of Service Experiences of the American Council on Education; if a grade of C or higher has been attained; and if the credit is for courses appropriate to the degree sought at this institution.

The University of Colorado will accept up to 72 semester credits (or 108 quarter credits) of junior college work to apply toward the baccalaureate degree at the University of Colorado. No credit is allowed for vocational-technical or remedial courses.

A maximum of 60 semester credits of extension and correspondence work (not to include more than 30 semester credits of correspondence) may be allowed if the above conditions are met.

Readmission of Former Students
1. Former students of the University of Colorado who have not attended another collegiate institution since their last enrollment at the University of Colorado must submit a Former Student Application prior to the deadline for the term they wish to attend.
2. Former students of the University of Colorado who have attended another collegiate institution since their last enrollment at the University of Colorado must submit a Former Student Application form to apply for readmission. In addition, a $10 nonrefundable application fee must accompany the application if the student has taken 12 semester or 18 quarter hours since his last attendance at the University of Colorado. The student must request that an official transcript of record from the institution(s) attended be sent to UCD. Consideration for readmission will be made after receipt of all the above listed credentials.

The University reserves the right to deny readmission to former students whose total credentials reflect an inability to assume those obligations of performance and behavior deemed essential by the University and relevant to any of its lawful missions, processes, and functions as an educational institution.

Intrauniversity Transfer
UCD students wishing to change colleges or schools within the University of Colorado, or to change campuses within the University of Colorado system, must make application through the Office of Admissions and Records, Room 203. This application must be filed not later than 90 days prior to the term for which they wish to register.

Official Notification of Admission
The only official notification of admission to UCD is provided by the Office of Admissions and Records and is printed on a Statement of Admission Eligibility form. Letters from the various colleges and schools indicating acceptance into a particular program are subject to official admission to the institution.

Admission of Special Students
Persons who wish to take University courses but who do not plan to work toward a degree from the University of Colorado are referred to as “special” students. Normally, special students have an undergraduate degree. Courses taken as a special student are fully credited and can be used in transfer to other institutions or for various professional improvement programs in the course of the student’s employment. Students who have not previously earned an undergraduate degree should apply for an undergraduate degree program rather than applying for the special student category.

Special students are advised that registration for particular courses will be on a “space available” basis.

Certified school teachers with a baccalaureate degree who seek only a renewal of the certificate currently held and who do not require institutional endorsement or recommendation may qualify for the University-wide special student classification outlined above.

Persons holding a baccalaureate degree who seek teacher certification may qualify for the special student classification but must apply for and be admitted to the Teacher Education Program separately and meet all requirements of the School of Education. Applications for teacher education are considered once each year (deadline is February 1 for the following summer term and/or academic year). Information regarding such application may be obtained from the School of Education Office, 892-1117, ext. 276.

Special students may take courses on a pass/fail basis; however, such credit will be counted as part of the total pass/fail credit allowed by the various colleges and schools should the student apply and be accepted for degree status. The student must maintain an overall grade-point average of 2.0 or higher to continue as a special student.

Applying Special Student Credits Toward Degree
Continuing and former special students may apply for admission to an undergraduate degree program by submitting the Special to Degree Application, complete academic
credits, and the application fee. Accepted degree applicants may transfer a maximum of 12 semester credits as a special student to an undergraduate degree program with the approval of the appropriate academic dean. Acceptance of credit toward degrees at the University changed in fall 1970. Special students enrolled prior to that date may transfer credit in accordance with provisions in effect between January 1969 and August 1970.

Special students desiring to pursue a graduate degree at this University are encouraged to submit the complete Graduate Application and supporting credentials as soon as possible. However, a department may recommend to the graduate dean the acceptance of as much as 8 hours of credit toward the requirements of a master's degree for courses taken either as a student at another recognized graduate school, as a special student at the University, or any combination thereof. In addition, the department may recommend to the graduate dean the acceptance of credit for courses taken as a special student for the semester, quarter, or summer term for which the student has applied for admission to the Graduate School.

CREDIT FOR NONTRADITIONAL EDUCATIONAL EXPERIENCES

U.S. Air Force Reserve Officer Training Corps (AFROTC)

UCD students may participate in Air Force ROTC programs offered on the Boulder Campus.

Air Force ROTC offers two programs leading to a commission in the U.S. Air Force upon receipt of the baccalaureate degree. Graduate students may be commissioned upon the completion of 12 hours of the Professional Officers Course and a six-week summer training program.

1. Standard Four-Year Course. This program is in three parts: the General Military Course for lower division (freshman and sophomore) students, the Professional Officers Course for upper division students, and Corps Training, attended by all students. Completion of the General Military Course is a prerequisite for entry into the Professional Officers Course. Completion of a four-week summer training course is required prior to commissioning.

2. Modified Two-Year Program. This program is offered to full-time, regularly enrolled, degree candidates at both undergraduate and graduate levels who will have two years remaining at the University when they enroll. Selection is on a competitive basis. Applicants may apply directly to the Professor of Air Force Aerospace Studies not later than February 1 of the spring semester immediately preceding the semester in which they desire to enroll in the program. Those selected for this program must complete a six-week field training program during the summer months as a prerequisite for enrolling in the Professional Officers Course the following fall or spring semester.

Scholarships

Most students participating in the program are eligible to compete for an Air Force ROTC College Scholarship. Students selected for this program are placed on a grant that includes payment of tuition, book costs, nonrefundable educational fees, and subsistence of $100 per month, tax free. All cadets enrolled in the Professional Officers Course receive subsistence of $100 per month during the fall and spring semesters, whether or not they are on scholarship.

Credit will be allowed for ROTC courses toward fulfillment of the requirements for a degree provided the department accepting the credit considers the work to be of suitable educational value. For more information on Air Force ROTC, and registration for AFROTC courses, write to Air Force ROTC Det 105, Folsom Stadium, Gate 3, Room 227, University of Colorado, Boulder, Colorado 80309, or call 492-8331.

U.S. Army Reserve Officer Training Corps (ROTC)

The Army ROTC program at UCD prepares students to become officers in the U.S. Army. Through this program qualified men and women have the opportunity to earn regular and reserve commissions while they are obtaining their college degrees. No previous military or ROTC experience is required and financial assistance is provided in the junior and senior years.

The ROTC program offered by the Department of Military Science consists primarily of a general four-year course of study designed for freshman students. There is also available, however, a special two-year course of study in which sophomore students who have not taken the first two years of ROTC may qualify to enroll when they become juniors. Both courses of study include extensive classroom work and field experience in the areas of leadership and management.

For further information concerning the Army ROTC program at UCD, including cross-enrollment procedures for Metropolitan State College and University of Denver students, write to the Department of Military Science (Army ROTC), University of Colorado, Boulder, Colorado 80309 or call 492-6497.

Credit for Military Service and Schooling

If copies of discharge, separation papers, and a DD Form 295 (Application for the Evaluation of Educational Experience During Military Service) are submitted to the Office of Admissions and Records at the time of application for admission or subsequently, an evaluation will be made and credit awarded as recommended by the Commission on Accreditation of Service Experiences of the American Council on Education to the extent that such credit is applicable to the degree sought at this University.

Credit will be allowed for college courses satisfactorily completed through the U.S. Armed Forces Institute, subject to the usual rules involving credit of this nature.

College Level Examination Program (CLEP)

An exciting challenge with rewarding opportunities is available to incoming UCD students who can earn university credit by examination in subject areas in which they have excelled at college level proficiency. Interested students are encouraged to take appropriate subject examinations provided in the College Level Examination Program (CLEP) of the College Entrance Examination Board (CEEB) testing service. Students who score at the 67th percentile or above in subjects approved by the University college or school from which they plan to be graduated will be granted advanced standing and University credit. The cost per examination is $15.

Students who wish to challenge subject areas for credit are urged to examine carefully the list of approved examinations for the college or school to which they are applying, or the professional school to which they expect to apply after completion of the lower division requirements, in order to determine the applicability of such credit to specific graduation requirements.

CLEP subject examinations are administered at UCD during the fourth week of each month. CLEP subject examinations are also administered during the third week
of each month at test centers listed below (students should check with the institutions for testing days). Arrangements to take these examinations must be made well in advance of the testing date.

Colorado residents may obtain CLEP materials from the regional office by contacting:
- College Level Examination Program
  c/o College Entrance Examination Board
  2142 South High Street
  Denver, Colorado 80210
Colorado residents may also obtain CLEP information from the several test centers throughout the state, preferably from the center located nearest to the student’s high school. In Colorado, testing centers are located at:
- Metropolitan State College, Denver
- Colorado State University, Fort Collins
- El Paso Community College, Colorado Springs
- University of Southern Colorado, Pueblo
- University of Denver, Denver
- Fort Lewis College, Durango
- University of Colorado at Boulder
- University of Colorado at Denver
- University of Colorado at Colorado Springs

Students living outside of Colorado may secure CLEP information and application forms by writing:
- Institutional Testing Department
- College Level Examination Program
- Box 1822
- Princeton, New Jersey 08540

Students interested in obtaining advanced standing and University credit through CLEP tests should consult the college or school to which they are applying for admission or the professional school to which they expect to apply after completion of lower division undergraduate requirements for specific subject examinations acceptable to that college or school for the desired degree program.

**Advanced Standing by Examination**
Examinations for advanced standing credit may be granted to a student in degree status and in good standing for work completed by private study or by occupational experience if such credit is equivalent to courses offered by the University of Colorado. A nonrefundable fee is charged for each examination taken.

**Advanced Placement Program**
The University is a cooperating member of the Advanced Placement Program of the College Entrance Examination Board, which provides able high school students, while still in high school, an opportunity to take work and then to be examined for credit on the college level.

Advanced placement and college credit may be granted on the basis of the College Entrance Examination Board’s Advanced Placement Test. For students who achieve scores of 3, 4, or 5 in the CEEB’s Advanced Placement Examination, college credit and advanced placement will be granted. Students with scores below 3 may be considered by the department concerned. College credit granted will be treated as transfer credit without a grade but will count toward graduation and other specific requirements for which it may be appropriate.

**Study Abroad Program**
An important educational and cultural experience in the form of a study abroad program is available to all qualified University of Colorado students. UCD’s study abroad programs are identical to the programs offered by the University of Colorado at Boulder. Representatives from the Office of International Education have regularly scheduled office hours in Denver to advise UCD students interested in participation in a year, semester, or vacation study abroad program.

Specific information regarding the length of each program may be obtained from the Office of International Education, Boulder Campus, telephone 492-7741. Opportunities for study abroad are currently available in the following countries: Costa Rica, England, France, Germany, Israel, Italy, Japan, and Mexico. The program in Mexico offers students the opportunity to study intensive Spanish during the fall or spring semesters, and advanced students can enter the University of Veracruz in the spring.

The programs carry resident credit toward graduation from the University of Colorado. Information regarding these programs (academic requirements, language requirements, cost, etc.) is available from the Office of International Education. This office also has information on many other programs administered by other universities and agencies, issues International Student ID cards, helps with charter flights, and maintains a library. Interested students should contact their advisers and the Office of International Education early in their freshman or sophomore year in order to prepare for study abroad. UCD students also may obtain information in the Social Sciences Division, or from Professor James Wolf, UCD History Department.

For further information contact the Office of International Education, 914 Broadway, Boulder, Colorado 80309 (telephone 492-7741); Professor James Wolf, Social Sciences Division, UCD; or the Office for Student Relations, Room 615, ext. 291.

**UNIFORM GRADING SYSTEM**
Grades awarded by all undergraduate colleges and schools of the University of Colorado are:

- A - 4 grade points per credit hour; superior
- B - 3 grade points per credit hour; good
- C - 2 grade points per credit hour; fair
- D - 1 grade point per credit hour; minimum passing
- F - 0 grade points; failing

The instructor is responsible for determining the requirements for whatever grade is to be assigned. The cumulative grade-point average is computed by dividing the total number of credit points earned by the total number of hours attempted.

In addition to the grades indicated above, the instructor may assign one of the following:

- **IP** - incomplete (automatic conversion to F grade after one academic year if the course is not made up)
- **IW** - incomplete withdrawal (automatic conversion to W after one academic year if the course is not made up)
- **P** - in progress (graduate students only)
- **H** - honors (given only in the Honors Program)
- **NC** - for students registered on an audit/no grade basis
- **Y** - symbol used to indicate that an entire grade roster was not received by the time grades were processed
- **W** - drop without discredit

**Regulations Governing the Award or Accumulation of Additional Grades**

1. **Pass/Fail.** Up to 16 semester credit hours of regular course work may be taken on a pass/fail basis and credited toward the bachelor’s degree. No more than 6 semester
credit hours of course work may be taken on a pass/fail basis in any given semester. The pass (P) grade is not included in the student’s grade-point average; the fail (F) grade is included. For additional information see the general information portion of each college or school section of this bulletin.

2. Honors. Credit hours earned in honors courses with grades of H or P count toward the student’s degree but are not included in the grade-point average calculation.

3. Withdrawal. A notation of withdrawal will be placed on the permanent record of any student who withdraws with approval during any term. Students who cease to attend classes and do not officially withdraw from the University will be subject to grades of F in all course work for which they were enrolled during that term.

INSPECTION OF EDUCATIONAL RECORDS
Under provisions of the Federal Family Educational Rights and Privacy Act, students have a right to inspect and review their educational records. Requests for such inspection may be made to the Office of Admissions and Records, Room 203.

Under the terms of the Act as amended, the University is required to list the personal “directory information” which it has on its students that will be released unconditionally to anyone. This information will be released without the consent of the student unless he has asked that his prior consent be obtained. At the University of Colorado such directory information includes the following: student name, address, telephone listing, date of birth, major field of study, dates of attendance, degrees received.

Any student who does not wish this information released must complete a directory waiver form obtained from the Office of Admissions and Records prior to the end of the first week of classes of the appropriate term. The signing of this form will restrict release of all of the above information and will remain in effect until formally canceled by the student.

Students should be aware that the signing of this waiver form will prevent the above information being printed in University directories, commencement programs, etc.

WITHDRAWAL FROM THE UNIVERSITY
A student who leaves the University without officially withdrawing will receive a grade of F in each course for which he is registered. Withdrawal forms may be obtained from the office of the academic dean of the college or school in which the student is enrolled.

OTHER REGULATIONS
Students are advised to refer to the Schedule of Courses each semester for specific information regarding course loads, adding or dropping classes, adjustments in tuition as a result of dropped classes, etc. Where requirements differ from one academic area to another, the student is advised to abide by the regulations stated by the college or school in which he is enrolled.

EXPENSES
Educational expenses at UCD normally involve tuition, fees, books, and required materials. UCD does not maintain residence facilities. All costs related to housing must be arranged by the student at his own convenience. Transportation and parking costs should be considered in the determination of expenses.

Tuition and Fees*
All tuition and fee charges are established by the Regents of the University of Colorado in accordance with appropriate legislation enacted annually (usually late in the spring) by the Colorado General Assembly. A tuition schedule is published prior to registration for each term during the year. The rates indicated below are effective for the 1975-76 academic year and are provided to assist prospective students in anticipating cost. The student should check with the Office of Admissions and Records for specific tuition and fee information for the term for which he intends to apply.

Tuition For 1975-76

<table>
<thead>
<tr>
<th>Credit Hours of Enrollment</th>
<th>Residents</th>
<th>Nonresidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 3.0</td>
<td>$ 48.00</td>
<td>$111.00</td>
</tr>
<tr>
<td>3.1 - 4.0</td>
<td>64.00</td>
<td>148.00</td>
</tr>
<tr>
<td>4.1 - 5.0</td>
<td>80.00</td>
<td>185.00</td>
</tr>
<tr>
<td>5.1 - 6.0</td>
<td>96.00</td>
<td>222.00</td>
</tr>
<tr>
<td>6.1 - 7.0</td>
<td>112.00</td>
<td>638.00</td>
</tr>
<tr>
<td>7.1 - 8.0</td>
<td>128.00</td>
<td>638.00</td>
</tr>
<tr>
<td>8.1 - 9.0</td>
<td>144.00</td>
<td>638.00</td>
</tr>
<tr>
<td>9.1 or more</td>
<td>159.50</td>
<td>638.00</td>
</tr>
</tbody>
</table>

1. A student activity fee will be charged in addition to the above tuition as follows:
   - Summer term 1976 ...................................... $3
   - Fall semester 1976 .................................. 7
   - Spring semester 1977 ................................. 7

2. There is a one-time nonrefundable matriculation fee of $15 for new degree students and $5 for new special students in the University of Colorado. This fee will be assessed at the time of initial registration. Charges then will not be made for adding or dropping courses or for transcript orders. If a special student is admitted to degree status, he will be assessed a $10 matriculation fee at the time of his first registration after the change has been made.

3. Students certified by the Graduate School for enrollment for doctoral dissertation pay $72.

4. Graduate students who enroll for a comprehensive examination only will pay $45. Such students will be assessed regular tuition and fees if they need hours toward graduation.

5. Students enrolled in a chemistry laboratory course pay a $10 breakage deposit.

6. Students enrolled in the College of Music pay an $18 music facilities fee. This same $18 fee is charged to students enrolled in piano class, sound reinforcement and recording, and electronic music. No student is charged more than one $18 fee.

Assessment of Charges and Payment Regulations
All tuition and fees are assessed during registration and must be paid at that time. Any student who registers for courses is liable for payment of tuition and fees even though he may drop out of school. A student with financial obligations to the University will not be permitted to register for any subsequent semester or term, to be graduated, or to be listed among those receiving a degree or credits. The only exceptions to this regulation are notes and other types of indebtedness maturing after graduation. Arrangements may be made through the Finance Office

*The Board of Regents of the University of Colorado reserves the right to change tuition and fees at any time.
at the time of registration to defer payment of a portion of tuition and fees after a minimum down payment or one-third of the total tuition, whichever is greater. Specific information regarding deferred payment will be found in the Schedule of Courses which is published in advance of each term or semester.

Personal checks will be accepted for any University obligation. Any student giving a check which is not acceptable to the bank may be dropped immediately from the rolls of the University.

The student should refer to the Schedule of Courses for charges imposed for late registration and late payments.

Refund policies and policies related to adding and dropping courses and withdrawing from the University will be found in the Schedule of Courses published prior to each semester or term.

REGISTRATION

See Academic Calendar in this bulletin for dates. See the appropriate Schedule of Courses for complete registration information for each semester or summer term.

Note: There is a penalty fee for late registration.

Inter-Institutional Registration Within the Auraria Higher Education Center

Because UCD is a full participant in the Auraria Higher Education Center, students who are approved by their college dean may enroll for courses being offered by either the Community College of Denver-Auraria Campus or Metropolitan State College.

TRANSCRIPTS

Transcripts of records should be ordered from the University of Colorado Transcript Section, Regent Administrative Center 125, Boulder, Colorado 80309, or from the Office of Admissions and Records, University of Colorado at Denver, 1100 14th Street, Denver, Colorado 80202. Transcripts are prepared only at the student's written request. A student having financial obligations to the University that are due and unpaid will not be granted a transcript. Copies of transcripts from other institutions cannot be furnished.

RESIDENCY CLASSIFICATION FOR TUITION PURPOSES

A student is classified initially as an in-state or out-of-state registrant for tuition purposes at the time an application and all supporting credentials have been received in the Office of Admissions and Records. The classification is based upon information furnished by the student and from other relevant sources. The requirements for establishing residency for tuition purposes are defined by law of the State of Colorado (Chapter 124, Article 18, Colorado Revised Statutes 1963, as amended). To be eligible for consideration for in-state status the applicant must be 21 years of age or older (or an emancipated minor as defined by law); must have been physically domiciled in the state of Colorado for 12 consecutive months immediately preceding the date of registration for the term in which in-state status is desired; and must be able to present proof of compliance with other mandatory laws of the state (valid motor vehicle operator's license, valid motor vehicle registration, payment of state income tax, etc.).

After the student's status is determined, it remains unchanged in the absence of satisfactory evidence to the contrary. Classification standards conform to state statutes and judicial decisions and are applicable to all of Colorado's state-supported colleges and universities.

The student who, due to subsequent events, becomes eligible for a change in classification whether from out-of-state to in-state or the reverse has the responsibility of informing the tuition classification officer, Office of Admissions and Records, in writing within 15 days after such a change occurs. An unemancipated minor whose parents move their domicile from Colorado to a location outside the state is considered an out-of-state student from the date of the parents' removal from the state. He will be assessed nonresident tuition at the next registration. The student or his parent is required to send written notification to the tuition classification officer within 15 days after such a change occurs. If an adult student or an emancipated minor establishes domicile outside Colorado, he is to send written notification within 15 days to the tuition classification officer.

Petitioning for Classification Change

Any student who is 21 years of age or older, or an emancipated minor as defined by law, is qualified to change his domicile and his tuition classification status. Detailed instructions as to the procedure to follow, the necessary petition forms, and a copy of the appropriate Colorado statute governing tuition classification at state-supported institutions in Colorado are available from the tuition classification officer, Office of Admissions and Records, Room 203.

Classification Notes

1. Petitions will not be acted upon until an application for admission to the University and complete supporting credentials have been received.

2. Changes in classification are made effective at the time of the student's next registration.

3. A student who willfully gives wrong information to evade payment of the out-of-state tuition is subject to legal and disciplinary action.

SERVICES FOR STUDENTS

Services offered by the Office for Student Affairs are available to the student, either as an individual or as part of an organization. The Vice Chancellor for Student Affairs is concerned with the total University experience of each student. His associates and staff provide personalized assistance to the student in educational, social, organizational, and behavioral areas.

Counseling Center

The services of the Counseling Center are available by appointment to all students. Personal and vocational counseling, group experiences, and student testing are provided by trained and qualified counselors. Interviews are confidential, and there is no fee for counseling.

Financial Aid

A large proportion of UCD students receive financial assistance through grants, loans, or the work-study program. In addition, many students find part- or full-time employment in the community. Short-term emergency loans also are available.

Most financial aid is awarded on the basis of the student's financial need, with academic achievement a secondary consideration. For current information on deadlines, applications, and types of aid available the student should consult the Office of Financial Aid at UCD or his high school counselor.

Job Opportunities

Full- and part-time job opportunities are listed in the
Student Employment Service Office, Room 2, ext. 488. Career placement, after graduation, is available through the Boulder Campus Placement Center. Applications and further information are available through the UCD Student Employment Office. Career counseling can be scheduled through the Office for Student Affairs, Room 602, ext. 291.

Office of Veterans Affairs
All student veterans, whether new, transfer, or previous students, must notify the Office of Veterans Affairs of intent to enroll each semester. The office is responsible for assisting veterans in being properly certified with the Veterans Administration Regional Office and in obtaining all VA benefits they are entitled to receive.

The Office of Veterans Affairs advises veterans regarding personal and academic counseling, tutorial benefits, reading and study skills aid, employment referral services, and assistance in obtaining emergency situation short-term loans.
Specific information concerning VA policy for school attendance and receiving GI Bill benefits may be obtained from the Office of Veterans Affairs.

Services for Disabled Students
Special efforts are made at UCD to assist handicapped students in obtaining a university education to the fullest extent of their capabilities. A Services for Disabled Students Office is maintained to serve students who are in wheelchairs or otherwise partially disabled. Orientation to UCD, assistance in registering for classes, locating readers for blind students, and dealing with other problem areas to facilitate a rewarding school experience are functions of this office. Special reserved parking spaces are available, and plans are underway to provide employment and housing assistance as needed in the future. A movement was undertaken to remove architectural barriers to the handicapped, and there now exist no major barriers to free movement of handicapped students through the buildings.

Students From Other Countries
Appropriate applications for immigration certifications and work permits may be obtained through the Office for Student Affairs. Counseling, assistance with housing, and special information are available from the foreign student adviser at UCD, Room 602, ext. 291.

Health Insurance Program
Student health insurance coverage through Blue Cross-Blue Shield is automatic for all students. Students may elect to waive this coverage by signing a waiver card and returning the card with registration materials. If the waiver card is not returned upon registration, the health insurance assessment will be automatic. Cost to the student is $40.50 each semester and is subject to change. Dependent coverage also is available at an additional charge. Further information regarding this program may be obtained from the Office for Student Affairs, Room 602. For information regarding benefits contact the Denver Blue Cross-Blue Shield office at 831-5484 with reference to Group No. 20007.

Study Skills Center
The Study Skills Center program is based on the concept that all University students should have the opportunity to develop fully the skills necessary for their academic progress. Services are provided to meet students’ needs for general improvement of study habits and for specific help with particular subject areas.

Each semester the center offers three courses (St.Sk. 100, Developmental Composition; St.Sk. 101, Developmental Reading; and St.Sk. 102, College Preparatory Mathematics; see page 42) for which students may receive 1 semester hour of credit (pass or fail). Noncredit, five-week modular courses, such as Rapid Reading, are also offered, in which students may accelerate reading speed, learn reading flexibility, and build word-grouping ability and comprehension. Study Skills mini-courses (noncredit) are offered in such areas as use of the library, listening and taking notes, taking examinations, writing a term paper, time scheduling, and systematic approaches to study.

Tutorial assistance is available to students who need help in any subject area. The center also keeps a file for students wishing to participate in discussion groups prior to and during examination week.

The center has available a collection of books, including a number by minority authors and about minorities, which may be utilized for research assignments as well as for improvement of general knowledge.

The Study Skills Center is located on the fourth floor of the Bromley Memorial Library Building. It is open from 8 a.m. to 8 p.m. Mondays and Wednesdays, and 8 a.m. to 5 p.m. Tuesdays, Thursdays, and Fridays.

Women’s Center
Programs of special concern to women at UCD are offered through the Women’s Center. A cooperative student and faculty effort provides activities, personal and vocational counseling, and referral services.

STUDENT ACTIVITIES
Numerous student clubs and organizations exist to provide a variety of interests for students desiring extracurricular activities. The student newspaper, The Fourth Estate, is published weekly, and there is an active student government.

Students participate in dramatic and musical productions, reading programs, special seminars and workshops, and intramural sports. Lectures and programs are offered throughout the academic year.

Students are vitally concerned with current issues such as environmental action, politics, education for minority groups, and women’s liberation, and student clubs for such issues invite participation and ideas.

Several honorary societies, fraternities, and professional associations have active student chapters at Denver, and UCD students also are eligible for membership in Boulder Campus organizations.

ALUMNI PROGRAMS
A UCD Alumni and Friends organization was established in 1975 and pursues a year-round program of activities for the benefit of its members and in support of UCD. The organization is represented in the CU-wide Alumni Coordinating Council.

All UCD graduates and former students are eligible for membership in both the UCD Alumni and Friends and the CU Alumni Association. The Colorado Alumnius newspaper is mailed 11 times a year to graduates.

FACILITIES
The UCD campus consists of an eight-story tower and a classroom building providing a total of more than 50 classrooms, 26 teaching laboratories, faculty and administrative offices, the Bromley Memorial Library Building, an auditorium, cafeteria, and student lounges.
**Bookstore**

Textbooks and supplies are available at the UCD bookstore, located on the first floor of the Bromley Library Building. The bookstore is open from 9 a.m. to 8:30 p.m., Monday through Thursday, 9 a.m. to 5 p.m. on Friday, and is closed Saturday, Sunday, and holidays. It also remains open during semester breaks from 9 a.m. to 6 p.m. Monday through Thursday and 9 a.m. to 1 p.m. Friday. Students must present their validated ID card when paying for purchases by check. BankAmericard and Master Charge credit cards are also accepted.

**Library**

The Auraria Learning Resources Center (library) is located on 10th Street between Lawrence and Curtis Streets on the Auraria Campus. Hours of service are from 8 a.m. to 10 p.m. Monday through Thursday, 8 a.m. to 5 p.m. on Friday, and 9 a.m. to 4 p.m. on Saturday. The library is closed on Sunday. Special holiday and vacation hours are posted in the library.

The library collection includes reserve books, reference materials, journals, microfilms, music records and nonprint materials. Microform and media equipment, and listening facilities are provided. General reference service, interlibrary loans, and assistance with individual library problems are available through the reference office on the first floor.

Students also may use the Norlin Library on the Boulder Campus, or any library in a Colorado state-supported institution of higher learning, for research materials not available in the Auraria Library by presentation of the student’s validated ID card. Books may be borrowed through interlibrary loan to minimize the inconvenience to students who wish to use the resources of other libraries.

**Children’s Center**

A Children’s Center is available for use by students who have young children to be cared for while attending classes or using the library. It is partially supported by the UCD student government. For information call 892-1117, ext. 395.

**Classroom Locations**

Most classes and laboratory sections meet in the main UCD buildings. A few courses are scheduled at other facilities, and UCD shares classrooms and laboratories in the Auraria Higher Education Center. Locations are designated in the Schedule of Courses under Building Codes.

**Parking**

Parking is available at nearby commercial off-street lots both day and evening.

**COOPERATIVE EDUCATION PROGRAM**

Cooperative Education is a relatively new program at UCD. Based on the precept that experience is often the most effective educator, this program is designed to provide students of sophomore standing or above with an opportunity for preprofessional employment. This is accomplished by placing students as employees with businesses, agencies, and institutions which are operating in a capacity related to the student’s course work.

The program is now expanding its placement opportunities. Normally students work full time for one semester and then attend classes full time for the following semester. However, half-time positions are also available. This program enables students in all disciplines to gain experience and income while attending college.

Students in the College of Liberal Arts and Sciences may also receive credit for current job experiences. This permits students who already have jobs in their field of study to earn academic credit. Students also can obtain volunteer internships through the Cooperative Education Office and receive both credit and valuable experience for their efforts.

Students interested in any of these options can apply or obtain more information in Room 3A or by calling extension 555. Students in the College of Liberal Arts and Sciences should also refer to Cooperative Education in the Special Programs section of this bulletin.

**DIVISION OF CONTINUING EDUCATION**

The Division of Continuing Education is responsible for noncredit programs, off-campus credit classes, correspondence study, audiovisual services, continuation education, and community services in the Denver metropolitan area. These programs and resources of the University of Colorado are an integral part of the statewide coordinated program of off-campus instruction under guidelines established by the Colorado Commission on Higher Education.

The division’s responsibility is three-fold: (1) to assist individuals in business, government, and other professions to stay abreast of latest developments in their fields and enhance their abilities to advance; (2) to offer to the general public opportunities to explore liberal arts topics, thereby enriching their cultural, intellectual, and personal vitality; and (3) to assist agencies and individuals in solving social and community problems through research, investigation, and education.

Noncredit programs are open to all adults regardless of previous education or training. Some advanced courses require a background in a specific subject matter area. Except in certificate programs, no grade is awarded upon completion of a course.

Off-campus credit offerings supplement the regular academic programs offered at UCD. Admission requirements and refund policies for off-campus instruction are identical with requirements for enrollment in UCD. Individuals who have never been enrolled on any campus of the University of Colorado usually are admitted to off-campus instruction as special students.

Individuals interested in obtaining a copy of the Division of Continuing Education Bulletin or other information may write or call the division office at UCD, 1100 14th Street, 892-1117, ext. 286.
College of Liberal Arts and Sciences

PHYLLIS W. SCHULTZ, Acting Dean

INFORMATION ABOUT THE COLLEGE

The College of Liberal Arts and Sciences, originally established in 1971 as the College of Undergraduate Studies, was formed to serve the higher educational needs of qualified university students in the Denver metropolitan area. Reflecting the varied objectives of the urban student, the instructional program provides opportunities for general education in the arts and sciences both as an end in itself and as preparation for professional and graduate work. New programs in interdisciplinary studies particularly appropriate to the urban environment are being planned and implemented. Since many students are employed full time during the day, numerous courses are offered in the evening.

The college is organized into three divisions: Arts and Humanities, Natural and Physical Sciences, and Social Sciences. Each division offers a wide variety of curricula including traditional undergraduate majors, interdisciplinary studies, and preprofessional programs. In order to broaden the student’s perspectives, the college requires 12 semester hours of course work in each of the areas represented by the three divisions. However, the student is given a wide selection of courses to satisfy each of the three area requirements and the other requirements for his degree.

The college offers the following degrees: Bachelor of Arts (B.A.) and Bachelor of Fine Arts (B.F.A.). A student may complete a major in one of the following disciplines: anthropology, biology, chemistry, communication and theatre, distributed studies, economics, English, writing, fine arts, French, geography, geology, German, history, mathematics, philosophy, physics, political science, psychology, sociology, Spanish, and urban studies.

Students also enroll in the College of Liberal Arts and Sciences to prepare themselves for admission to one of the professional schools of the University, which include the School of Dentistry, School of Education, School of Journalism, School of Law, School of Medicine, School of Nursing, and School of Pharmacy. Each professional school has specific requirements which must be followed if the student intends to pursue a career in one of these fields.

REQUIREMENTS FOR ADMISSION

Freshmen

The student must be a high school graduate and must present 15 units of acceptable secondary work. (The College of Liberal Arts and Sciences does not specify particular units.) An applicant who has not graduated from high school must present satisfactory scores on the General Educational Development Test (GED) and a high school equivalency certificate to be considered for admission. Individuals applying for admission to UCD who have completed the Spanish Language General Educational Development Test (GED) must also submit scores from Test VI, “English as a Second Language.” High school is interpreted as grades 9, 10, 11, and 12. Students should refer to the General Information section of this bulletin for complete admission requirements.

Transfer Students

Students who have attended another college or university are expected to meet the general requirements for admission of transfer students as outlined in the General Information section of this bulletin.

Applicants (residents and nonresidents) will be considered for admission provided a minimum overall grade-point average of 2.0 (C) or better has been attained on all work attempted at all institutions attended. If the applicant has been away from the collegiate environment for more than three years, he will be considered on the basis of all factors available: high school record, test scores, original college admission qualifications, college performance, and interim experiences that might suggest potential success in the College of Liberal Arts and Sciences. A maximum of 72 semester hours taken at junior colleges may be applied toward a degree in the College of Liberal Arts and Sciences.

ADVANCED PLACEMENT PROGRAM

Advanced placement and college credit may be granted on the basis of the College Entrance Examination Board’s Advanced Placement Tests. For students who have taken an advanced placement course in high school and who make scores of 3, 4, or 5 in the CEEB’s Advanced Placement Examination, advanced placement as well as college credit will be granted. Students who make scores of 2 may be considered for advanced placement by the discipline concerned. College credit granted will be treated as transfer credit without a grade but will count toward graduation and the meeting of other specific requirements for which it may be appropriate.

College Level Examination Program (CLEP)

Prospective students who plan either to graduate from the College of Liberal Arts and Sciences or to enroll in the college to fulfill lower division requirements for professional schools may earn college level credit for advanced standing in the following CLEP Subject Examinations scored at the 67th percentile and above:

- American Literature
- Analysis and Interpretation of Literature
- English Literature
- American Government
- American History
- General Psychology
- Introductory Calculus
- Introductory Economics
- Western Civilization
- Biology
- General Chemistry
- Geology
- Psychology

For complete information about the CLEP program, students should refer to the General Information section of this bulletin.

STUDY ABROAD PROGRAM

The University of Colorado sponsors an active study abroad program, which is open to students from all campuses of the University. The program is described in the General Information section of this bulletin.

ADVANCED STANDING BY EXAMINATION

Examinations for advanced standing credit may be granted to a student in degree status and in good standing for work completed by private study or by occupational experience if such credit is equivalent to courses offered by the University of Colorado. A nonrefundable fee is charged for each examination taken. The fee is assessed at the lowest resident tuition charge currently in effect at UCD. Arrangements for the examinations are made through the Office of Admissions and Records.
ACADEMIC ADVISING
Students in the college are expected to assume the responsibility for planning their academic programs in accordance with college rules and policies and major requirements.

To assist students with this planning the college maintains an advising staff located in Room 804 of the Tower Building. Students are urged to consult with the staff of this office concerning individual academic problems.

As soon as the student has determined his major, he must declare his intentions to his discipline adviser. The discipline adviser will be responsible not only for the student's advising but also for the certification of the completion of his major program for graduation.

Students planning to earn a degree from one of the professional schools should see an adviser in that school. Each professional school has certain specific requirements. Pre-professional health science students should see a member of the Health Sciences Committee early in their careers. Appointments should be made through the sciences secretary in Room 508.

UCD also has a counseling service available through the Office for Student Affairs to which a student may go for assistance with problems.

CREDIT FOR ARMY ROTC
Students in the College of Liberal Arts and Sciences may participate in the Army ROTC program through the College of Arts and Sciences on the Boulder Campus. The College of Liberal Arts and Sciences will accept a maximum of 12 hours of ROTC course work toward the baccalaureate degree. For more information about the ROTC program, see the General Information section of this bulletin.

ACADEMIC POLICIES

Courses and Credits
The University operates on the semester system. The term "course" as used in this bulletin means a one-semester course. Except for laboratory courses, the credit-hour value assigned to a course is roughly equivalent to the number of hours per week of class work involved in the course (thus a 3-semester-hour course normally meets 3 hours per week).

The value of a course in semester-hours is indicated by that part of the course number which follows the hyphen. Example: "Chem. 103-5" is the identifying department number, and "5" indicates that the course is for 5 semester hours credit.

Course Numbering System
Course levels are designated as follows: 100 level, freshman; 200 level, sophomore; 300 level, junior; 400 level, senior; 500 level, graduate.

Upper Division Credit
Courses numbered 300 or above and all honors courses are awarded upper division credit.

Student Classification
Students are classified according to the number of semester hours of credit earned: freshman classification, 0 to 29 semester credits; sophomore, 30 to 59 semester credits; junior, 60 to 89 credits; and senior, 90 to 120 credits.

Course Load Policy
The normal course load is 12 to 18 hours. Students registered for fewer than 12 hours are regarded as part-time students. Students wishing to register for 20 hours or more must obtain approval from the dean. These totals include all courses taken for credit in the University, but do not include correspondence courses, noncredit courses, and courses taken at other institutions. To receive credit, the student must be officially registered for each course.

Students who hold or expect to hold full- or part-time employment while enrolled in the college must register for course loads they can expect to complete without unusual difficulty. Recommended course loads are given below, but each student must weigh his own abilities and assess the demands of each course in determining an appropriate schedule. The college assumes that all courses selected will be completed.

Employed 20 hours per week—10 to 13 semester hours or three to four courses
Employed 30 hours per week—8 to 11 semester hours or three courses
Employed 40 hours per week—6 to 9 semester hours or two to three courses

Independent Study
Students may register for independent study with the written approval of the appropriate faculty member and division dean. The amount of credit to be given for an independent study project (not to exceed 3 credits per semester) shall be arranged at the time of registration. A maximum of 12 credits taken on an independent study basis may apply toward the bachelor's degree.

Credit for Courses in the Professional Schools and in Physical Education
Students may count toward the Bachelor of Arts degree as many as 24 credit hours of course work for curricula leading to degrees other than the B.A. (business, engineering and applied science, environmental design, journalism, music, nursing, and pharmacy). College of Liberal Arts and Sciences students desiring secondary school certification will be allowed to take 32 hours in the certification program of the School of Education as part of their total required hours for the Bachelor of Arts degree. Vocational and technical courses from a two-year program may not be included. Activity courses in physical education, up to a maximum of 8 hours, will count toward the 120 required for the degree.

Correspondence Study
Students in the College of Liberal Arts and Sciences, with the approval of the dean, may take work in correspondence study offered by the University's Division of Continuing Education. A maximum of 30 hours of correspondence work may count toward the degree.

Adding and Dropping Courses
All changes of schedule must be made by processing the official drop/add card. No change will be made in a student's schedule until all necessary signatures have been entered on the drop/add card and the card has been returned to the Office of Admissions and Records. Restrictions on changes of schedule are noted below:

Adding Courses. Courses may not be added after the second week of classes except under unusual circumstances.

Dropping Courses. Students receive a grade of F in any course that they discontinue without officially dropping. Students will be allowed to drop during the first two weeks of the semester with no signatures required on the drop card. After the second week the instructor must certify that the student is passing if the course is to be dropped without discredit. After the tenth week of the semester, courses may not be dropped unless there are circumstances clearly beyond the student's control (accident, illness, etc.). The instructor and the dean must approve the drop under these circumstances.
Withdrawal
When a student withdraws from the University, he must obtain the approval of the dean’s office (Room 804) and the Office of Admissions and Records. A notation of withdrawal is made on the permanent record page. Students who leave the University without officially withdrawing will receive grades of F for all course work. After the tenth week of the semester, a student will not be permitted to withdraw except for reasons clearly beyond his control.

Attendance Regulations
The matter of classroom attendance is left to the discretion of the instructor. It is the responsibility of the student to determine at the beginning of each semester his instructor’s policies on attendance.

Students who do not attend the first class session in limited enrollment courses of 15 or less will lose their place in the class unless arrangements have been made with the instructor prior to the first class session.

Incompletes
The following grade symbols may be assigned to indicate that work in a particular course was not completed at the end of the semester:

I/W - Incomplete/Withdrawal. Automatic conversion to W after one academic year if the course is not made up. This grade is awarded when, for reasons acceptable to the instructor, sufficient information is unavailable to warrant a final grade, and when the student’s work indicates a potential passing grade.

I/F - Incomplete/failing. Automatic conversion to F grade after one academic year if the course is not made up. This grade is awarded under the same circumstances as above, except that the student’s work is of failing quality. In the case of graduating seniors, I/F grades will be calculated in the grade-point average as F in order to avoid the possibility of the grade-point average dropping below the required 2.0 (C) after degrees have been conferred.

Pass/Fail Option
All students who wish to register for a course on a pass/fail basis may do so during regular registration procedures. Changes to or from a pass/fail basis may be effected during the normal two-week drop-add period. After two weeks, it will not be possible for the student to change his registration unless approved by the dean of the college as a specific exception. The following restrictions should be noted on the use of the P/F option:

1. Not more than 16 semester hours of course work passed may be credited toward the 120 hours required for graduation. These 16 hours are in addition to those taken in honors, physical education, cooperative education, and certain teacher certification courses through the School of Education.

2. The use of the pass/fail option may be restricted in certain major programs.

3. Courses taken on a pass/fail basis may not be included in the minimum of 30 hours of C or better required for the major.

4. Only 6 hours of course work may be P/F in any given semester.

5. Grades of D and above convert to a P. The P grade is not included in the student’s grade-point average.

6. Grades of F equal a letter grade of F and will count in the grade-point average.

7. Transfer Students. No course may be taken on a P/F basis by transfer students graduating with only 30 semester hours completed at the University of Colorado.

Grade-Point Average Requirements and Scholastic Suspension
A minimum cumulative grade-point average (GPA) of 2.0 (C) is required of all students in the College of Liberal Arts and Sciences. If a student’s GPA drops below 2.0 at the end of any semester (excluding summer term), the student will be required to achieve better than a 2.0 in a succeeding semester, as described in the following sliding scale, or he will be suspended. The student must then continue to meet the sliding scale every semester until his grade-point average reaches 2.0. Scholastic records of students will be reviewed as soon as possible after the close of each spring semester, and the student will be informed in writing if he is to be suspended.

<table>
<thead>
<tr>
<th>Hours Deficiency</th>
<th>After Readmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>2.2</td>
</tr>
<tr>
<td>11-20</td>
<td>2.3</td>
</tr>
<tr>
<td>21-30</td>
<td>2.4</td>
</tr>
<tr>
<td>Over 30</td>
<td>2.5</td>
</tr>
</tbody>
</table>

The “Hours Deficiency” is the number of credit hours of B work the student must earn to raise his GPA to 2.0. Hours of deficiency may be computed as follows: multiply the total number of hours by 2 to obtain the GPA points that would have been attained with a 2.0 average. Subtract from this figure the total grade points shown on the last grade slip. The difference is the hours of deficiency.

In an effort to raise his grade-point average, a student may register for courses in the University of Colorado summer term on any campus, for correspondence study through the University, for correspondence study offered through UCD Division of Continuing Education, irrespective of his academic status.

Grades earned at another institution are not used in calculating the grade-point average at the University of Colorado. However, grades earned in another college or school within the University of Colorado are used in determining the student’s scholastic standing and his progress toward the degree.

First Suspension. The normal period of suspension is two regular semesters (one academic year, excluding summer term), after which the student will automatically be readmitted to the College of Liberal Arts and Sciences. The student will then be expected to meet the sliding scale (based on his CU record only) until his cumulative GPA reaches 2.0. Failure to do so will result in a second suspension.

A student under a first suspension may be readmitted before the end of the normal suspension period only if he has demonstrated academic improvement in one of the following ways:

1. By achieving a cumulative 2.5 average on all summer or correspondence work attempted at the University of Colorado since suspension. (A student must register for a minimum of 6 credits in the summer term on any campus or through correspondence work.)

2. By raising the cumulative grade-point average to 2.0 through correspondence or summer work at the University of Colorado.

3. By raising the cumulative grade-point average to 2.0 at another institution. (The cumulative grade-point average is defined as the grade-point average at the University of Colorado in combination with the work taken at all other institutions.) Upon return to the University, however, the student retains his previous grade-point average. (GPA from another institution does not transfer back to the University.)

Second Suspension. A student suspended for a second time will be readmitted only under unusual circumstances, and
only by petition to the Committee on Academic Progress of the College of Liberal Arts and Sciences. Each petition will be examined individually. The committee will expect the student to show that his chances for successfully completing his education in the college have been materially improved by factors such as increased maturity or a relief from stressful circumstances. The deadline for petitions to the Committee on Academic Progress for reinstatement for any fall semester is August 1; for reinstatement for any spring semester the deadline is December 1.

Students who complete 12 or more semester hours at another institution must apply for readmission to the University of Colorado as transfer students, regardless of their status in the University of Colorado. They also must present a 2.0 cumulative grade-point average on all collegiate work attempted (at the University of Colorado and elsewhere) in order to be considered for readmission.

**Academic Warning**

Students whose cumulative grade-point averages fall below a 2.0 (C) at the end of the fall semester will be so notified early in the spring semester. Students will be informed in writing concerning the grade-point requirements which must be met by the end of the spring semester.

**Committee on Academic Progress**

The Committee on Academic Progress (CAP) is responsible for the administration of the academic policies of the college as established by the faculty. The committee constitutes the bridge between the faculty in its legislative capacity and the students upon whom the legislation comes to bear. The committee alone is empowered to grant waivers or exemptions from, and exceptions to the academic policies of the college.

One of the major responsibilities of the committee is the handling of suspensions and reinstatement of suspended students. The normal period of suspension is two regular semesters (one academic year, excluding summer term). However, students suspended a second time will be reinstated only under unusual circumstances and only by petition to the committee.

**Academic Ethics**

Students are expected to conduct themselves in accordance with the highest standards of honesty and integrity. Cheating, plagiarism, illegitimate possession and disposition of examinations, alteration, forgery, or falsification of official records, and similar acts or the intent to engage in such acts are grounds for suspension or expulsion from the University.

In particular, students are advised that plagiarism consists of any act involving the offering of the work of someone else as the student’s own. It is recommended that students consult with their instructors as to the proper preparation of reports, papers, etc., in order to avoid this and similar offenses.

**REQUIREMENTS FOR GRADUATION**

**College Requirements**

The following four requirements apply to all Bachelor of Arts and Bachelor of Fine Arts students:

1. Arts and humanities—12 semester hours.
2. Natural and physical sciences—12 semester hours.
3. Social sciences—12 semester hours.

Lists of courses that will satisfy the above area requirements are available in the Fall and Spring Schedule of Courses, in each divisional office, and in the dean’s office.

**College of Liberal Arts and Sciences**

4. Foreign language. This requirement is satisfied by:
   a. Completion of a Level III high school course in any classical or modern foreign language; or
   b. Completion of a third-semester course (normally 211, but in French, German, 201 or 211) in the college; or
   c. Demonstration of third-semester proficiency by test.
   d. This requirement also may be satisfied by completion of Intensive German (12 credit hours in one semester).

Students who elect to continue a language studied before entering the college will be placed in courses appropriate to their level of preparation and will continue from the level indicated until the third-semester course has been passed. A student who enrolls in a course at a lower level than that in which he has been placed will not receive credit for the course.

Students who may go on to do graduate work are advised to complete the fourth semester of a foreign language in preparation for language requirements of graduate schools.

**Foreign Language Placement.** Placement of students in college-level foreign language courses is based on units of high school language study and on the verbal SAT score or English ACT score according to the following schedule:

<table>
<thead>
<tr>
<th>Verbal SAT Score</th>
<th>English ACT Score</th>
<th>High School Foreign Language Levels or Units</th>
<th>Approved Courses, Strongly Advised for the Freshman Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>600-800</td>
<td>25-36</td>
<td>4 or more</td>
<td>Exempt from requirement. No credit allowed below third-year (300-level) courses.</td>
</tr>
<tr>
<td>200-599</td>
<td>0-24</td>
<td>4 or more</td>
<td>Exempt from requirement. Recommended 300-level courses; no credit allowed below fourth-semester (202 or 212) courses.</td>
</tr>
<tr>
<td>600-800</td>
<td>25-36</td>
<td>3</td>
<td>Exempt from requirement. Recommended 300-level courses; no credit allowed below fourth-semester (202 or 212) courses.</td>
</tr>
<tr>
<td>200-599</td>
<td>0-24</td>
<td>3</td>
<td>Exempt from requirement. No credit allowed below fourth-semester (202 or 212) courses.</td>
</tr>
<tr>
<td>600-800</td>
<td>25-36</td>
<td>2</td>
<td>Third semester courses (201 or 211).</td>
</tr>
<tr>
<td>200-599</td>
<td>0-24</td>
<td>2</td>
<td>Second semester courses (102).</td>
</tr>
<tr>
<td>600-800</td>
<td>25-36</td>
<td>1</td>
<td>Second semester courses (102).</td>
</tr>
<tr>
<td>200-599</td>
<td>0-24</td>
<td>1</td>
<td>Beginning course (101).</td>
</tr>
</tbody>
</table>

A student may enroll in a course at a lower level than that in which he is placed upon consultation with the appropriate faculty member. However, he will not receive credit for any course taken at a level lower than his placement. Exceptions to this policy can be made when there has been a lapse of five or more years since previous study of the language. There is ample opportunity for language review by enrolling on a noncredit basis in lower-level language courses upon consultation with the adviser.

Students may request a placement test to place them in a higher level course than that assigned, or to demonstrate proficiency sufficient to satisfy the college foreign language requirement.
Students who do not wish to continue a language studied previously may begin a new language without penalty. However, students are strongly urged to begin or continue their college-level language study immediately upon enrollment in the college. Students also are urged to consult with the appropriate faculty member concerning any problems that might arise regarding foreign language study or the foreign language requirement.

Note: Physical education is no longer required for completion of the bachelor's degree. However, a maximum of 8 hours of physical education credit will count toward the 120 required for the degree.

**Major Requirements**

A candidate for the degree Bachelor of Arts shall fulfill such requirements as may be stipulated for his major program. These requirements shall include at least 30 semester hours of work in the major area (as determined by his adviser) of C grade or higher, at least 16 hours of which shall be at the upper division level. The grade average in the major shall be at least C. Not more than 48 semester hours in one field may be counted in the 120 hours required for the degree. The student is responsible for knowing the requirements for the major. The adviser shall be responsible for determining when a student has satisfactorily completed the requirements for the major and for so certifying to the dean of the college.

For requirements of the Bachelor of Fine Arts degree, consult the fine arts section in the alphabetical listings under the description of courses and programs.

**Upper Division Requirement**

Students must complete at least 45 hours of upper division work (courses numbered in the 300s and 400s) to be eligible for the bachelor's degree. Any student may register for upper division courses providing he has satisfied the prerequisites or has the approval of the discipline in which the course is offered.

Courses transferred from a junior college carry lower division credit. Exceptions to this require approval of the dean of the college and the appropriate discipline representative, who may ask the student to validate upper division credit by taking an advanced standing examination.

**Total Credit-Hour and Grade-Point Requirement**

To qualify for the Bachelor of Arts degree in the College of Liberal Arts and Sciences, students must pass at least 120 semester hours with an average of at least 2.0 (C) in all courses attempted at the University of Colorado.

**Residence Requirement**

A candidate for a degree from the College of Liberal Arts and Sciences must earn his last 30 hours in the University of Colorado and must be enrolled as a degree student in the College of Liberal Arts and Sciences.

**Senior Progress Report**

Upon completion of 80 semester hours of course work, each student should request a Progress Report from the Office of the Dean to determine his status with respect to the above requirements.

At the beginning of their last semester, students are required to file Diploma Cards, showing the date when they intend to be graduated. Diploma Cards are available in the College of Liberal Arts and Sciences, Office of Admissions and Records, and at registration. During their senior year, students must clear all schedule changes with the Degree Requirements Section of the Office of the Dean.

**Graduation With Honors and With Distinction**

The Honors Program of the college is outlined in the Special Programs section of this bulletin. In addition to graduation with honors, a student may be graduated with distinction if, prior to his final semester, he has taken at least 30 hours at the University of Colorado and if his cumulative grade-point average by the end of the semester prior to his final semester's work toward the degree is 3.5 or higher, both at the University of Colorado and in all collegiate work attempted.

**Summary Checklist of Graduation Requirements**

The student alone is ultimately responsible for the fulfillment of these requirements. Questions concerning them should be directed to the Office of the Dean. Upon completion of degree requirements (including the fulfillment of a major) the student will be awarded the appropriate degree.

**General Requirements**

1. 120 semester hours passed.
2. 2.0 cumulative grade-point average on all University of Colorado work.
3. 45 hours of upper division work.
4. The last 30 hours in residence in the college.

**Area Requirements**

1. Arts and humanities: 12 semester hours.
2. Natural and physical sciences: 12 semester hours.
3. Social sciences: 12 semester hours.
4. Foreign language: third-semester proficiency in any one language or completion of a Level III high school foreign language course.

**Major Requirements**

1. 30 to 48 hours in the major area.
2. 30 hours of C grade or better in the major area.
3. A 2.0 grade-point average in all major work.
4. 16 hours of upper division courses in the major, C grade or higher.
5. Special requirements as stipulated by the major program.

Note: Not more than 48 hours in any one field and not more than 24 hours outside the college can be counted in the 120 hours required for the degree.

Students planning to transfer to the Boulder Campus are responsible for informing themselves of the degree requirements on that campus.

**Division of Arts and Humanities**

ROBLEY D. RHINE, Assistant Dean

The division includes the disciplines of communication and theatre, communication disorders and speech science, English, fine arts, French, German, philosophy, and Spanish. Complete undergraduate majors are offered in all but communication disorders and speech science. Requirements for each major are explained before the course listings for the respective disciplines. Information on preprofessional programs is given in that section of this bulletin.

This division offers course work in several special programs including Comparative Literature, American Studies, and the Writing Program. The Writing Program is
designed to prepare professional writers in the techniques and vocabularies of fields such as fine arts, science, engineering, creative writing, business, social sciences, and literature. Two curricular programs also are open to students: Theatre and Forensics. Students interested in majoring in any of the disciplines or in participating in any of the specialized programs should request additional information from the divisional office.

Description of Courses and Programs

For information on scheduling of courses, consult the appropriate Schedule of Courses for day, time, and meeting place of classes.

ARTS AND HUMANITIES

A.H. 398-3 Cooperative Education. Designed experiences involving application of specific, relevant concepts and skills in supervised employment situations. Prer., sophomore standing and 2.5 GPA.

COMMUNICATION AND THEATRE

A major in communication and theatre at both the bachelor's and master's levels may be completed at UCD. Students majoring in communication and theatre must present a minimum of 40 semester hours (although the individual areas within communication and theatre may require additional hours) including C.T. 202 and C.T. 400. The student must elect to pursue one of the several areas of emphasis within the communication and theatre field. Each area has its own requirements for graduation, and specific programs will be developed in consultation with academic advisers to insure proper balance of courses within the major. Lists of required and suggested courses in each major area may be obtained from the divisional office.

C.T. 400. Speech Laboratory in English as a Second Language. Group assistance for people for whom English is a second language and who wish to improve their spoken English. C.T. 410. Reading Laboratory in English as a Second Language. Group assistance for people for whom English is a second language and who wish to improve their speed and comprehension in reading English.

C.T. 420. Writing Laboratory in English as a Second Language. Group assistance for people for whom English is a second language and who wish to improve their writing in English.

C.T. 140-5. Structure and Pronunciation of Standard English for Speakers of Other Languages. Practice in speaking and understanding spoken English, with attention to grammar, pronunciation, and vocabulary as well as meaning and appropriateness.

C.T. 141-3. Written Composition for Speakers of Other Languages I. Beginning course in written English composition for people for whom English is a second language. Oral and written work.

C.T. 142-3. Written Composition for Speakers of Other Languages II. Second semester course. Continued work on grammar, syntax, spelling, and the mechanics of writing, but with greater focus on selection, development, and organization of material for longer connected discourse.


C.T. 203-3. Principles of Communication II. Further development of the principles of communication. Specific topics such as argumentation, source credibility, attitude, organization, language style, and mass communication will be expanded by both theoretical refinement and analysis of specific research studies. Prer., C.T. 202.


College of Liberal Arts and Sciences


C.T. 273-2. Stage Movement. (Dance 242.) Analysis and practice of stage movement, including the study of basic techniques in gesture, mime, and pantomime as related to period drama, modern drama, and musical comedy.


C.T. 315-3. Discussion. Theory and practice in group discussion processes, decision making, participant and leader behavior combined with interpersonal laboratory.


C.T. 362-3. Television Production. Introduction to basic television production principles, practices, techniques, facilities, and equipment, including cameras, audio equipment, lighting, films, videotape, graphics, sets, etc. Prer., C.T. 360.

C.T. 373-3. Acting. Theory and practice to enable the student to improve his techniques and to utilize these techniques in creative acting.

C.T. 374-3. Directing. A study of the director's function in the live theatre with particular emphasis on play analysis and the relationship of creative communication existing between the director and the production team.


C.T. 415-3. Group Communication Theory. Observation and analysis of group processes and leadership roles and functions from the viewpoint of modern communication theory. Prer., C.T. 315 or consent of instructor.


C.T. 433-3. Teaching With Group Methods. The study of group forces, potentials, and the teacher's role in creating effective learning groups.

C.T. 435-3. Creative Dramatics. The study of creativity, its role and application in dramatics, and the manner in which creative dramatics are used in the growth and development of children and youth.


C.T. 441-3. Teaching Standard English to Speakers of Other Languages or Dialects. Comprehensive overview of the principals and techniques necessary to a broad-based audiolingual-cognitive approach to language teaching. Prer., C.T. 440 or consent of instructor.


C.T. 465-3. Television in Education (L.M. 507.) Utilization of television at all levels of education. Theory and practice in defining needs, identifying alternative solutions, producing materials, and evaluating results. Fourth credit hour requires comprehensive project design. Prer., C.T. 360 or consent of instructor.

C.T. 471-3. History of the Theatre I. Study of theatres, methods of presentation, actors, and acting from primitive times to 1700, emphasizing perception of contemporary theatre as a way of understanding and appreciating the place of theatre in historical contexts.


C.T. 478-3. Drama Theory. Examination of critical and theoretical ideas from Aristotle to the present day.

C.T. 479-0 to 4. Theatre Practice. Participation in University Theatre productions. Credit hours to be arranged by director of the theatre. Not more than 2 hours may be earned in any one semester or in the summer session. Prer., consent of the director of the theatre.


COMMUNICATION DISORDERS AND SPEECH SCIENCE

NATALIE HEDBERG, Coordinator

The B.A. degree in communication disorders and speech science is not available at UCD. The following courses are open to undergraduates: CDSS 401 and CDSS 435. For graduate-level courses see Communication Disorders and Speech Science in the Graduate School section of this bulletin.

CDSS 401-2. Speech and Language Development in Children. Underlying processes in the development of speech and language, normal and atypical.

CDSS 435-2. Introduction to Language and Learning Disabilities. Orientation to the field of language and learning disorders found in preschool, elementary, and secondary school children. Diagnostic and remedial techniques and treatment programs will be surveyed. Films, case studies, guest speakers, and field trips will provide a comprehensive view of the field.

CDSS 499-1 to 3. Independent Study.

COMPARATIVE LITERATURE

Students wishing to pursue graduate work in comparative literature should consult the Graduate School Bulletin.

On the 400 level, students may read all texts in translation; however, reading knowledge in at least one foreign language is highly recommended. On the 500 and 600 levels, students must be able to read in two foreign languages or obtain the consent of the instructor.


C.L. 448-3. Contemporary Literature.

C.L. 466-3. Themes, Motifs, and Characters.

C.L. 473-3. Philosophy and Literature. (Phil. 473.)


ENGLISH

A major in English at both the bachelor's and master's levels may be completed on the Denver Campus.

Students majoring in English must present a total of 36 hours in English, excluding Engl. 100-101, of which 24 hours must be earned in upper division courses. None of the required 36 hours may be taken on a pass/fail basis. Of the 24 hours required at the 300- or 400-level, at least 3 must be earned in a course dealing with English literature before 1800, at least 3 in a course dealing with English literature after 1800, and at least 3 in a course on American literature.

Required courses: Engl. 250, 251, 252 (Survey of English Literature — 9 hours); Engl. 300 (Critical Writing — 3 hours); Engl. 497 or 498 (Major Authors or Topics in Literature — 3 hours).

At least 12 hours of the major's upper or lower division work in English must be done at UCD in order to qualify for the B.A. in English.

English majors interested in graduating with honors should confer with the honors adviser as soon as possible, but definitely no later than the beginning of the spring term of their junior year.

Students who contemplate teaching should obtain from the School of Education sheets listing curriculum required for a teaching certificate and should consult the School of Education, which supervises the teacher-training program. Since fulfilling requirements for education and English involves close scheduling, students should fulfill at least some of the college requirements during their freshman and sophomore years.

English for foreign students and courses for prospective teachers of English as a foreign language are listed under
Communication and Theatre in this bulletin.

For additional literature courses see Comparative Literature and Mexican American Education Program.

Note: A considerable amount of writing is required in all English courses and is graded on form as well as on content.

Engl. 101/102-3. Beginning Composition. Students are placed in 101 or 102 after diagnostic testing during the first week of classes to determine their writing needs.

Engl. 103-3. Intermediate Composition. Emphasis on the longer essay and the research paper. Prer., Engl. 102 or consent of instructor.

Engl. 120-3. Introduction to Fiction. Reading and analysis of short stories and novels.

Engl. 130-3. Introduction to Drama and Poetry. Reading and analysis of plays and poems.


Engl. 250-3. Survey of English Literature I. Chronological study of the greater figures and forces in the mainstream of English literature from the beginning through the 16th century including Shakespeare. Engl. 250, 251, and 252 should be taken in sequence.


Engl. 259-3. Great Books II. From Plato to the Renaissance; selected dialogues of Plato, the Aeneid, the Inferno, and a few works by other writers.


Engl. 274-3. The American Writer and the Black Man I. Reading and analysis of significant literary works by black or white American writers treating black Americans.

Engl. 275-3. The American Writer and the Black Man II. Continuation of Engl. 274, but may be taken independently of that course.


Engl. 290/390-3. Topics in Literature. Topics such as the following will be offered at regular intervals: science fiction, women in literature, opera as drama.

Note: Before taking any 300-level course in English, a student must have earned 24 semester hours of college credit.

Engl. 300-3. Critical Writing. Criticism of novels, poems, and plays; emphasis on written work.


Engl. 318-3. Writing Topics. Individual papers based on upper division courses from the arts and humanities, natural and physical sciences, and social sciences. For writing program majors only. May be repeated for up to 9 hours credit.

Engl. 365-3. American Literature I. Survey of the literature from its beginnings until the Civil War.


Engl. 395-3. Chaucer. A study of Chaucer's major works with emphasis upon the Canterbury Tales. Reading in Middle English after a short introduction to the language.


Note: Before taking any 400-level course in English, a student must have earned 36 semester hours of college credit.


Engl. 430-3. Development of British Drama I. From the beginnings through the Restoration.


Engl. 446-3. Recent World Literature. Survey of important works and trends in poetry, drama, and fiction since World War II.

Engl. 450-3. Medieval Literature. Selections read in modern English, representative of the life and thought of the Middle Ages (up to 1500).

Engl. 452-3. The English Renaissance. Selected works from the 16th and 17th centuries.


Engl. 458-3. The Victorian Age. Main currents of Victorian thought in prose and poetry, 1830-1890.

Engl. 460-3. Modern British and Irish Literature. Chronological survey of the period 1890 to World War II.


Engl. 481-3. Literature for Adolescents. Same as T.Ed. 444. Reading and evaluating books for junior and senior high school pupils. Attention is given to sources of information about books and criteria for selection, as well as to the writers.


Engl. 497-3. Topics in American and British Literature. Courses such as the following will be offered at regular intervals: Regional Literature—the Frontier; Satire; Comedy; Tragedy. Open to English majors only, except with consent of the instructor.

Engl. 498-3. Major American and British Authors. Intensive study of works of one major British or American author. Open to English majors only, except with consent of instructor.

FINE ARTS

The Department of Fine Arts offers both a B.A. degree and a B.F.A. degree in painting, sculpture, print-making, or design. The B.A. degree must include 40, but not more than 48, hours in fine arts, 24 of which must be in upper division courses. The B.F.A. degree must include 54, but not more than 72, hours in fine arts, 24 of which must be in upper division courses. Students wishing to apply for the B.F.A. degree must have a 2.0 average in all course work at the time of application, which may not be earlier than the end of the junior year. Application forms are available in the divisional office.

The core curriculum for fine arts majors includes 12 hours of Studio I (Fine Arts 100, 101, 102), Studio II (Fine Arts 202), Fine Arts 180-181, Fine Arts 496, and 6 hours of upper division art history. The recommended program for the B.F.A. includes at least two years in one creative field (painting, printmaking, design, or sculpture) plus 9 semester hours in drawing. Students who are candidates for the B.F.A. must take a minimum of 20 hours while in residence.

Studio I and II Courses

For an orientation to studio practice, including drawing and an exploration of two- and three-dimensional media, fine arts majors are required to take 12 hours of Studio I and II courses. There are no prerequisites for Studio I and II courses, but all upper division courses require the corresponding basic course as a prerequisite.

Fine Arts 100-3. Basic Drawing. Exploration of drawing approaches and media.


Fine Arts 202-3. Visual Studies. Studio course designed to introduce to the student the realm of visual thinking while solving the problem of making a visual statement.

Life Drawing

Fine Arts 300-3. First-Year Life Drawing and Composition. Problems in drawing from life; exploring the possibilities in pictorial design and composition. May be repeated.

Fine Arts 400-3. Advanced Drawing. Problems in drawing with emphasis on individual development. Prer., 6 hours Fine Arts 300. May be repeated.

Printmaking

Fine Arts 340-3. First-Year Printmaking. Introduction to intaglio and relief printing, including metal engraving and etching, and woodcut. May be repeated.


Fine Arts 342-3. Silk Screen (Serigraphy). Silk screen techniques as they relate to fine art prints. May be repeated.

Painting


Fine Arts 420-3. Second-Year Painting. Expressive pictorial problems involving varied subject matter and painting media, with emphasis on individual development. Prer., Fine Arts 320 or equivalent. May be repeated.

Sculpture


Design

Fine Arts 315-3. First-Year Photography I. Using lecture as an introduction to history, technique, and concepts of photography as it relates to the fine arts. Emphasis on photography as a means to a formal and expressive end. Students must have access to a camera.

Fine Arts 316-2. Graphic Design. Problems in advertising illustration and design.


Fine Arts 363-3. Film Making. Studio course designed to acquaint students with the basic visual and aesthetic elements of film through actual shooting, editing, and discussion. All work is in 8 or super 8mm. with student's own or rented camera.

Fine Arts 402-3. Movement-Performance in Fine Art. Studio course designed to present the possibility of movement-performance to the fine arts/humanities student as a form for self-exploration and expression. May be repeated.


Fine Arts 418-3. Creativity and Problem Solving. Exploration of the process of problem solving through the means fundamental to all artistic endeavors, i.e., making and doing. May be repeated.


Art History

Note: Not all art history courses are offered every year. Check current Schedule of Courses.

Fine Arts 180-3. History of Art I (Survey). History of art of all ages, reflecting the various cultures of mankind from cave paintings to the Renaissance.

Fine Arts 181-3. History of Art II (Survey). History of art of all ages, reflecting the various cultures of mankind from the Renaissance to the present.

Fine Arts 470-3. Primitive Art. (African and Pacific areas.) Native arts of various African peoples as well as those of the major island groups of the Pacific area.

Fine Arts 471-3. Pre-Columbian Art. Architecture, sculpture, painting of the high cultures of Meso-America and the Andean area before the Spanish conquest.


Fine Arts 490-3. Origins of Modern Art II. History of European movements of the late 19th century from Realism through Post-Impressionism.


Fine Arts 492-3. Modern Art II. A survey of major trends in painting and sculpture from Surrealism to the present (1924-).

Independent Study and Seminar

Fine Arts 399, 499-variable credit. Independent Study. Individual projects or studies assigned by the major professor. To be arranged.


Fine Arts 496-3. Art Seminar. For fine arts majors, undergraduate and graduate. Course based on an exchange of ideas basic to the student's own creative work, and to contemporary philosophies and tendencies in the field. Prer., 12 hours of basic art courses or equivalent. Fine Arts 180-181, or consent of instructor. May be repeated once with consent of instructor.
FRENCH

Students who have completed a Level III high school French course have automatically satisfied the college graduation requirement in foreign language. This requirement may also be satisfied by completion of French 201 or 211 or by demonstration of equivalent proficiency by placement test. Students who have studied French in high school and who wish to continue with the language will be placed according to their high school record and verbal SAT score or English ACT score. A student normally may not receive credit for a course at a lower level than that into which he is placed. For a complete statement of policy on foreign language placement and credit, see the College of Liberal Arts and Sciences General Information section of this bulletin.

Students majoring in French must complete 35 semester hours beyond the first year. Students presenting four years of high school French for admission must complete 30 hours beyond the second year. Required courses are French 211-212, 301-302, 311-312, 401-402, plus 6 hours of literature courses at the 400 level.

Note: For comparative literature, see that section.

GERMAN

Students who have completed a Level III high school German course have automatically satisfied the college requirement in foreign language. This requirement may also be satisfied by completion of Intensive German (12 credit hours in one semester), by completion of German 201, or by demonstration of equivalent proficiency by placement test. Students who have studied German in high school and who wish to continue with the language will be placed according to their high school record and verbal SAT score or English ACT score. A student may not receive credit for a course at a lower level than that into which he is placed.

The German major must take 35 semester hours beyond first year proficiency. Not more than 12 semester hours of 200-level courses and not more than 6 semester hours of courses given in English translation may be taken for credit toward the 35-hour minimum. Required courses for the B.A. are German 301-302: Advanced Conversation, Grammar, Composition; German 401-402: Structural Analysis, Composition, Stylistics; German 423: German Civilization; and German 495: Methods of Teaching German (required of students who desire the recommendation of the discipline representative for secondary school teaching positions). Native German speakers or students with advanced training may request permission to substitute more advanced German courses to fulfill the 35-hour minimum.

German 101-4, Sect. I; German 102-4, Sect. I; German 201-4, Sect. I. These three sections together comprise a 12-hour, one-semester course. Satisfactory completion of Intensive German fulfills the foreign language requirement. Offered fall semesters only.

German 101-4. Beginning German I.  
German 102-4. Beginning German II. Prer., German 101 or one year of high school German.  
German 201-4. Intermediate German I: Reading. Prer., German 102 or two years of high school German.  
German 202-4. Intermediate German II: Reading. Prer., German 201 or three years of high school German.  
German 222-4. Scientific German. Prer., German 201 or upon consultation.  
German 301-3. Advanced Conversation and Grammar. Prer., German 202 or consent of instructor.  
German 302-3. Advanced Conversation and Composition. Prer., German 301 or consent of instructor.  
German 311-3. Die deutsche Novelle. Prer., German 202 or consent of instructor.  
German 312-3. Das deutsche Drama. Prer., German 202 or consent of instructor.  
German 333-3. Deutsche Klassik. Prer., German 311 and 312, or consent of instructor.  
German 334-3. Deutsche Romantik. Prer., German 311 and 312, or consent of instructor.  
German 381-3. German Literature in Translation I.  
German 382-3. German Literature in Translation II.  
German 401-3. Structural Analysis, Composition, and Stylistics I. Prer., German 302 or consent of instructor.  
German 402-3. Structural Analysis, Composition, and Stylistics II. Prer., German 401 or consent of instructor.  
German 423-3. German Civilization.  
German 436-3. Die Deutsche Lyrik. Prer., German 311 and 312 or consent of instructor.  
German 437-3. Einführung in die deutsche Literaturgeschichte I. Prer., German 311 and 312 or consent of instructor.  
German 438-3. Einführung in die deutsche Literaturgeschichte II. Prer., German 311 and 312 or consent of instructor.  
German 496-3. Methods of Teaching Modern Languages. Methodol-
PHILOSOPHY

A program for the philosophy major must include a minimum of five courses (15 hours) at the 300 level; a minimum of three courses (9 hours) at the 400 level; and a minimum of one course (3 hours) at the 500 level. The balance of the courses for the major may be taken at the discretion of the student.

The following courses are recommended (not required) for philosophy majors who are planning to do graduate work in philosophy: Symbolic Logic (Phil. 344); History of Philosophy (Phil. 300, 302, 402, 403, 404); Ethics (Phil. 315); Metaphysics (Phil. 335); Epistemology (Phil. 336); Philosophical Method (Phil. 350); several courses concerned with a single philosopher (e.g., Phil. 580, 581, 582, etc.); and one course concerned with the relationship of philosophy to some other discipline (e.g., Philosophy of Science, Philosophy of History, etc.).

General prerequisites (which may vary for some courses) are: 100-level—none; 200-level—3 hours; 300-level—6 hours; 400-level—9 hours; and 500-level—12 hours. The prerequisite may be waived with consent of instructor.

Phil. 115-3. Ethics. Introductory study of major philosophies on the nature of the good of man, principles of evaluation, and moral choice.
Phil. 120-3. Philosophy and Society. Systematic discussion and analysis of the philosophic ideas of community, freedom, political power, the nature and role of violence, etc., together with the challenge of war, poverty, and racism to contemporary culture.
Phil. 130-3. Philosophy and the Physical World. An introduction to philosophy through the consideration of topics and problems related to the physical and biological sciences such as freedom and determinism; mind and body; artificial intelligence; sciences and ethics; current theories of the universe, space, time, matter, energy, causality, etc.
Phil. 160-3. Philosophy and Religion. An introduction to philosophy through problems of religion, such as the existence of God, faith and reason, religious language, etc.
Phil. 170-3. Philosophy and the Arts. Consideration of philosophic questions involved in the analysis and assessment of artistic experiences and of the objects with which the arts, including the literary arts, are concerned.
Phil. 220-3. Classical Social Theories. Introductory study of major philosophies of the past in relation to political, economic, and social issues.
Phil. 221-3. Modern Social Theories. Present social issues, together with theoretical analyses by communist, fascist, and democratic thinkers.
Phil. 240-3. Introduction to Philosophy of Science. Examination of some major concepts and problems of scientific thought: explanation, confirmation, causality, measurement, and theory construction.
Phil. 260-3. Oriental Religions.
Phil. 290-3. A Philosophical Classic. Detailed study of one major philosophic text which illustrates a variety of types of philosophic concerns. Emphasis on techniques for analysis, discussion, and assessment of philosophical argumentation. Such works as The Republic, Leviathan, and Treatise of Human Nature.
Phil. 301-3. Medieval Philosophy.
Phil. 315-3. Ethical Theory. Selected problems in classical and contemporary ethical theory.
Phil. 320-3. Social and Political Philosophy. A nonhistorical, systematic treatment of basic issues in social and political philosophy, with reference to theories of being, knowledge, and human nature.
Phil. 328-3. Philosophy of Education.
Phil. 335-3. Metaphysics.
Phil. 336-3. Epistemology.
Phil. 344-3. Introduction to Symbolic Logic.
Phil. 370-3. Aesthetic Theory. Introduction to major theories of aesthetics and contemporary discussions of problems in aesthetics; i.e., the nature of art, the problem of evaluations in art.
Phil. 400-3. Nineteenth-Century Continental Philosophy.
Phil. 401-3. Nineteenth-Century British Philosophy.
Phil. 402-3. Twentieth-Century Analytic Philosophy.
Phil. 403-3. Twentieth-Century Speculative and Idealistic Philosophy.
Phil. 404-3. Twentieth-Century Phenomenology and Existentialism.
Phil. 405-3. Studies in Contemporary Philosophy.
Phil. 410-3. American Philosophy.
Phil. 424-3. Philosophical Problems and Contemporary Culture. Issues and controversies in contemporary culture, their relation to modern theories of society, and their manifestations in the arts, science and technology, education, religion, and ethics. No prere.
Phil. 426-3. Philosophy of Law. Consideration of various views of the nature of law, its role in society, and its relation to other disciplines. Investigation of philosophic commitments which underlie and affect legal conceptions and procedures. No prere.
Phil. 427-3. Philosophy of History. Contemporary issues in critical and speculative theory of history, including the problems of methodology, explanation, values, and the relationship between history and social philosophy.
Phil. 430-3. Philosophy of Mind. Consideration of the problems in the philosophy of mind, including the mind-body problem, the problem of our knowledge of other minds, the compatibility of free will and determinism, etc., and discussion of such concepts as action, intention, motive, desire, enjoyment, memory, imagination, dreaming, self-knowledge, etc.
Phil. 443-3. Logical Theory. Prer., Phil. 144 or Phil. 344, or consent of instructor.
Phil. 444-3. Intermediate Symbolic (Mathematical) Logic. Prer., Phil. 344 or consent of instructor.
Phil. 446-3. Theories of Human Nature.
Phil. 449-3. Philosophy of Language.
Phil. 473-3. Philosophy and Literature.
Phil. 493-3. Existentialist Philosophies.
Phil. 496-3. Senior Major Colloquium.
Phil. 499-3. Independent Study.

SPANISH

Students who have completed a Level III high school Spanish course have automatically satisfied the college graduation requirement in foreign language. Requirement may also be satisfied by completion of Spanish 211 or by demonstration of equivalent proficiency by placement test. Students who have studied Spanish in high school and wish to continue with the language will be placed according to their high school record and verbal SAT or ACT score. A student may not receive credit for a course lower than that into which he is placed. For complete statement of policy on foreign language placement and credits, see the College of Liberal Arts and Science General Information section of this bulletin.

A major in Spanish consists of the following requirements:
1. Total of 35 credit hours in Spanish courses beyond 102, including the following minimum distribution: (a) at least 9 hours in upper division courses in language theory and practice (301-302, 401-402, 495); (b) at least 8 hours in upper division literature courses including at least one course in Spanish Peninsular literature and one in Spanish-American literature; (c) at least 12 hours in courses numbered 400 or above.
2. Total of 6 hours from one or more of the following areas: (a) Latin American studies (e.g., history, political science, etc.); (b) Mexican American Studies; (c) linguistics; (d) upper division courses in another foreign language or comparative literature.
Students who entered the University before fall 1969 may choose the current major program or the program in effect at the time of their first registration.

Students seeking certification for teaching at secondary level note: School of Education requires Spanish 495 (Methods of Teaching Spanish); the 3 credit hours earned in that course count toward the major and are subject to the 48-hour maximum from one discipline allowed by the College of Liberal Arts and Sciences for the B.A. degree. Hence, students who begin the major program with Spanish 101 and intend to include secondary certification in their B.A. program must include Spanish 495 in their electives in Spanish.

To be admitted to practice teaching of Spanish, majors must take the language skills tests of the Modern Language Association Proficiency Tests for Teachers and Advanced Students of Spanish and make satisfactory scores.

Students must see the discipline adviser prior to registration for their final semester. Failure to do so may result in delay of graduation. Students considering entering graduate school, either at the University of Colorado or elsewhere, should see an adviser as early as possible since admission depends largely on courses taken in the major.

It is strongly recommended that all majors include some study in a Spanish-speaking country in their programs. Credit earned normally counts toward satisfaction of major requirements, but students should see an adviser before enrolling in a foreign program to insure full transfer of credit. Courses taken abroad and designated as Spanish are subject to the 48-hour-maximum rule of the College of Liberal Arts and Sciences. Students interested in study abroad should consult with the Spanish faculty or the UCD representative for International Education.

For comparative literature courses, see that section.

Spanish 101-5. Beginning Spanish I.
Spanish 102-5. Beginning Spanish II. Prer., Spanish 101 or placement.
Spanish 301-3. Pronunciation, Diction, and Conversation. Prer., Spanish 212 or consent of instructor.
Spanish 302-3. Conversation and Oral Composition. Prer., Spanish 301 or consent of instructor.
Spanish 304-2. Workshop in Southwestern Spanish. Prer., Spanish 303 or consent of instructor.
Spanish 314-2. Introduction to Literature. Prer., Spanish 212 or consent of instructor.
Spanish 331-3. Twentieth-Century Spanish Literature. Prer., Spanish 314 previously or concurrently, or consent of instructor.
Spanish 332-3. Nineteenth-Century Spanish Literature. Prer., Spanish 314 previously or concurrently, or consent of instructor.
Spanish 333-3. Spanish Literature: Middle Ages Through Golden Age. Prer., Spanish 314 and 6 hours of literature at the 300 level, or consent of instructor.
Spanish 336-3. Spanish-American Poetry and Short Story. Prer., Spanish 314 and 3 hours of literature at the 300 level, or consent of instructor.
Spanish 391-3. Topics in Spanish Literature. Prer., Spanish 314 or consent of instructor.
Spanish 401/501-3. Advanced Rhetoric and Composition I. Prer., Spanish 302, or consent of instructor.
Spanish 402/502-3. Advanced Rhetoric and Composition II. Prer., Spanish 401, or consent of instructor.

Spanish 452/552-3. Golden Age Drama.
Spanish 462/562-3. Don Quijote.
Spanish 496-3. Methods of Teaching Modern Languages. Methodology of teaching French, German, and Spanish in an urban setting; required for secondary language teachers wishing to be certified through the Initial Certification Program of the School of Education. Prer., language proficiency interview and upper-division standing.

Spanish 499/599-1 to 3. Independent Study.

Division of Natural and Physical Sciences

RICHARD E. STEVENS, Assistant Dean

The Division of Natural and Physical Sciences includes the following disciplines: biology, chemistry, geography, geology, mathematics, physical education, physics, and psychology.

The division offers a wide variety of programs of study which includes undergraduate majors within a discipline, interdisciplinary programs, and preprofessional programs. It is possible to satisfy all requirements for the Bachelor of Arts degree at UC in the following disciplines: biology, chemistry, geography, mathematics, physics, and psychology. The description of the program of each discipline includes the requirements for a major within that discipline.

Students enrolled in health-related preprofessional programs should consult with the Health Sciences Committee of the Division of Natural and Physical Sciences at the beginning of their preprofessional education and at selected intervals thereafter. Appointments for advising must be made in the division office, Room 508. The preprofessional health program options are: child health associate, medical technology, physical therapy, dentistry, dental hygiene, medicine, optometry, osteopathy, nursing, and pharmacy. Requirements for preprofessional programs can be obtained in Room 508.

Course options are available for the nonscience major. There are three sets of courses from which a student may satisfy the Division of Natural and Physical Sciences' area requirement of 12 semester hours. Any combination of these courses will satisfy the requirement.

Set I, Topics in Science—133-1, are modular courses designed for, but not limited to, majors outside of the natural and physical sciences. Each module carries 1 semester hour of credit and is offered in a 1½-semester time block of five weeks, during which the course meets the equivalent time of three lectures a week. There are no prerequisites and each module is a self-contained unit designed to cover a given problem or topic in science in a unified way. It is recommended that the student take a
single module during each five-week period with a maximum of three per semester.

The topics will change from semester to semester and from year to year. The Schedule of Courses for each semester will give the list of current topics offered. (For general descriptions, see Topics in Science entries under each discipline involved.)

Set II courses are one or two semesters in length and have no formal prerequisites. These include both introductory survey courses and special topics courses and are also usually designed with the nonscience major in mind.

Set III includes all other natural and physical science courses offered in the division. Although these courses are generally designed for the science major, they are open to students with the proper prerequisites.

**Description of Courses and Programs**

For information on scheduling of courses, consult the appropriate Schedule of Courses for day, time, and meeting place of classes.

**BIOLOGY**

The major in biology is designed to be as flexible as possible to allow each student to build a program that meets his needs. The student should contact a biology adviser early in his academic career. Majors are required to take 17 hours of core biology courses: Biol. 205, 206; Biol. 341; Biol. 383; and Biol. 361. An additional 15 hours of biology courses are to be selected in consultation with a biology adviser. Majors are required to take Chem. 103, 106 and sufficient mathematics to prepare themselves to take Math. 140 in addition to the 32 hours in biology.

**Biol. 133-1. Topics in Biology.** Five-week courses dealing with topics in biology. See Schedule of Courses for current topics. For nonscience majors to fulfill the natural science requirements.


**Biol. 325-4. Human Biology and Pathogenesis I.** Lect. Understanding of the human organism as a biological being and interrelationships and interdependence between structure and function of systems. Prer., one year of general biology and one year of general chemistry, or consent of instructor.


**Biol. 384-2. Laboratory in General Genetics.** Lab. To acquaint students with techniques used in study of genetics. Independent study projects and general laboratory exercises included. Prer., Biol. 383.

**Biol. 410-3. Behavioral Genetics.** (Psych. 410.) Lect. Interdisciplinary course for upper division students interested in relationships between behavior and heredity. Prer., consent of instructor.


**Biol. 425-3. Introduction to Animal Behavior.** (Psych. 425.) Lect. Similarities and differences among animals. Principles of behavior in a variety of species. Prer., 6 hours of psychology or of biology, or consent of instructor.

**Biol. 427-4. Environmental Physiology.** Lect., lab. Adaptations of plants and animals to such parameters as temperature, light, and water. Prer., one year of chemistry and a course in physiology.

**Biol. 438-3. Advanced Animal Behavior.** (Psych. 438.) Lect. Comparison of behavior in a variety of species, with emphasis on social behavior and its evolution. Prer., Biol. 425 or consent of instructor.

**Biol. 439-2. Laboratory in Animal Behavior.** (Psych. 439.) Lab. Laboratory projects and field observations of the behavior of animals. Prer. or coreq., Biol. 438 and consent of instructor.


**Biol. 470-4. Biometry.** Lect., lab. An intensive course in intermediate statistics with emphasis on experimental design and analysis. Includes statistical design of repeated measures, analysis of variance, correlation, regression, and nonparametric tests. Use of computer processing is introduced. Prer., one year of general biology, statistics, and two other biology courses.

**Biol. 491-variable credit. Independent Study in Biology.** Prer., open to seniors with consent of instructor.

**CHEMISTRY**

A major in chemistry at either the bachelor’s or master’s levels may be completed at UCD.

For graduation at the bachelor’s level, students majoring in chemistry must present credits in the following courses or their equivalents: Chem. 103, 106, 311, 341, 342, 348, 349, 412, 413, 451, 452, 455; Phys. 111, 112, 114; Math. 140, 241, 242. Students interested in the chemistry major should consult regularly with a member of the chemistry faculty. A copy of the chemistry major’s program may be obtained in Room 508.

Qualified majors are strongly urged to participate in the Independent Study program.

A Distributed Studies program in chemistry must include the following courses or their equivalent: Chem. 103, 106, 311, 341, 342 and either 343 and 344 or 348 and 349, 451. Thirty hours are required in chemistry.

Students planning chemistry as a career should be familiar with the recommendations of the American Chemical Society for the professional training of chemists. Among these recommendations are a reading knowledge of German or Russian, one semester of inorganic chemistry (Chem. 401), and two semesters of advanced work: see graduate chemistry offerings. Six hours of Chem. 493 will satisfy the special courses requirement.

Students wishing to graduate with honors in chemistry should plan to do a minimum of two semesters (6 credit hours) of research (Chem. 493), ordinarily starting in the junior year. Additional requirements are listed under Honors Program.
Chem. 101-5. General Chemistry. Lect., rec., and lab. A beginning course intended primarily for prenursing, physical education, physical therapy, and other students wanting to fulfill curriculum or natural science requirements. No previous knowledge of chemistry is required. Prer., working knowledge of high school algebra.


Chem. 103-5. General Chemistry. Lect., rec., and lab. A beginning course for science majors, medical technologists, premedical, predental, and preveterinarian students. Prer., one year of high school chemistry or Chem. 100, and working knowledge of high school algebra.


Chem. 133-1. Topics in Chemistry. Different 5-week modules dealing with topics in chemistry. See current Schedule of Courses. Designed for nonscience majors to fulfill the natural science requirement.

Chem. 341-3. Organic Chemistry I. A lecture course designed as an introduction to the study of structure, reactions, properties, and mechanisms of organic molecules. Chem. 343 lab. to be taken concurrently by nonmajors. Chem. 348 lab. to be taken concurrently only by majors. Prer., Chem. 103 and 106.


Chem. 343-1. Organic Chemistry Laboratory I. A laboratory course to be taken concurrently with Chem. 341 illustrating the practical aspects of organic chemistry. Prer., Chem. 103 and 106; coreq., Chem. 341.

Chem. 344-1. Organic Chemistry Laboratory II. A laboratory course to be taken concurrently with Chem. 342 illustrating the practical aspects of organic chemistry. Prer., Chem. 341 and 343; coreq., Chem. 343.


Chem. 413-1. Instrumental Analysis Laboratory. Laboratory practice to accompany Chem. 412. Required of chemistry majors and open to other students in Chem. 412. Coreq., Chem. 412.


Chem. 545-3. Experimental Physical Chemistry. One lect. and two 3-hour labs, per wk. Instruction in the experimental techniques of modern physical chemistry with emphasis on the fundamental principles of chemical thermodynamics, quantum chemistry, statistical mechanics, and chemical kinetics. For chemistry majors. Prer., Chem. 418; prer. or coreq., Chem. 452.

Chem. 481-3. General Biochemistry. Lect. Topics include structure, conformation, and properties of proteins; enzymes; mechanisms and kinetics; intermediary metabolism; carbohydrates, lipids; energetics and metabolic control; and an introduction to electron transport and photosynthesis. Prer., one year of organic chemistry.

Chem. 482-3. General Biochemistry. Continuation of Chem. 481. Topics include macromolecules; metabolism of nucleic acids and nitrogen-containing compounds; biosynthesis and function of macromolecules including DNA, RNA, and proteins; biochemistry of subcellular systems; and special topics. Prer., Chem. 481.

Chem. 493-1 to 3. Independent Study in Chemistry. Consent of instructor required.

COMPUTER SCIENCE

ROLAND SWEET, Adviser

Students in the college may enroll in courses in computer science for College of Liberal Arts and Sciences credit. Mathematics majors may select an option in computer science.

C.S. 201-3. Introduction to Computer Science. (E.E. 201.) An elementary course in computer science covering computer programming methods. Fortran programming, numerical applications, and non-numerical applications. Prer., high school algebra, trigonometry, and geometry.

C.S. 311-3. Computer Applications in Mathematical Sciences. (Math. 311.) An advanced Fortran course for scientists and engineers. Aspects of optimal programming with respect to various goals and examination of goals that are appropriate to given contexts. Prer., C.S. 201 and Math. 140.


C.S. 453-3. Assembly Language Programming. (E.E. 453.) A laboratory course in programming at the machine code level. Lectures deal with the organization of the machine, its effect on the order code, and techniques for programming in Assembly Language. Primary emphasis is on preparing and running programs. Prer., C.S. 201, or consent of instructor.

C.S. 455-3. Computer Organization. (E.E. 455.) This course is concerned with computer arithmetic units, memory systems, control systems, and input-output systems. The emphasis is completely on logic structure rather than electronic circuitry. Prer., E.E. 257 or equivalent.


GEOGRAPHY

Students majoring in geography must complete the following basic courses or their equivalents: Geog. 100, 101, 199, 306, and 361. Distributed majors selecting geography as a primary or secondary subject should consult with the discipline adviser. Students interested in environmental problems will find the nonregional courses of particular value to their program.

Geog. 100, 101, 102 is a series of three courses designed to provide a broad introduction to the physical environment and may be taken concurrently or in any order.

Geog. 100-4. Man and His Physical Environment I. (Geol. 100.) A general introduction to elements of weather, physical climatology, and world regional climate classification.

Geog. 101-4. Man and His Physical Environment II. (Geol. 101.) Study of earth materials, features, and processes, and how they relate to man.

Geog. 102-4. Man and His Physical Environment III. (Geol. 102.) Study of structure of the crust of the earth, history of the earth, and development of life forms throughout geologic time. Includes Sunday field trips.

GEOLOGICAL SCIENCES

Students majoring in the geological sciences must take the following courses within the discipline: Physical Geology, Mineralogy, Structural Geology, and Field Geology. Introductory Paleontology, Stratigraphy, and Petrology are recommended. In addition, students must take the following courses in allied fields: Chem. 103, 106; Math. 140, 241, 319 (or the equivalent Boulder Campus courses, Math. 130, 230); Phys. 111, 112, 114.

Physical Geology, Mineralogy, and Introductory Petrology are presently offered at UCD, as are the required courses in chemistry, physics, and mathematics. Structural Geology and Field Geology must be taken on the Boulder Campus in order to complete a career-oriented major in the geological sciences. Alternatively, a student may complete all the requirements for a distributed studies major and environmental sciences major, with emphasis in geology at UCD.

Man and His Physical Environment I, II, III is a series of three courses designed to provide a broad introduction to the physical environment and evolution of the earth. They may be taken concurrently or in any order.

Geol. 100-4. Man and His Physical Environment I. (Geog. 100.) A general introduction to elements of weather, physical climatology, and world regional climate classification.

Geol. 101-4. Man and His Physical Environment II. (Geog. 101.) Study of earth materials, features, and processes, and how they relate to man. Includes Sunday field trips.

Geol. 102-4. Man and His Physical Environment III. (Geog. 102.) Study of structure of the crust of the earth, history of the earth, and development of life forms throughout geologic time. Includes Sunday field trips.

Geol. 204-4, 208-4. Physical Geology and Geophysics. General instruction to geologic processes of the earth's surface and interior. Physical properties of the earth as a planet. Intended for students desiring major work in the geological sciences. Includes three Sunday field trips per semester. Prereq., two years of high school science or mathematics and science. (Students may follow Geol. 101 with Geol. 208 if they wish additional work in geophysics and internal processes, or they may begin the 207-208 sequence with Geol. 208, with consent of the instructor.)

Geol. 301-4. Mineralogy. Principles of mineralogy, including crystallography, crystal chemistry, and a systematic study of the more important non-silicate and silicate minerals. Origins and occurrences of minerals. Prereq., physical geology and college-level chemistry, or consent of instructor.

Geol. 323-4. Introductory Petrology. An introduction to the classification, distribution, and origin of igneous, metamorphic and sedimentary rocks, including their indentification in hand specimens. Prereq., physical geology and mineralogy.

Geol. 341-4. Introductory Paleontology. The study of fossils, including a survey of the organic world and its history in the geologic past. Includes invertebrates, protista, vertebrates and plants, an introduction to evolution and paleoecology, and discussion of the uses of fossils in geologic correlation. Prereq., introductory geology or biology. Offered occasionally.


Geol. 463-4. Principles of Geomorphology. (Geog. 431.) Systematic study of weathering, mass-wasting, fluvial, wind, and marine processes and the landforms resulting therefrom. Prereq., Geol. 101 or equivalent and elementary chemistry, or consent of instructor. Offered occasionally.

Geol. 494-4. World Mineral Resources. (Geog. 434.) Nonprofessional study of distribution, reserves, and uses of mineral resources.

MATHEMATICS

A major in mathematics can be completed by students in the College of Liberal Arts and Sciences by satisfying all of the following requirements, completing each with a grade of C or better:

1. At least 30 semester hours of mathematics courses.
2. At least 18 semester hours of mathematics courses
numbered above 300, approved by adviser, and excluding Math. 303, 304, 383, 427, 428, 429, 470, 475, 495, 496 and 497.

Students who plan to do graduate work in mathematics should take Math. 431-432; students who wish to obtain a mathematics courses numbered below 140.

Math. 321-422; students planning to major in mathematics must see an adviser from that discipline.

Students who choose the computer science option in the mathematics major are required to take the following courses, all with grades of C or better:

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<tr>
<th>Course</th>
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<th>Prerequisites</th>
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<tr>
<td>Math. 140, 241, 242</td>
<td>C.S. 201</td>
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<td>Math. 300, 314, 315</td>
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<td>C.S. 465 (Math. 465)</td>
<td>C.S. 546</td>
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Variations in these courses must be approved by a mathematics adviser.

At the graduate level, master's degrees are available in mathematics, applied mathematics, and basic science (mathematics option).

The Department of Mathematics offers a Teaching Internship Program which consists of three phases as follows:

**Phase 1.** A junior-level student who is majoring in mathematics or applied mathematics, and who shows promise as a teacher, is sponsored by a member of the full-time faculty of the department. A freshman-level course is then assigned to the student, on an honorarium basis, with the understanding that the faculty member will attend all sessions of the course. The student will thus be acting as an intern and will be provided with a critique of his performance after each lecture.

It is the interested student's task to convince a faculty member that he or she should sponsor the student. No faculty member is required to perform this function nor is any compensation afforded to the sponsor for so doing.

**Phase 2.** After completion of one or two semesters of fully supervised classroom exposure, and upon the student's entry into the senior year of study, the faculty sponsor may recommend that the intern be accepted as an undergraduate teaching assistant. With approval of the mathematics faculty, the student will then be assigned broader responsibility for one (or at most, two) freshman courses, with the faculty sponsor exercising such supervision as may appear appropriate under individual circumstances.

**Phase 3.** Upon completion of a baccalaureate program the intern hopefully would be prepared to accept a graduate teaching assistantship in the department, or in a related interdisciplinary area, as the next step in his or her professional career.

No student may earn more than 9 hours credit in mathematics courses numbered below 140.

**Math. 101-3. College Algebra.** A credit course in introductory college algebra. Prer., one year of high school algebra and satisfactory placement test score.*


**Math. 108-3. Polynomial Calculus.** A one-semester course in the calculus. No knowledge of trigonometry or analytic geometry is presupposed. Intended especially for social science and business students and for the general liberal arts student. Those planning to take more than one semester of calculus should take Math. 140 instead of Math. 108. Prer., ½ years high school algebra.

**Math. 111-3. College Mathematics I.** Advanced topics in algebra, especially designed for students who intend to take the calculus sequence. Prer., Math. 101 or ½ years of high school algebra, one year of plane geometry, and satisfactory placement test score.

**Math. 112-3. College Mathematics II.** Topics in trigonometry and elementary functions, especially designed for students who intend to take the calculus sequence. Prer., Math. 111 or four years of high school mathematics and satisfactory placement test score.

**Math. 133-1. Topics in Mathematics.** Different five-week course modules dealing with various topics in mathematics. See current Schedule of Courses for the particular topics being offered. Designed for nonscience majors to fulfill the natural science requirement.


**Math. 300-3. Introduction to Abstract Mathematics.** The student learns to prove and critique proofs of theorems by studying elementary topics in abstract mathematics, including such necessary basics as logic, sets, functions, equivalence relations, etc. Prer., Math. 241 or consent of instructor.

**Math. 303-3. Mathematics for Elementary Teachers I.** Designed to help provide appropriate mathematical background to teach K-6 mathematics. This is not a method course but each topic is related to the elementary curriculum through concurrent examination of relevant text and laboratory materials as each topic is studied. Topics include sets, the concept of number, place value numeration and associated algorithms, the structure of the natural numbers, the integers, and the rational numbers. Applications and problem solving are included. Carries credit only for elementary education majors.

**Math. 304-3. Mathematics for Elementary Teachers II.** Designed to meet objectives as described for Math. 303 above. Topics include intuitive and logical development of geometric ideas relevant to K-6 curriculum; measurement of length, area, volume, mass, angle, temperature, and time; stress is on the metric system; further study of the rational number system; applications and problem solving. Carries credit only for elementary education majors. Prer., Math. 303 or consent of instructor.

**Math. 311-3. Computer Applications in Mathematical Sciences.** (C.S. 311.) An advanced Fortran course for scientists and engineers. Aspects of optimal programming with respect to various goals and examination of goals that are appropriate to given contexts. Prer., C.S. 201 and Math. 140.


*Students without prerequisites are advised (and with an unsatisfactory placement test score will be directed) to consider enrollment in precollege course D.C.E. 95, as needed, through the Division of Continuing Education.
Math. 412-3. Topics in Mathematics. Special topics in mathematics will be covered. Students should check the current Schedule of Courses to obtain the topics to be covered as well as the prerequisites. With permission, this course may be taken for credit more than once.


Math. 422-3. Higher Geometry II. An introduction to the study of synthetic projective geometry. The relation of the projective and affine planes, coordinatization of the projective plane, linear and projective transformations. With permission, this course may be taken for credit more than once.


Math. 428-3. Mathematical Foundations of Quantitative Methods I. Matrix algebra related to model building and linear and nonlinear programming leading to a study of the Theory of Games with applications in engineering and other applied areas such as planning, transportation and environmental problems. Prer., Math. 427 and consent of instructor.

Math. 429-3. Mathematical Foundations of Quantitative Methods II. Parametric and nonparametric statistics which treat statistics in a Decision Framework (includes introduction to Decision Theory). Bayesian statistics and applications with exercises in probability representative of simple probabilistic models (e.g., queuing, single-server models, etc.). Prer., Math. 427 or consent of instructor.


Math. 432-3. Advanced Calculus II. Sequences and series, convergence, uniform convergence; Taylor's theorem; calculus of several variables including continuity, differentiation and integration; Picard's theorem in ordinary differential equations and Fourier series if time permits. Prer., Math. 431.

Math. 433-3. Advanced Calculus III. Vector fields, implicit function theorem, inverse function theorem; Green's, Stokes' and divergence theorems; Taylor's theorem for functions of several variables; calculus on manifolds if time permits. Prer., Math. 432 or consent of instructor, and Math. 313 or 319.


Math. 449-3. Tensor Analysis for Engineers and Scientists. Review of vector concepts. Indicial notation, oblique coordinates, generalized coordinates, summation conventions. Covariant and covariant tensors. Tensor algebra and tensor calculus. The course is designed primarily to familiarize the professional with the foundations of this useful subject rather than to develop detailed applications. Prer., differential equations and matrix analysis.


Math. 456-3. Laplace Transforms for Engineers and Scientists. Topics include the general methods, transforms of special functions, heaviside expansion theorems, transforms of periodic functions, convolution integrals, the inverse transforms, and solutions of ordinary and partial differential equations. Prer., ordinary differential equations.


Math. 458-3. Calculus of Variations for Engineers and Scientists. Techniques and applications of the powerful tools of the variational calculus will be developed and both classical and modern optimization problems will be attacked. Prer., ordinary and partial differential equations.

Math. 461-3. Analog Computation and Simulation. (Same as E.E. 450.) Analog computing techniques including time and amplitude scaling, and programming of linear and nonlinear differential equations. Simulation of dynamic systems, iterative analog computing. Laboratory work on an analog machine is required. Digital simulation languages are studied. Prer., ordinary differential equations and familiarity with Laplace transforms.


Math. 469-3. Estimation Theory for Engineers and Scientists II. A continuation of Math. 468. Selected topics will be developed extensively in accordance with the needs of the class. With the consent of the department, students may register for this course more than once. Prer., Math. 468 or consent of instructor.


Math. 475-3. Topics in Finite Mathematics. Especially suitable for those students who are not majoring in engineering or physical science. Prer., consent of department.


Math. 493-2, 494-2. Honors Seminar. Intended for candidates for departmental honors and other superior students. Topics covered vary

*This is one of several courses offered alternately by UCD and Metropolitan State College. See appropriate Schedule of Courses.
PHYSICS

from year to year. Student participation is stressed.

Math. 495-1 to 5. Workshop in Teaching Elementary Mathematics. Variable credit depending upon specific topics covered. Course content designed in consultation with groups of practicing teachers who desire courses to meet their specific needs. Students may register for this course more than once with consent of appropriate departmental adviser. Prereq., consent of department.

Math. 496-1 to 5. Workshop in Teaching Middle School Mathematics. Variable credit depending upon specific topics covered. Course content designed in consultation with groups of practicing teachers who desire courses to meet their specific needs. Students may register for this course more than once with consent of appropriate departmental adviser. Prereq., consent of department.

Math. 497-1 to 5. Workshop in Teaching Secondary Mathematics. Variable credit depending upon specific topics covered. Course content designed in consultation with groups of practicing teachers who desire courses to meet their specific needs. Students may register for this course more than once with consent of appropriate departmental adviser. Prereq., consent of department.

Math. 499-1 to 3. Independent Study. Variable credit depending upon the student's needs. This course is listed for the benefit of the advanced student who desires to pursue one or more topics in considerable depth. Supervision of a full-time faculty member is necessary, and the dean's office must concur. Students may register for this course more than once with departmental approval. Prereq., consent of department.

PHYSICAL EDUCATION

Effective fall semester 1976, Metropolitan State College will be responsible for teaching all undergraduate physical education for the Auraria Higher Education Center. This includes the basic activity program as well as the undergraduate major in health, physical education and recreation.

UCD students may take any activity class MSC offers. Check the fall and spring UCD Schedule of Courses for activities offered, class times, and procedures for enrolling in such classes.

Although physical education credit is not required for completion of the Bachelor of Arts or Bachelor of Fine Arts degrees, a maximum of 8 hours of elective credit consisting of activity courses may be applied toward the graduation requirement of 120 hours. All activity classes offered by MSC in Auraria may be taken on an elective basis. A course may be counted for credit only once. The student will have the option of being graded either by letter grade or pass/fail.

Students interested in pursuing a Bachelor of Science degree in physical education should contact the discipline representative at UCD. Major courses will be available through MSC or the Boulder Campus.

PHYSICS

Required of all physics majors are Phys. 111, 112, 114, 213, 214, 215, two years of calculus, and one year of another science. Majors preparing for graduate study in physics should also take Phys. 317, 321, 322, 331, 332, 341, 491, 492, and 495, and additional mathematics courses. Students not going to graduate school in physics or wishing an interdisciplinary physics major must consult an adviser for the suitable additional program. Students should also be aware of the engineering physics major available through the College of Engineering and Applied Science.

Phys. 105-4. General Astronomy. The methods and results of modern astronomy (solar system, stars, galaxies, cosmology) at an elementary level.


Phys. 111-4. General Physics. First semester of four-semester sequence for science and engineering students. Covers vectors, kinematics, dynamics, momentum of particles and rigid bodies, work and energy, gravitation, simple harmonic motion, and introduction to thermodynamics. Prereq., knowledge of algebra, geometry and trigonometry; coreq., calculus through derivatives and indefinite and definite integrals of polynomials and trigonometric functions, as typically covered in Math. 140.


Phys. 114-1. Experimental Physics. To be taken concurrently with or following Phys. 112-4. One 2-hour lab. per wk.

Phys. 133-1. Topics in Physics. Different five-week course modules dealing with various topics in physics. See current Schedule of Courses for specific modules covered. Designed for nonscience majors to fulfill the natural science requirement.

Phys. 199-variable credit. Independent Study for Lower Division.

Phys. 201-5, 202-5. General Physics. Four demonstration lect. and one lab. per wk. Phys. 201 mechanics, heat, and sound; Phys. 202: electricity, light, and modern physics. An elementary but thorough presentation of the fundamental facts and principles of physics. Majors in mathematics, chemistry, and others taking calculus are urged to take Phys. 111, 112, 114, 213, and 215. Prereq., 1½ years high school algebra and satisfactory grade on mathematics placement test. Generally offered by MSC.


Phys. 215-1 Experimental Physics. To be taken concurrently with or following Phys. 213. One 2-hour lab. per wk.

Phys. 251-5. 252-5. Physics for the Life Sciences. A two-semester introductory physics course emphasizing those subjects relevant to biology and medicine. Topics covered will include mechanics, fluids, thermodynamics, sound, optics, electricity, magnetism, atomic and nuclear physics, and their applications to the life sciences. Three hours of lect., one rec. pd., and one lab. per wk.

Phys. 308-3. Energy. A course in the supply and usage of energy resources and the environmental problems associated with our energy usage. Prereq., one course in college science or mathematics.

Phys. 317-2, 318-2. Junior Laboratory. Contains experiments on data handling, electrical measurements, electronics, optics, vacuum techniques, heat and thermodynamics, mechanics, and modern physics. Emphasis will be on developing basic skills and on design of experiments. Each student will carry at least one project experiment each semester. Coreq., Phys. 321, 331, or consent of instructor.


Phys. 341-3. Thermodynamics and Statistical Mechanics. Statistical mechanics applied to macroscopic physical systems; statistical thermodynamics, classical thermodynamic systems; applications to simple systems. The relationship of the statistical to the thermodynamic points of view is examined. Prereq., Phys. 213.

Phys. 362-3. Sound and Music. This course will consider the basic nature of sound waves, the ear and hearing, and musical instruments. No prerequisites. Although this course is mainly descriptive, some high school algebra will be used.


Phys. 395-3. Development of Physics from the 17th Century. This course examines the history and development of the important theories of physics from the time of Newton to the present day. The broad concepts and the people who originated them are stressed, rather than the mathematical details. Prereq., Phys. 105.
Phys. 429-variable credit. Psychophysics Methods and Research. This course covers the methodology of psychophysics by involving students in actual research in perception, with occasional seminars on techniques and data analysis. Prer., Psych. 416 or Phys. 363 and 364, and a knowledge of statistical analysis.


Phys. 465-3. Creative and Cultural Aspects of Physics. One of two independent courses (with Phys. 466) dealing with the interplay between physics and culture. It examines the lives and works of individual scientists and the relationship of physical theory to culture and creativity. Prer., upper division standing.

Phys. 466-3. Art, Science, and Technology. One of two independent courses (with Phys. 465) dealing with the interplay between physics and culture. It examines the relationship between physics and art, and the possibilities of art based on science and technology. Prer., upper division standing.


Phys. 495-2, 496-2. Senior Laboratory. Individual project laboratory with emphasis on modern physical experimentation.

Phys. 499-variable credit. Independent Study for Upper Division. Students must check with a faculty member before taking this course.

PSYCHOLOGY

Majors should include college algebra in their lower division schedules. At least 30 semester hours and not more than 48 semester hours in psychology must be completed, with at least 16 hours in upper division courses. No grade below C in psychology courses is acceptable toward the major.

Specific course requirements are Psych. 203-204 with laboratory; Psych. 210; at least one biotopic course, including Psych. 322, 405, 410, 414, 416, 425, 438; at least one sociotropic course, including Psych. 364, 365, 430, 431, 440, 445, 449, 464, 466, 471, 485; at least one advanced laboratory course, including Psych. 416, 422, 440, and 485; and one integrative course, Psych. 451.


Psych. 204-3. General Psychology II. Continuation of Psych. 203, covering topics of individual differences and their assessment and experimental social psychology. Psychology majors must register concurrently for Psych. 207.


Psych. 206-1. General Psychology Laboratory I. To be taken concurrently with Psych. 203 by psychology majors.

Psych. 207-1. General Psychology Laboratory II. To be taken concurrently with Psych. 204 by psychology majors.


Psych. 245-3. Psychology of Social Problems. An examination of social psychological aspects of social issues and problems in contemporary society. Includes such topics as poverty or minority status, prejudice, drug use, student protest, and patterns of sexual behavior. Consideration of theory and research relative to the topics as well as the definition of social behavior as a "problem."


Psych. 320-3, 321-3. Human Behavior and Maturati on Through the Life Span. Three hours lect. per week. Analysis of the normal range of behaviors found in each development stage from birth through senescence.


Psych. 365-3. Adolescence and Youth. Principles of development in adolescence, including physical, cognitive, and social development. Prer., Psych. 203-204 or 6 hrs. of psychology.

Psych. 400-2. Honors Seminar. Topic to be determined. Prer., major in psychology, senior standing, and consent of instructor.


Psych. 410-3. Behavioral Genetics. (Biol. 410.) Interdisciplinary course for upper division students interested in relationships between behavior and heredity. Prer., consent of instructor.

Psych. 412-3. Quantitative Genetics. (Biol. 412.) Survey of the principles of genetics of quantitative characteristics. Topics will include gene frequencies, effects of mutation, migration, and selection; correlations among relatives, heritability, inbreeding, cross-breeding, and selective breeding. Prer., Psych. 203-204.

Psych. 413-3. Drugs and the Nervous System. The physiological basis of drug action on the nervous system and behavior, with emphasis on the use of drugs as analytic tools in the study of behavior. Not concerned with subjective, social, or legal consequences of drug use. Part I: chemical basis of conduction and transmission in the nervous system. Part II: pharmacology of sleep, pain, addiction, dependence, appetite, anxiety, learning, memory, and perception. Prer., Psych. 405.


Psych. 421-1. Theories of Learning and Motivation I. An advanced survey of past and present major theoretical formulations in learning and motivation. Prer., Psych. 322 and consent of instructor.

Psych. 422-2. Laboratory in Learning. Laboratory projects demonstrating basic principles of operand and respondent conditioning. Class meetings for discussion as well as laboratory work will be required. May be used to fulfill the advanced laboratory requirement for the psychology major. Prer. or coreq., Psych. 322.


Psych. 429-1 to 3. Psychophysical Methods and Research. (Phys. 429.) Methodology of psychophysics is studied by involving students in research in perception, with occasional seminars on techniques and data analysis. Prer., Psych. 416 or Phys. 363 and 364 and knowledge of statistical analysis.


Psych. 431-4. Psychopathology. Intensive analysis of the major theories of personality and behavior disorders. Open to majors only, and not open for credit to those who have taken Psych. 430. Prer., Psych. 203-204, 6 additional hrs. of psychology, and upper division standing.

Psych. 438-3. Advanced Animal Behavior. (Biol. 438.) Comparison of behavior in a variety of species, with emphasis on social behavior and its evolution. Prer., Psych. 425 or consent of instructor.

Psych. 439-2. Laboratory in Animal Behavior. (Biol. 439.) Laboratory projects and field observations of the behavior of animals. Prer. or coreq., Psych. 438 and consent of instructor.


Psych. 449-3. Cross-Cultural Psychology. The influence of culture on personality, including sex roles, patterns of child rearing, attitudes and values, and mental illness. Prer., 6 sem. hrs. of courses in psychology, sociology, and/or anthropology in any combination.

Psych. 451-3. History of Psychology. Development of psychological
theories since 500 B.C. Schools of psychology and their adherents. Readings of primary and secondary sources. Prer., 16 hrs. of psychology and senior standing.


**Psych. 466-3. Psychology of the Exceptional Child.** Psychology of retarded, handicapped, and superior children. The relation of special traits to educational and social needs. Prer., Psych. 203-204, a course in developmental or child psychology, and upper division standing.

**Psych. 467-2. Psychology of Mental Retardation.** Psychological problems of mental deficiency. Concern with causes, identification characteristics, and treatment of the mentally retarded with an emphasis on research findings. Prer., Psych. 203-204 and 364.


**Psych. 498-1 to 3. Topics in Psychology.** Advanced study of special topics in psychology to be selected by the instructor. May be repeated for credit. Prer., consent of instructor.

**Psych. 499-1 to 3. Independent Study.** Prer., consent of instructor.

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**Division of Social Sciences**

FREDERICK S. ALLEN, Assistant Dean

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In the last two decades the social sciences have included study of some of the most intractable problems of contemporary society: the population explosion, urban concentration, the impact of rapidly changing technology, the strains of race relations, and the thrust of developing societies. Students interested in such problems can come to grips with important concepts in the social sciences which will help orient their lives as well as their careers. The social science disciplines also provide important bridges between thought and action and between values and problem-solving techniques. In short, the social sciences may now be considered to be at the center of the academic constellation, giving inspiration and possibly direction in the entire enterprise of education.

The Division of Social Sciences includes the following disciplines: anthropology, economics, history, political science, and sociology. The division offers courses in the various disciplines, in interdisciplinary studies, and in preprofessional studies.

Students can satisfy all requirements for the Bachelor of Arts degree at UCD in all the disciplines included in the division. The requirements of each major are explained before the course listings for the respective disciplines.

Students should be aware of the possibilities for a distributed studies major in the social sciences. The most usual combinations are economics and sociology, and history and political science. See the Special Programs section of this bulletin for details on a distributed studies major.

The division also has developed a major in urban studies. The program is designed to provide a broad educational experience for persons who are interested in careers related to the problems of urban life. The major is appropriate for students intending to enter the fields of business, law, medicine, or public school teaching, to work in or with federal, state, or local agencies or volunteer and community action groups, or to enter graduate programs in the social sciences or environmental planning. Interested students should contact the Division of Social Sciences office for information concerning advisers, requirements, courses currently offered and proposed, and options involved in the program.

For preprofessional programs, see listings and requirements in that section of this bulletin.

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**Description of Courses and Programs**

For information on scheduling of courses, consult the appropriate Schedule of Courses for day, time, and meeting place of classes.

**ANTHROPOLOGY**

Undergraduate students majoring in anthropology must complete a minimum of 30 semester hours with grades of C or better. Sixteen of the 30 hours must be upper division. The maximum number of hours in the major is 48.

Majors in anthropology must take Anthro. 103 and 104 (Principles of Anthropology I and II) or demonstrate knowledge of materials covered by these courses. Majors also must take Anthro. 201 and 202 (Introduction to Physical Anthropology I and II); Anthro. 453 (History of Anthropology); and either Anthro. 280 (Nature of Language); Anthro. 480 (Anthropological Linguistics); or Anthro. 481 (Language and Culture).

**Note:** Most 400-level courses do not have prerequisites.

**Anthro. 103-3. Principles of Anthropology I.** Physical anthropoogy and archaeology. Evolution of man; his physical and cultural development through the rise of early civilization. Includes consideration of man as a biological organism, his origin and relationship with nonhuman and prehuman primates and development of culture as an adaptive device.


**Anthro. 201-4. Introduction to Physical Anthropology I.** Theory of biological evolution; examination of man's organic structure, function, and behavior from an evolutionary-comparative perspective; analysis of fossil evidence of human evolution. Laboratory work emphasizing osteology and osteology.


**Anthro. 220-3. Principles of Archaeology.** Basic introduction to concepts, techniques, and theory of archaeological excavation and interpretation. Two lect., one two-hour lab per week. Lectures, demonstrations, and practical work.

**Anthro. 227-3. The Evolution of New World Culture.** Cultural evolution in the New World from the earliest hunting cultures through the rise of civilization as seen from the perspective of archaeological evidence and theory.


**Anthro. 280-3. The Nature of Language.** Survey of languages of the world and their historical relationships. Introduction to language analysis.
Study of theories of the origin of language, its relationship to other forms of communication, to cognition, and to thought and writing.

Anthro. 310-3. Cultural Pluralism. The cultural and social anthropology of the plural ethnic and racial component of modern complex societies (nation-states). The focus will be on the forms and processes of sociocultural identity, its maintenance and change with national integration.

Anthro. 360-3. Anthropology of Sex. Study of sex as a factor in human evolution, contemporary biological variation, and in the allocation of roles and responsibilities in different cultures. (Special emphasis will be placed on roles and attributes of women.)

Anthro. 399-3. Undergraduate Seminar in Anthropology. Directed investigation of a specific topic of current interest. The topic may be within the subfields of anthropology or interdisciplinary with anthropological and other related topics will be announced. Prer., consent of instructor.


Anthro. 414-3. Primatology. Survey of the Primate Order in evolution. Morphology and behavior from a comparative point of view, with emphasis on issues related to the origin and evolution of the most social member of this order.

Anthro. 415-3. Human Ecology. A study of demographic and ecological variables as they relate to man. Aspects of natural selection, overpopulation, and environmental deterioration will be considered.


Anthro. 421-3. Archaeology of the American Southwest. Prehistoric cultures of the southwestern U.S. and adjacent Mexico, their origins, characteristics, and interrelations.

Anthro. 422-3. Archaeology of Mesoamerica. Prehistoric and protolithic cultures of Mexico and northern Central America, including the Aztecs and the Maya.

Anthro. 430-3. Cultural Evolution. Review of various theories explaining the evolution of culture with particular attention to the Neolithic and Urban Revolutions.

Anthro. 435-2. Anthropology. 6. Archaeological Field and Laboratory Research. Summer session only; Boulder Campus only. Students will participate in archaeological field research and conduct laboratory analysis of archaeological materials and data. Open only to University of Colorado anthropology majors. Prer., consent of instructor.

Anthro. 443-3. Economic Anthropology. Cross-cultural survey and comparison of economic systems and their functional relationships with other social institutions in a range of societies from simple to complex.

Anthro. 444-3. Urban Anthropology. An anthropological approach to the comparative study of factors influencing urbanization in different parts of the world along with the implications of environments, economy, values, and psychology of urban living in general. Cross-cultural, but with emphasis on the modern western world.

Anthro. 447-3. Ethnohistory. The use of documents and other external sources in the reconstruction of culture history.

Anthro. 448-3. Anthropology and Education. An anthropological focus on contemporary educational systems. Review of recent research in the anthropology of education as well as an introduction to teaching anthropology in the classroom. Primarily for social studies teachers, education, and anthropology students. Prer., consent of instructor.

Anthro. 450-3. Family Dynamics. The course examines processes of change in values, roles, and relations involved in marriage and family structure, using contemporary cross-cultural materials leading to understanding of such phenomena as generation and sex role changes. Special attention is given to changing structure of authority, economics, and the emotional components associated with marriage and family life of today's America.

Anthro. 451-3. Applied Cultural Anthropology. Concept, methods, and problems in the application of anthropology to community organization and institution organization, development and administration; exemplified through analysis and discussion of U.S. and cross-cultural case materials. Urban and medical problems as well as ethical issues to be included.

Anthro. 452-3. Seminar: Recent Anthropology. Current directions in sociocultural theory, method, and technique as exemplified in reported research and theoretical works of major anthropologists from mid-20th century to the present. Prer., anthropology major or consent of instructor.


Anthro. 454-3. Psychological Anthropology. A comparative study of the relationship between culture and social character and between culture and individual personality. Anthropological perspectives on the effects of various sociocultural contexts on individual experience. The relationships of sociocultural situations to motives, values, cognition, personal adjustment, stress, and qualities of personal experience are emphasized.


Anthro. 456-3. Contemporary Cultural Studies. Beginning with the historical background on American Indian acculturation and persistence, but emphasizing present-day relations between Indian communities and the dominant society, stressing conditions and events in Denver and the Southwest generally.

Anthro. 458-3. Political Anthropology. Analysis of institutions of political control both comparatively and from an evolutionary perspective; the interconnections between political and other aspects of human cultural systems.


World Ethnography (Anthro. 462-476) Each course listed below will cover the major aspects of cultural and social anthropological interest relating to the peoples and cultural systems within the areas indicated. Upon completion of the course, the student will be able to discuss the cultural affiliation of the inhabitants, the culture-historical knowledge of the area will be reviewed. The ways of life of the indigenous populations, their relations with each other and to other peoples, and the effects of cultural change will be discussed.


Anthro. 463-3. Ethnography of Mexico and Central America.


Anthro. 474-3. Ethnography of India, Pakistan, and Ceylon.

Anthro. 476-3. Ethnography of Southeast Asia.


Anthro. 481-3. Language and Culture. Course explores the relationships between culture and language in the following contexts: language acquisition, language and individual, social dialects, language and education, language and world view, the role of language in cultural interaction and social structure, planned language change including language problems in new nations and at the international level.


ECONOMICS

Students majoring in economics must meet the following requirements: at least 30, but not more than 48, semester hours in economics, of which 22 must be numbered 300 or higher; C.S. 201; Econ. 301, 407 and 408. Majors are urged to take Econ. 381 as soon as possible.

For all courses numbered above 300, the prerequisite, unless otherwise indicated, is Econ. 201 and 202, or Econ. 300.
Distributed Studies  
Students majoring in distributed studies may make economics their primary area of concentration by taking 30 semester hours in economics. Required courses for this option are Econ. 407-408 and a course in statistics.

Introductory Courses
Econ. 201-3. Principles of Economics I: Macroeconomics. Purpose is to teach fundamental principles, to open the field of economics in the way most logical and careful placement examination; (2) Math. 140, 241, 242 (students planning to go to graduate school in economics should take option 2); and Econ. 201 and 202.

Econ. 481. Prereq., Econ. 481 and 211 and others who want a one-semester introduction to economics. Open to qualified freshmen.


Econ. 250-3. Capitalism and Slavery I. History of the development of slavery as an American institution from 1619 to 1970. Includes growth of the slave trade, development of the plantation system, stimulation of the American economy by slavery, economic implications of the Civil War, theoretical freeing of the slaves in 1863, and the development of modern slavery in America from Reconstruction to the present.

Econ. 251-3. Capitalism and Slavery II. Continuation of Econ. 250.

Econ. 300-3. Accelerated Principles of Economics. Condensation of Econ. 201 and 202. Intended for students who have taken Soc. Sci. 210 and 211 and others who want a one-semester introduction to economics. Open to seniors without prerequisite. Not open to students who have taken Econ. 201 and 202.

Econ. 379-3. Consumer Economics. Application of microeconomics to the problems of the ordinary consumer: budget management, purchases, insurance, etc. Intended for nonmajors.

Econ. 381-3. Introduction to Quantitative Research Methods in Economics I. Introduction to the use of mathematics in economics research. Prereq., (1) Math. 108 with a grade of B or better, or Math. 140 with a grade of C or better, or passing grade on mathematics placement examination; (2) Math. 140, 241, 242 (students planning to go to graduate school in economics should take option 2); and Econ. 201 and 202.


Econ. 481-3. Introduction to Econometrics. The application of mathematical and statistical techniques to problems of economic theory. Emphasis is on principles rather than computational methods or mathematical rigor. Major topics include demand, production, and cost analysis. Prereq., two semesters of calculus and one semester of statistics, or consent of instructor.

Econ. 482-3. Introduction to Econometrics II. Continuation of Econ. 481. Prereq., Econ. 481.

Economic Theory and Thought

General Courses
Econ. 201 and 202. See Introductory Courses section.

Econ. 300-3. See Introductory Courses section.

Econ. 403-3. The Price System. Course in microeconomics designed for teachers and other nonmajors. Production, price, and distribution theory in a free-market system. Assumptions and conditions of a free-market and other market structures.

Econ. 404-3. Income, Employment, and Economic Activity. Course in macroeconomics designed for teachers and other nonmajors. Theory and applications of national income determination, the role of money in the economy, and economic growth. Policy problems in dealing with unemployment, inflation, growth, and our international balance of payments.


Econ. 409-3. History of Economic Thought. Survey of the development of economic thought from ancient to modern times.

Econ. 410-3. Radical Political Economy. An introduction to modern radical economics, emphasizing Marxist critiques of capitalism; Marx's theory of capitalist development; contemporary analysis and majors in economics; others by consent of instructor. Designed to give seniors a chance to evaluate critically some practical or theoretical problems under supervision, and to present results of their thinking to fellow students and instructors for critical evaluation.

Econ. 499-variable credit. Independent Study. Consent of instructor required.

Fiscal and Monetary Policy and Public Finance

Econ. 421-3. Public Finance I. Taxation, public expenditures, debts, and fiscal policy. Role of public finance in times of peace and war. National, state, local taxation, with some special attention to the state of Colorado.

Econ. 422-3. Public Finance II. Continuation of Public Finance I. Either course may be taken separately.

International Economics and Economic Development
Econ. 441-2. International Trade and Finance. Theories of international and international trade, private and public trade, world population and resources, tariffs, and commercial policy. International economic organization.

Econ. 477-3. Economic Development—Theory and Problems I. Theoretical and empirical analysis of problems of economic development in both underdeveloped and advanced countries.

Econ. 478-3. Economic Development—Theory and Problems II. Current conditions of economic development, with emphasis on accelerating and maintaining growth.


Econ. 489-3. Economics of Africa and the Middle East. Current problems of development faced by African and Middle Eastern economies. Emphasis on case studies, regionalism, planning, and ramifications of economic change.

Economic History, Systems, and Institutions
Econ. 250 and 251. See Introductory Courses section.


Econ. 451-3. Economic History of Europe. Evolution of industrial society with emphasis upon the growth and development of English industry and commerce.

Econ. 452-3. Economic History of the United States. American economic organization and institutions and their development from colonial times to present.


Human Resources Economics and Labor Economics
Econ. 460-3. Introduction to Human Resources. Economics of investments in man, including the economics of poverty and the application of cost benefit analysis to social welfare programs.

Econ. 461-3. Labor Economics. Study of problems associated with determination of wages, hours, and working conditions in the American economy. History and analysis of economic effects of trade unionism and other social institutions, including agencies of formal government. Introduction to manpower studies.

Econ. 462-3. Economics of Collective Bargaining. Scientific analysis of processes by which labor and management democratically reach agreements; how differences between labor and management are settled by means of grievance procedure and arbitration; and overall economic effect of collective bargaining on goods produced by the national economy. Demonstrations, workshops, and lectures.


Econ. 464-3. Collective Bargaining, Labor Law, and Administration. Study of social pressures that are shaped into labor policy acceptable to labor, management, and the general public by various means of social control. Evolution of a "common law" of labor relations out of free collective bargaining and arbitration. Prereq., senior status.
Government and Business: Industrial Organization

Econ. 456-3. Economics of Agriculture. Economic analysis of the agricultural sector and of problems and policies related to agriculture and other primary industries.

Econ. 469-3. Government in the Economy. Analysis of the role of government in the economy, neo-classical microeconomic theory as a point of departure for understanding what a free market system can and cannot accomplish. Prereq.: Econ. 403 or equivalent.


Urban, Regional, and Environmental Economics


Econ. 427-3. Economics of Transportation. Survey of transportation in U.S. First part of course deals with development of intercity transportation via water, rail, highway, and air. Second part deals with the urban transportation problem, comparing private and public alternatives.


HISTORY

Undergraduate students majoring in history must complete a minimum of 30 semester hours in history, 16 of which must be upper division. Not more than 48 hours in the student's major area will count toward the 120-hour requirement. As of fall 1973, a student must have a cumulative grade-point average of 2.0 or better in the major to be graduated.

A history major shall fulfill his lower division course requirements with Hist. 101 and 102 and Hist. 150 or any 200-level course in U.S. history or the equivalents.

Hist. 101-3. History of Western Civilization I. Selected topics from ancient to early modern times.

Hist. 102-3. History of Western Civilization II. Selected topics from early modern to modern times.

Hist. 150-3. Introduction to United States History. Survey of selected topics in American history from colonial times to the 1960s. Emphasis on the major forces and events that have shaped American society.

Hist. 215-3. Afro-American History I. Major emphasis on the events that have occurred in the life of the Afro-American from the time of his first landing in the U.S. to the present.


Hist. 250-3. Topics in American History. Forces that have affected the development of the United States. Each topic is treated as a complete unit. Suggested background: Hist. 150.


Hist. 282-3. History of Latin America II. Latin America since independence. Focus on Mexico, Brazil, and Argentina.

Hist. 322-3. Women in History. A study of Western culture with particular focus on the role of women.


Hist. 422-3. The Second World War. A military-political orientation, examining the grand strategy, diplomacy, and campaigns of the war in some detail. Emphasizes the influence of technology upon the conflict.

Hist. 423-3. Europe During the Renaissance. Social and intellectual history of Europe from the 14th to the 16th centuries.

Hist. 424-3. Europe During the Reformation. Social and intellectual history of Europe from the 16th to the 18th centuries.

Hist. 430-3. History of France Since 1815.


Hist. 441-3. History of Africa to 1840. Part I of a two-semester sequence introducing the student to political, economic, and cultural change in Africa.

Hist. 442-3. History of Africa From 1840. Part II of a two-semester sequence introducing the student to political, economic, and cultural change in Africa.


Hist. 450-3. A Political History of Africa. An analysis of the variety of political units in Africa and the ways in which they have changed.


Hist. 453-3. Civil War and Reconstruction. Events leading to the outbreak of war, the war itself and its impact on North and South, and the efforts to reconstruct Southern society during the post-war period.

Hist. 454-3. The Progressive Movement and After, 1900-1929. In domestic affairs, emphasis on the Progressive Movement and the reaction against it in the twenties. In foreign affairs, emphasis on slowly increasing but reluctant participation in world power politics.

Hist. 456-3. The Jacksonian Era. Emphasis on conditions that produced striking alterations in the political, psychological, and economic organization of the United States, as well as violence and war.


Hist. 463-3. American Society and Thought to 1865. Analysis of social ideas to 1865, and the impact of these ideas on American society.

Hist. 464-3. American Society and Thought Since 1865. Analysis of social ideas since 1865, and the impact of these ideas on American society.


Hist. 467-3. Diplomatic History of the United States to 1912. The development of American foreign policy, emphasizing the evolution of the basic policy of isolation from European affairs and increasing involvement in the Pacific and East Asia.


Hist. 469-3. The New South From Reconstruction to the Present. Historical origins, race relations, society and culture, and political aspects.

Hist. 470-3. History of Urban America. From colonial times to the present with the chief focus on major changes in the process of urbaniza-
tion. Subjects will include town promotion, rise of heavy industrial cities, utopian towns, emergence of the city “boss,” urban transportation, and the future of American cities.

Hist. 471-3. The U.S. in the Pacific. A thematic course which explores the following major themes: the growth of American interest in the Pacific, especially in trade and missionary activities; the gaining and governing of the American colonial empire; and the U.S. role in international rivalry in the Pacific.

Hist. 473-3. History of China. Deals with traditional China covering a period from the “beginning” to the mid-19th century.

Hist. 474-3. History of China. A combination of descriptive material with a broad analytical base is applied to an investigation of the emergence and development of modern China.


Hist. 479-3. United States Military History to 1900. Development of the military and naval art of war in American history, in both its peacetime and wartime aspects, from colonial times to the end of the Spanish-American war.

Hist. 480-3. United States Military History Since 1900. American military and naval history since the Spanish-American war, presented as a continuing evolution in both war and peace and emphasizing the dominating influence of technology upon operations, organizations, and policies.


Hist. 486-3. The Old South and National Disunion. Early development of the southern United States, the institution of slavery, and the sectional conflict leading to national disunion.


Hist. 489-3. The Modern Middle East, 1789 to the Present. Emphasis on the modernization of the region from Egypt through Persia, Anatolia, and Arabia, not only in political terms, but also in terms of the economic, social, and intellectual changes which have transformed the Middle East in the last century and a half.


Hist. 496-3. The Soviet Union, 1929 to the Present.


Hist. 499-variable credit. Independent Study. Consent of instructor required.

POLITICAL SCIENCE

Undergraduate majors must complete a minimum of 36 semester hours in political science, of which at least 21 semester hours must be in upper division courses. Courses must be distributed among the primary fields as listed in this bulletin, i.e., American government and politics, comparative politics, international relations, public administration, and political theory and public law. The major must include the following: Pol. Sci. 100, 110, 200, 440, and 441; Econ. 201 and 202; and one upper division course in each of the primary fields of political science except public administration. In addition, it is strongly recommended that all majors enroll for Pol. Sci. 202.

For all courses numbered 300 and above, the prerequisite, unless otherwise indicated, is either the Pol. Sci. 100-110 sequence or consent of the instructor.

General Courses in Political Science

Pol.Sci. 100-3. Introduction to Political Science. Introduction to the study of politics, its human importance, and its relationship to social institutions. Analysis of the relationship between individual political behavior and characteristics of the political system. Development of key concepts such as power, legitimacy, authority, political socialization, and revolution. Required of all majors. Pre-, Pol.Sci. 100 or consent of instructor.

Pol.Sci. 101-3. Introduction to Comparative Politics I: Technological Societies. Comparison of legal-institutional features; social, economic, and ideologica polities; patterns of recruitment and decision making and of political-system maintenance and change.

Pol.Sci. 202-3. Introduction to Comparative Politics II: Pretechnological Societies. Comparison of the basic political features of the economically developing societies. The traditional political culture, nationalism, political integration, political structures, political groups in developing societies, modes of political conflict, the style of development politics and political implications of planned socioeconomic change; evolution and revolution in the third world.

Pol.Sci. 310-3. Women in a Changing World. (Soc.Sci. 335.) Offers an understanding of the historical, economic, and sociocultural background of women’s changing roles and function in the contemporary
world. The approach and material are multidisciplinary. The goal is a balanced understanding through analysis and discussion based on objective information.

Pol.Sci. 409-3. Comparative Metropolitan Systems. Comparative analysis of the major metropolitan systems in different countries; the structural environment, decision-making in the bureaucracies and political groupings, governmental interaction and communication.

Pol.Sci. 410-3. Advanced Comparative Politics—Western Europe. An intensive and comparative analysis of the political systems and processes of Western Europe. Emphasis on political culture and constitutionalism; executive-legislative relationships; electoral politics; political parties and interest groups; administrative and judicial processes; and the impact of social changes on political institutions. Prereq. Pol.Sci. 201 or consent of instructor.


Pol.Sci. 419-3. Political Systems of Sub-Saharan Africa. Analysis of major types of political systems in sub-Saharan Africa and intensive case studies of selected countries exemplifying each type. Anticolonial movements, adoption and rejection of Western political institutions and values. Special political problems of multiracial and multicultural societies.


Pol.Sci. 460-3. Politics of South Asia. Study of the political and administrative systems of India, Pakistan, Ceylon, and Nepal. Impact of British role on development and political institutions on subcontinent as well as problems of political development at all levels.

International Relations

Pol.Sci. 421-3. International Politics. The system of national states, concepts of national interest, goals of foreign policies, conduct of diplomacy, and the bearing of these elements on the problem of peace. Presentation and evaluation of the solutions that have been offered for the maintenance of peace. Great powers and regions of the earth in international politics today, and their roles in international tensions.

Pol.Sci. 423-3. American Foreign Policy. Examination of the foundations, assumptions, objectives, and methods of U.S. foreign policy. Special attention to the revolutionary international environment, and to problems of colonialism and imperialism.

Pol.Sci. 428-3. International Behavior. Presentation of alternate theoretical frameworks for the explanation of international processes. Theories of conflict behavior and social organization applied to systems of war and peace. Special emphasis on the role of systematic empirical research in the development of theories of international behavior.

Pol.Sci. 472-3. Soviet and Chinese Foreign Policy. Foreign policies of the Soviet Union and China, including the Sino-Soviet conflict; relations with Western powers and the Third World; interaction of domestic developments and foreign policy; role of national interest, ideology, and elite personalities.


Pol.Sci. 475-3. Africa and U.S. Foreign Policy. Examination of historical background, assumptions, objectives, methods, and results of U.S. policy toward black Africa. Special attention to areas under foreign or minority rule, ethnic factors, potency of economic and political variables, and stresses between alliance policy and sympathy for self-determination.


Public Administration

Pol.Sci. 406 and 408 may be used by majors in political science to satisfy the requirement in the field of public administration.


Pol.Sci. 435-3. Natural Resources: Policy and Administration. Resource control and management; governmental, and private control of natural resources; organization, procedures, and programs for administration and development of natural resources.


Pol.Sci. 439-3. National Policies and Administration. Major policies and programs of the national government and their administration; the role of the President and other administrators in formulating public policy; problems of centralization and public accountability.

Political Theory and Public Law


Pol.Sci. 440-3. East Asian Political Thought. Main currents of political thought in their historical setting from Plato to the 17th century, with a critical evaluation of those elements of continuing worth. Required of all majors.


Pol.Sci. 443-3. Jurisprudence. Origins of modern legal institutions and role of law in society throughout the ages. Contrast between Anglo-American and legal systems stemming from the Roman Law. Law cases are studied only insofar as they mirror historical and sociological developments.


Pol.Sci. 447-3. Constitutional Law I. Nature and scope of the following American constitutional principles as developed by the U.S. Supreme Court: federalism, jurisdiction of the federal courts, separation of powers, the judicial power, and the commerce power. Case method.

Pol.Sci. 448-3. Constitutional Law II. Continuation of Pol.Sci. 447, with emphasis on the power war, powers of the President, citizenship, the Bill of Rights, and the Civil War Amendments. Case method. Not open to freshmen and sophomores.

Pol.Sci. 449-3. American Judicial System. Examination of the principal actors in the legal system: police, lawyers, judges, citizens. About half of the course will be devoted to the study of judicial behavior, especially at the Supreme Court level.

Pol.Sci. 490-3. Revolution and Political Violence. Study, discussion, and evaluation of alternative frameworks for the analysis of revolution and political violence. The theoretical material will be firmly couched in
case situations such as western, class, colonial, urban, international, historical, racial, religious, and intergenerational violence. Development by the class of its own theoretical model.

**SOCIOLGY**

Majors in sociology are required to complete 30 hours in sociology with a grade of C or better. Of these hours, 16 must be upper division. Maximum of 6 hours of social science credit may be counted toward the major in sociology. As no fixed sequence of courses is prescribed, it is recommended and expected that students will select an adviser from the sociology faculty to help them develop their programs. This is particularly important for those intending to do graduate work in sociology.

The department has developed the following rationale for courses offered. The course number changes that have resulted take effect in the fall semester 1976.

1. **Lower Division Courses** (100 and 200)
   a. One hundred level courses are an introduction to the broad sociological perspective as it applies to social life, social systems, and society.
   b. Two hundred level courses introduce the student to somewhat more specific content areas: population study, human ecology, social psychology, etc.

2. **Upper Division Courses** (300 and 400)
   a. Three hundred level courses serve as advanced surveys of some specific area of concentration. They are designed to acquaint the student with the issues, methods and concepts, and theoretical frameworks employed in the content area. Such courses as urban sociology, sociology of the family, and sociology of work are offered at this level. Many of these courses are "open" courses in that students from other disciplines and colleges are encouraged to enroll in them.
   b. Four hundred level courses are devoted to a more detailed in-depth examination of specific issues, approaches, and concepts within the previously identified content areas. These are advanced courses and are geared more directly to sociology and social science majors.

**Soc. 100-3. Introduction to Sociology.** (Formerly Soc. 111.) Sociology as a science, man and culture, social groups, social institutions, social interaction, social change.

**Soc. 101-3. Race and Minority Problems.** (Formerly Soc. 128.) Race and ethnic groups, facts and myths about great populations, including psychological, social, and cultural sources of bias and discrimination.

**Soc. 102-3. Contempoary Social Issues.** Introductory consideration of some current social controversies such as democracy, capitalism, race and ethnic groups, marriage, the family, crime, international tensions, and world order. Designed to improve the student's ability to understand current debate and to formulate opinions for himself.

**Soc. 103-3. Mass Society.** (Formerly Soc. 239.) Study of the emergence of modern society. Emphasis on the role of masses and of separated and isolated individuals in the lack of unifying values and purposes.

**Soc. 104-3. Social Problems and Social Change.** (Formerly Soc. 250.) Sociological analysis of problems resulting from recent social changes including occupational shifts and the redefinition of work; adolescent roles and responses; public responses to crime, delinquency, and mental illness; race and minority relations; community disorganization; and the effects of population growth and redistribution on underdeveloped areas.

**Soc. 105-3. Analysis of Modern Society.** (Formerly Soc. 255.) Examination of various sociological views of modern society including those of Lundberg, Richardson, Mills, Riesman, Goffman, Sorokin, Cohen, and others.

**Soc. 119-3 Deviance.** A consideration of the processes of social differentiation.

**Soc. 221-3. Population Studies.** Elements of demography, natality, mortality, international and internal migration, population growth, population policy.

**Soc. 222-3. Human Ecology.** Ecological organization and processes in urban, rural, and regional areas.

**Soc. 246-3. Introduction to Social Psychology.** Survey of the following varieties of social psychology: psychoanalysis, symbolic interactionism, culture and personality, structural functionalism, and psychological social psychology.

**Soc. 248-3. Social Movements.** Social bases and development features of such modern social and political movements as communism, socialism, liberalism, and conservatism.

**Soc. 299-variable credit. Independent Study in Sociology.** Consent of instructor required.

**Soc. 300-3. Urban Sociology.** (Formerly Soc. 426.) The city in terms of its social structure, residential and institutional patterns, processes of interaction, demographic processes, and patterns of growth and change.

**Soc. 301-3. Social Stratification.** (Formerly Soc. 444.) Status, social mobility, and class in selected societies; elites and leadership problems.

**Soc. 302-3. Social Institutions.** Organized system of practices and social roles developed about values. Machinery evolved to regulate the practices and behavior of family, church, government, economy, recreation, and education.

**Soc. 303-3. Social Change.** (Formerly Soc. 453.) Process of change in Western society and its effects on the individual, the family, and economic and political institutions.

**Soc. 304-3. Sociology of the Family.** (Formerly Soc. 455.) The family as a social institution. Historical development and contemporary cross-cultural analysis with emphasis on the contemporary American family.

**Soc. 305-3. Sociology of Work.** (Formerly Soc. 478.) The analysis of work in a variety of organizational settings with an emphasis on the changing meaning of work.

**Soc. 384-3. Environment and Behavior.** Focuses on the influence of both rational and man-made environments upon human behavior and social organization.

**Soc. 400-3. Contemporary Sociological Theory.** (Formerly Soc. 316.) The explication of various conceptual approaches to the problems of social order, societal functioning and integration, social conflict, social oppression, and social structural change by the examination of the works of contemporary sociological theorists.

**Soc. 401-3. History of Sociological Thought.** (Former Soc. 315.) Major social theorists from early times to date, including Aristotle, Plato, Machiavelli, Comte, Spencer.

**Soc. 402-3. Statistics.** (Former Soc. 317.) Quantitative techniques used in analyzing social phenomena. Prer., Math. 107 or its equivalent, or consent of instructor.

**Soc. 406-3. Sex Role Differentiation.** Causes and consequences of sex role differentiation at the individual, group, and societal levels.

**Soc. 409-3. Research Practicum.** Practical experience for undergraduates in application of principles of research design and data processing to a social research problem selected by the instructor.

**Soc. 417-3. Research Methods.** Design of social research. Application of statistical techniques and procedures to social phenomena. Prer., Soc. 402 or consent of instructor.

**Soc. 421-3. Advanced Population Studies.** The sociological importance of population study. Advanced demographic analysis and population theory. Natality, mortality, problems of population growth and internal and international migrations, population policy, and aspects of population planning and control.

**Soc. 422-3. City and Region.** Reviews and appraises theory and research concerning the relationship of the city to its hinterland. The analysis examines institutional, demographic, and ecological patterns evolving from dynamic city-region relationships.

**Soc. 424-3. Migration.** World migration patterns. Migration examined as an effect and as an influence. Planned and unplanned migration.

**Soc. 433-3. Communities.** Review and appraisal of community studies.

**Soc. 443-3. Technology and Modernization.** Description and analysis of changing social structure and social relationships as a response to technological innovation and change.

**Soc. 449-3. Social Control.** Informal and formal regulative processes in social behavior, with reference to techniques and processes of social control, such as propaganda, the political order, and other institutions.

**Soc. 451-3. Social Institutions.** Organized system of practices and social roles developed about values, and behavior of institutions of family, church, government, economy, recreation, education.

**Soc. 452-3. Collective Behavior.** Social, cultural, and psychological factors affecting behavior in crisis situations.

**Soc. 454-3. Social Mobility.** Status, occupational, and income change examined from viewpoints of individual, organization, and society as a whole. Special attention to methods of analyzing change, comparative social mobility, and status equilibration.

**Soc. 466-3. Advanced Social Psychology.** An in-depth course in social psychology viewed from a sociological perspective.
These courses can satisfy, in part, the area requirement in the social sciences.

**Soc.Sci. 210-3. The Study of Man in Society I.** An integrated introduction to concepts and methods of the social sciences as they apply to analysis of societal contexts.


**Soc.Sci. 305-3. Education and Culture in Historical Perspective.** An analysis of the interaction of culture and education in Western society since the Renaissance.


**Soc.Sci. 321-3. The American Indian and Federal Law.** The objectives of this course are to survey a special status as set forth in Federal law, to identify its problems, costs and benefits to Native Americans, and to acquaint course participants with applications and politics of the law through the study of actual case materials.


**Soc.Sci. 325-3. Pathology of the Ghetto I.** Major emphasis on social and institutional ills found in the disadvantaged Black community.

**Soc.Sci. 326-3. Pathology of the Ghetto II.** Major emphasis on social and institutional ills found in the disadvantaged Black community.

**Soc.Sci. 327-3. Comparative Urban Cultures.** Emphasis on historical background and social concerns of diverse cultural and ethnic groups which constitute the modern American city.


**Soc.Sci. 330-3. Selected Topics on Asian Americans.** Examining of topics and issues concerning Asian Americans to be selected by instructor and students.

**Soc.Sci. 335-3. Women in a Changing World.** Offers an understanding of the historical, economical, and sociocultural background of women's changing roles and function in the contemporary world. The approach and material are multidisciplinary. The goal is a balanced understanding through analysis and discussion based on objective information.


**Soc.Sci. 398-variable credit. Cooperative Education.** Designed experiences involving application of specific, relevant concepts and skills in supervised employment situations. Prer., sophomore standing and 2.5 grade-point average.

**Soc.Sci. 402-3. Economic and Political Determinants in a Health Care System.** (Health Ad. 602.) Designed to acquaint the student with the health care industry, in terms of both the organization and delivery of health care services and the socioeconomic consequences of those services.

**Soc.Sci. 410-3 Business and Government.** (B.Ad. 410.) The study of government regulation of the business systems. Topics include regulation of business concentration, markets for labor, money, other resources and final products. Prer., Econ. 201-202, Pol.Sci. 110.
ASIAN AMERICAN STUDIES

ANDREW G. WILLIAMS, Director

Soc.Sci. 329-3. The Asian Americans. Examines the experience of Asian Americans from a sociological perspective. Emphasizes analysis of activities and problems. The history of the groups is reviewed and the contemporary situation in their communities receives attention. Class is structured around lecture/discussion, reading materials, speakers, films, and field trips. Students have the opportunity to work on projects related to Asian American communities and peoples.

Soc.Sci. 330-3. Topics on Asian Americans. Examines specific topics on Asian Americans to be selected by the instructor and the students. Detailed study of subjects related to the Asian American experience and communities.

BLACK STUDIES

CECIL E. GLENN, Director

Bl.St. 110-3. Black Contemporary Social Issues. Designed to expose the student to those areas of intellectual, social, cultural, economic, political, and educational concerns relevant to the Afro-American experience. Principally an introductory survey of primary issues currently affecting the black man.

Bl.St. 112-3. Introduction to Black Studies. A course designed to acquaint new students with the history, purpose, organization, and goal of the Black Education Program.


Bl.St. 203-3. Behavioral Analysis I. A psychology course which deals with the interrelationships between the black individual and his social environment. Social influences upon motivation, perception, and behavior. The development and change of attitudes and opinions in the ghetto.

Bl.St. 204-3. Behavioral Analysis II. Psychological analysis of small groups, social stratification, and mass phenomena such as riots. Continuation of Bl.St. 203.


Bl.St. 227-2. Interrelated Studies. An integrated study of the development of the black man in the arts, history, literature, politics, economics, etc.

Bl.St. 250-3. Capitalism and Slavery I. (Econ. 250.) The development of slavery as an American institution from 1619 to 1970, the plantation system, the growth of the slave trade, the stimulation of the American economy by slavery, the Civil War as an economic conflict between the industrialists of the North and the agriculturalists of the South.

Bl.St. 251-3. Capitalism and Slavery II. (Econ. 251.) Post-Civil War to the present, trade unions, legislation, the urban crisis, and “Black Capitalism.” Continuation of Bl.St. 250.


Bl.St. 271-3. African-American Art History II. (Fine Arts 271.) Continuation of Bl.St. 270.

Bl.St. 274-3. The African Writer and the Black Man I. Close reading and analysis of significant literary works by black or white American writers treating black Americans: novels, poems, plays, and essays.

**Educational Opportunity Programs**

CECIL E. GLENN, Director

Programs for minority groups were established at UCD in 1969. Since then the quality and scope of these programs have expanded greatly. Courses are presently offered in Asian American, Black, Mexican American, and Native American Studies.

Student organizations provide assistance with recruiting, counseling, personal guidance, and tutoring; financial help is available through grants and the Work-Study Program.
of basic geometry. In addition, students acquire skills in the use of logarithms and the slide rule.

M.AM. 127-3. Contemporary Mexican American I. (Soc. 127.) An introductory sociology course in which the basic terminology of the Chicano movement is studied. The roots of the Chicano movement from its early manifestations to the present.

M.AM. 135-1. Beginning International Folk Dance, Spanish and Mexican. (P.E. 135.) Basic dances of Mexico and Spain: El Jarabe Tapatio; La Bamba, jotas, and paso dobles.

M.AM. 326-1. Advanced International Folk Dance, Spanish and Mexican. (P.E. 136.) An advanced course in the dances of Spain and Mexico including jotas, paso dobles, zapateados, huastecas, and jaranas.


M.AM. 211-3. Contemporary Mexican Literature in Translation. Mexican literature since World War I has been in the forefront of literary innovations directly reflecting the rapid progress and changes in the society. The purpose of the course is literary but serves also to dispel many false views of Mexico as a rural, traditionally conservative country.

M.AM. 212-3. Contemporary Latin American Literature in Translation. The approach is the same as in M.AM. 211. The best of the contemporary Latin American authors are studied: Borges, Fuentes, Rulfo, Carpenter, Cortazar, and others.

M.AM. 300-3. The Chicano Movement. A study of the ideas of the contemporary thinkers and leaders of today’s Mexican American and the events which have shaped them.

M.AM. 302-3. Methodology of Tutoring the Educationally Disadvantaged. A course designed to improve the tutorial skills of upperclassmen, especially Chicanos, or those who expect to help minority students. Concentration on tutoring of basic skills required for M.A.E.P. and Special Services tutors.

M.AM. 303-3. History of the Spanish Language in the Southwest. The Spanish of the southwest is compared to that spoken in other areas of the world. The course is the first and most basic in the linguistic series in the Spanish discipline. Basic linguistic terminology is introduced and applied in the analysis of Southwest Spanish. Prereq., Spanish 212 or equivalent.

M.AM. 304-3. Workshop in Southwest Spanish. A research-oriented workshop designed to conduct an in-depth analysis of Southwest Spanish through field study. Basic fundamentals of field research will be introduced. Prereq., M.AM. 303 or consent of instructor.

M.AM. 310-3. Mexican American Ethnic Relations (Same as Anthro. 310.) The anthropological works of North Americans of Spanish, Spanish-Indian, and Mexican national descent, ethnohistorical backgrounds, current interrelations and social movements among rural and urban groups. Cultural patterns, identity maintenance, and the social forms and problems of national incorporation.


M.AM. 313-3. Arts of the Mexican Revolution. A study of the arts which developed during the years of the Mexican Revolution. Both plastic and letters included.

M.AM. 340-3. Social Psychology and the Mexican American. (Psych. 340.) An introduction to the research on Mexican-Americans in the fields of intelligence and achievement, language and learning ability,
attitudes, perception, personality, and motivation.

M.A.M. 369-3. Historical Geography of the Southwest. Regional study of man and culture in relationship to the environment.

M.A.M. 383-3. History of Mexican American in Colorado I. (Hist. 383.) Research-oriented seminar course in which the student is expected to gather material on the subject from original sources.


M.A.M. 405-3. Intergroup Relations. (Soc. 405.) A study of intergroup (race) relations at the small group level. Includes analysis of a group that has been stratified into a majority number of white students and a fixed number of minority students.

M.A.M. 430-3. Chicano and the U.S. Social System. A study of the Mexican American in his contact with the systems of justice, education, politics and social sets, primarily in the Southwest.

M.A.M. 432-3. Education in Multilingual Communities. (Soc. 432.) A combined social problem and sociolinguistic approach to education in multilingual communities. The student will explore the ways in which the school system has affected language acquisition; the role of the community in language policy; and the social and cultural consequences of bilingualism.

M.A.M. 455-3. The Mexican American in Politics. (Pol.Sci. 455.) Analysis of the social, cultural, and economic factors which affect political behavior of Mexican Americans. Special attention will be paid to the Mexican American cultural heritage and to relations between Mexican Americans and Anglo Americans.

M.A.M. 459-3. The Mexican-American in the Southwest. A study of the development of the social structures of the Mexican American in the Southwest and the forces that have affected them.

M.A.M. 460-3. The Chicano Community and Community Organizations. (Soc. 460.) Examination of the origin of the terms "community" and "barrio." A comparative analysis of the internal barrio structure and the larger society. Community organization and community development. Positive and negative role models/leaders. Methods and techniques of community organization as related to La Raza.

M.A.M. 462-3. The New Chicano Movement. (Soc. 462.) A seminar which requires extensive field research aimed at discovering the current role of the Chicano in American society.

M.A.M. 476-3. Contemporary Chicano Literature. (Engl. 476.) A study of the present narrative literature produced by Chicanos. No political slant is imposed. The literary value is emphasized.

Note: Spanish 101 and 102 special M.A.E P. sections are taught by a Chicano with an understanding of the particular problems of the bilingual student.

NATIVE AMERICAN STUDIES

LINDA MASON, Director

N.A.M. 260-3. The American Indian Experience. An introduction to North American Indian history and culture. Focus is on the aesthetic, linguistic, psychological, and historical properties, as well as the contemporary, social, and cultural influence upon the native author and his material.


N.A.M. 436-3. The American Indian in Contemporary Society. (Anth. 436.) Begins with the historical background on American Indian acculturation and persistence, but emphasizes the present day relations between Indian communities and the dominant society, stressing conditions and events in Denver and the Southwest generally.


Special Programs

COOPERATIVE EDUCATION PROGRAM

DANIEL R. GUIMOND, Coordinator

UCD offers undergraduates an opportunity to earn academic credit for approved work experience through the Cooperative Education Program. The College of Liberal Arts and Sciences participates in this program, listing three divisional courses; A.H. 398, N.P.S. 398, and Soc.Sci. 398. Students placed by the cooperative education office in paid or volunteer assignments, as well as students who have obtained their own jobs, may be eligible, subject to the guidelines below:

1. The student should have reached the sophomore level of University work and must be enrolled in an undergraduate degree program.

2. The participating student should have at least a 2.5 grade-point average. Students with GPAs in the 2.0 (C) to 2.4 range must obtain the approval of the dean in order to participate in the program.

3. Job experiences approved for credit should be pre-professional in nature and should be generally related to the student's major area of study. Jobs of a routine nature, lacking experience relative to the undergraduate academic curriculum, are not suitable for University credit.

4. A job in which the learning possibilities and responsibilities of the student remain static will not be approved for more than one semester. In contrast, a job in which the learning opportunities and responsibilities vary and increase may be eligible for credit over a longer time span.

5. Projects will be granted from 1 to 6 hours of elective credit per semester, 3 being the usual number of credit hours for each project. However, certain projects, such as certain full-time intensive internships, may be granted as much as 6 credits.

6. Twelve semester hours is the maximum number of credits a student can earn in cooperative education. In some disciplines, cooperative education hours may count toward satisfying requirements for the major.

Information and forms for placement and credit are available in Room 3A, or call ext. 555.

DISTRIBUTED STUDIES PROGRAM

Students working toward the B.A. degree may elect a major in a Distributed Studies Program in any one of the three divisions of the college. Requirements are a minimum of 60 semester hours in two or three subjects in which a major program for the B.A. is offered. One of these shall be designated the primary subject. Major advisors shall have the prerogative of designating acceptable secondary subjects.

Primary Subject. Minimum of 30 hours. (Not more than 30 hours will be required.) The grade-point average in the primary subject must be at least 2.0; 30 hours of work must carry grades of C or better; 12 hours must be in upper division courses in which grades of C or better have been earned. The adviser for the primary area may stipulate specific course requirements. The student should check each major listing to note specific course requirements for the primary field.

Secondary Subjects. Minimum of 30 hours distributed in one or two disciplines. A secondary subject shall consist of at least 12 hours in one discipline.

Language Courses. No first-year course in English (100-101) or foreign language (101-102) may be used in satisfaction of the requirements of either a primary or a secondary subject.
HONORS PROGRAM

The Honors Program of the College of Liberal Arts and Sciences is designed for the student who likes to deal creatively with ideas and who desires to extend his education beyond the usual course requirements.

The Honors Program is responsible also for determining which students merit the award of the bachelor's degree with honors: cum laude, magna cum laude, or summa cum laude. These awards are made on the basis of special honors work and not simply on the basis of grades.

A student may participate in either discipline honors or general honors, or both. To become a candidate for discipline honors, the student must (1) have at least a 3.0 grade-point average; (2) complete special work such as a research project or honors thesis in his particular discipline; (3) take the Advanced Graduate Record Examination; and (4) take an oral examination given by a committee of faculty members in his discipline and a member of the Honors Council. To become a candidate for general honors, the student must (1) have at least a 3.0 grade-point average; (2) complete at least four general honors courses with a grade of H; (3) take the Undergraduate Program Area Test; (4) submit an Honors paper; (5) take oral and written honors examinations.

Any qualified junior or senior may enroll in honors courses without becoming a candidate for graduation with honors. There are no examinations in the honors courses themselves; and no letter grades are awarded, only the marks H (Honors), P (Pass), and F (Fail). All honors courses are awarded upper division credit.

Detailed information concerning the Honors Program should be obtained from Dr. Fahrion, director, or from the Office of the Dean at least three semesters prior to graduation.

STUDY SKILLS CENTER

KATHY R. JACKSON, Director

St.Sk. 100-1. Developmental Composition. Offered as an aid to improving writing skills. Areas in which the student feels a need for growth are explored, and a concentrated program for improvement is then determined for each individual. The mechanics of writing, as well as methods of research are reviewed as a general guide for composition growth.

St.Sk. 101-1. Developmental Composition. Offered as an aid to improving writing skills. Areas in which the student feels a need for comprehension. Improvement of other related reading skills, such as skimming and scanning, critical reading, reading for the main idea, and significant facts also are offered.

St.Sk. 102-1. College Preparatory Mathematics. Offered as both a refresher course for those interested in brushing up previous algebra skills and an aid for students requiring specific help with any algebra course offered by the University.

Preprofessional Programs

HEALTH CAREERS

The required preprofessional courses are offered in the following areas:

- Child Health Associate
- Dental Hygiene
- Dentistry
- Medical Technology
- Medicine
- Nursing
- Optometry
- Osteopathy
- Pharmacy
- Physical Therapy

Because the prerequisites for these health career programs are continually changing, students interested in pursuing one of these careers should contact the Health Sciences Committee, Room 508, ext. 257, for current requirements and for advising.

PREJOURNALISM

Students are referred to the School of Journalism Bulletin for detailed information concerning requirements for the Bachelor of Science degree in journalism, which is granted only on the Boulder Campus.

Prejournalism students should so designate themselves on all application and registration materials so that they may be advised by members of the faculty of the School of Journalism (Boulder).

Students normally transfer to the School of Journalism at the beginning of the junior year. Application for intra-University transfer must be filed not later than 90 days prior to the term for which the student wishes to register, or 60 days prior to preregistration if the student participates in early registration. A cumulative grade-point average of 2.25 in prior work at the University of Colorado is required.

PRELAW

Students are referred to the School of Law Bulletin for details of the curriculum leading to the professional degree, Juris Doctor (J.D.), which is granted only on the Boulder Campus.

The School of Law of the University of Colorado requires a bachelor’s degree for admission, but does not stipulate courses that shall constitute a prelaw curriculum.

The Law School Admission Test is required of all applicants for admission to the School of Law and should be taken as early as possible during the senior year in the College of Liberal Arts and Sciences.

Students are urged to contact the Admissions Office of the School of Law, Room 118, Fleming Law Building, Boulder, Colorado 80309.

TEACHER EDUCATION

Students are referred to the School of Education office at UCD for detailed information concerning teacher education programs at both elementary and secondary levels.

Two avenues are open to students wishing to prepare themselves for careers in teaching.

1. Elementary education majors and distributed studies majors preparing to teach at the secondary school level normally transfer from the College of Liberal Arts and Sciences to the School of Education at the beginning of the junior year and continue on to receive the Bachelor of Science degree in education.

2. Students with a major program in the College of Liberal Arts and Sciences who seek certification for teaching at the secondary school level remain in the College of Liberal Arts and Sciences for the bachelor’s degree, but take approximately 32 hours of professional education work in the School of Education.

Pre-Education Program

Students pursuing elementary education or distributed studies majors for secondary school teachers should so indicate on all application and registration materials so that they may be advised by the education counselor or faculty members of the School of Education. Application for transfer to the School of Education and for admission to the Teacher Education Program should be made during the last semester of the sophomore year. The minimum requirements for acceptance are:

1. Completion of at least 60 semester hours of acceptable college work with a grade-point average of 2.5 for all
courses attempted, and 2.5 for all courses attempted at the University of Colorado; and 2.5 in the major teaching field. No student will be recommended for certification to teach in any field or subject in which the grade-point average is less than 2.5.

2. General education requirements for students planning to student teach at the secondary or elementary school level as follows:

a. General Education (with early counseling, a major part of general education, urban studies, and teaching field requirements can be combined):

<table>
<thead>
<tr>
<th>Section</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) 12 cumulative semester hours to be completed in each of the following three areas; sequences of course work not required:</td>
<td></td>
</tr>
<tr>
<td>Arts and Humanities</td>
<td>12</td>
</tr>
<tr>
<td>(In order to meet typical certification requirements in other states, students should take at least 6 semester hours of humanities in English language courses, e.g., Engl. 100, Exposition I; Engl. 101, Exposition II; Engl. 480, Advanced Composition; Engl. 484, English Grammar; Engl. 485, History of the English Language)</td>
<td></td>
</tr>
<tr>
<td>Social Sciences</td>
<td>12</td>
</tr>
<tr>
<td>Natural and Physical Sciences</td>
<td>12-16</td>
</tr>
</tbody>
</table>

Bachelor of Arts (in the College of Liberal Arts and Sciences) With Teacher Certification

Students in the College of Liberal Arts and Sciences who intend to pursue a regular major curriculum in one of the disciplines or programs in the college, and who also desire secondary school teacher certification, must apply for and be accepted into the Teacher Education Program. The requirements for such admission are identical with those in "a" above. These students also must meet all requirements for a bachelor's degree in the College of Liberal Arts and Sciences.

Early planning is crucial for students intending to enter the Teacher Education Program. Since the School of Education has initiated a new program at both the elementary and secondary levels, students are urged to consult the school early and regularly concerning new requirements.

College of Business and Administration and Graduate School of Business Administration

GORDON G. BARNEWALL, Associate Dean

INFORMATION ABOUT THE COLLEGE

The College of Business and Administration and Graduate School of Business Administration at UCD exist to serve today's need for competent responsible administrative and related professional personnel, for the continued education of men and women already in such positions, and to further research and new thinking about administrative problems.

The College of Business and Administration was admitted to membership in the American Assembly of Collegiate Schools of Business in 1938.

The problems of administration are common to many kinds of public and private endeavor, and the College of Business attempts to confront these problems as they pertain to the management of business enterprises.

The major purpose of the College of Business is to provide opportunities both for a liberal education and for professional training. Students are given help in preparing not only for effective careers but also for satisfying living and constructive citizenship.

The Graduate School of Business Administration offers graduate-level education in business to persons with undergraduate degrees in business and other academic fields and prepares them for work in the broad spectrum of business enterprise.

Organization

Within the broad framework of policy established by the Regents of the University of Colorado, policy decisions for the College of Business are made by the Educational Policy Committee of the faculty under the chairmanship of the dean and are subject to review by the faculty as a whole.

The college's activities are administered by the associate dean at UCD, by the heads of its several instructional divisions, and by other faculty directors of particular programs.

Student Organizations

Opportunity for association with other College of Business students in varied activities intended to stimulate professional interests and to give recognition to scholastic attainment is provided by the following student organizations:

- AIESEC—international business association
- Beta Alpha Psi—professional and honorary accounting fraternity
- Beta Gamma Sigma—honorary scholastic fraternity in business
- CSBA-Chicano business students association
- CUAMA—University of Colorado student chapter of the American Marketing Association
- Delta Phi Epsilon—honorary graduate fraternity in business education
- Delta Sigma Pi—national professional business fraternity
- MBA Association—University of Colorado association of master's students in business
- Phi Chi Theta—national professional business and economics fraternity
- Rho Epsilon—professional real estate fraternity
- Sigma Iota Epsilon—professional and honorary management fraternity

UNDERGRADUATE DEGREE PROGRAMS

The undergraduate curriculum leading to the Bachelor of Science (Business) degree is intended to help the student achieve the following general objectives:

1. Understanding of the activities that constitute business enterprise and of the principles underlying administration of those activities.
2. Ability to think through logically and analytically the kinds of complex problems encountered by management.
3. Facility in the arts of communication.
4. Comprehension of the human relationships involved
in an organization.
5. Awareness of the social and ethical responsibilities of those in administrative positions.
6. Skill in the arts of learning that will help the student continue self-education after leaving the campus.

UNDERGRADUATE ACADEMIC POLICIES
Each student in the College of Business is responsible for knowing and complying with the academic requirements and regulations established for the college and for the student's classes. Upon admission to the College of Business, the student has the responsibility for conferring with the student adviser in the college concerning an academic program.

Standards of Performance
Students are held to basic standards of performance established for their classes in respect to attendance, active participation in course work, promptness in completion of assignments, correct English usage both in writing and in speech, accuracy in calculations, and general quality of scholastic workmanship. Fulfillment of these fundamental responsibilities must be recognized by students as a requirement for continuance and as an essential condition for achievement of satisfactory academic standing. Only those who meet these standards should expect to be recommended for a degree.

In general, examinations are required in all courses for all students, including graduating seniors. To be in good standing, the student must have an overall grade-point average of not less than 2.0 (C) for all course work attempted and 2.0 (C) for all business courses attempted. This applies to work taken at all University campuses. Activity, physical education, and remedial course work is not included in the overall average.

When semester grades become available, the College of Business Committee on Academic Deficiency will review the records of all students not meeting academic standards. Students below standard will be notified of (1) probationary status or (2) suspension.

To return from probationary status to good standing, students must not only achieve a grade-point average of 2.0 or better for the academic year but also bring their cumulative grade average on all courses attempted, and on all College of Business courses attempted, to a 2.0 level or above.

To receive credit, all courses must be listed on the student's registration in the Office of Admissions and Records. Courses completed at UCD are credited toward College of Business degree requirements exactly the same as courses taken on the Boulder Campus. Credits earned at UCD are applicable toward residence requirements only when earned after admission to the College of Business.

Transfer Credit
Credits in business subjects transferred from other institutions will be limited to the number of credit hours given for equivalent work in the regular offerings of the University. Transfer work from unaccredited institutions may not apply toward the business degree. In general, the college will limit transfer credit for business courses taken at a lower division level, which it applies toward degree requirements, to such courses as the college offers at that level. All courses in the area of emphasis must be taken at the University of Colorado unless written approval is given by the appropriate division head. Transfer students must take 30 hours of degree requirements in residency after admission to the College of Business. For a detailed explanation of transfer credit, see the General Information section of this bulletin.

Nonclassroom Sources of Credit
A total of 6 hours of credit for business or nonbusiness courses in Experimental Studies or Independent Study programs will be accepted toward graduation. A maximum of 3 hours of this type of credit may be taken in any one semester.

Independent Study Credit
Upper division undergraduate business students desiring to do work beyond regular business course coverage may take variable credit courses (1-3 semester hours) under the direction of an instructor who approves the project, but the students must have prior approval of the dean. Complete information and request forms are available in the Office of the Associate Dean.

To receive credit for nonbusiness independent study courses, students should obtain the dean's approval prior to registering for the course. Further information and forms are available in the Office of the Associate Dean.

Correspondence Credit
Only 9 semester hours of credit in business courses taken through correspondence study at the University of Colorado or any other institution will be counted toward the B.S. degree in business. Required business courses and area of emphasis courses cannot be taken by correspondence. All correspondence courses are evaluated to determine their acceptability.

ROTC Credit
Students who are enrolled in and complete the ROTC program may apply a maximum of 12 semester hours of advanced ROTC credit toward nonbusiness elective requirements and toward the 120-semester-hour total degree requirement for the B.S. degree in business. No credit toward degree requirements is granted for basic (freshman and sophomore) ROTC courses.

For more detailed information, students should consult the ROTC adviser.

Credit by Examination
Students who are able to offer evidence of prior study of the subject matter of a given course may make application for an advanced standing examination. If performance on the examination is satisfactory, the student will be given credit for the course but will not receive a grade for it. Students who have received a failing grade in a course may not take an advanced standing examination in the same course. Arrangements are made through the Office of Admissions and Records.

College Level Examination (CLEP) credits are acceptable toward degree requirements under procedures established by the college. Specific information is available in the Office for Student Affairs, Room 602.

CLEP credit will be applied in the same manner as transfer credits from accredited institutions. To receive credit, students must rank in the 66.7 percentile based on national available norms. Generally, CLEP credit is most appropriate for (a) prebusiness requirements and (b) nonbusiness electives. A maximum of 6 hours of credit in any one course area will be allowed. CLEP examinations may not be taken in course areas where credit already has been allowed. General examinations are not acceptable for college credit.

Credit for CLEP subject examinations in business course areas must be approved by the College of Business and
Administration and by the appropriate division head. Business degree students may receive CLEP credit for selected business course requirements only with prior written approval as above.

**Study Abroad Credit**
Transfer credit from study abroad programs is most appropriately applied as nonbusiness elective credit. Required business courses should not be taken during studies abroad. Such credit must be validated either by examination or additional course work at the University. Students are responsible for checking with the Office of the Associate Dean for details and approval.

**Adding and Dropping Courses**
See the General Information section of this bulletin for University-wide Drop/Add policies.

**Withdrawal**
A student leaving the University before the end of the semester should secure a Withdrawal Form from the Office of the Associate Dean and follow the instructions on the form. The completed form should be returned to the Office of Admissions and Records. Students who attend classes will be charged an appropriate amount or receive a refund according to a definite schedule published in the official Schedule of Courses each term.

**Registration for Business Courses**
Students may register for only those courses for which they have the stated prerequisite training. If junior standing is required, students should have earned at least 60 semester hours of credit; for senior standing, 90 semester hours.

**Scholastic Load**
The normal scholastic load of an undergraduate student in the College of Business is 15 semester hours, with 19 hours the maximum except as indicated below. Hours carried concurrently in the Division of Continuing Education, whether in classes or through correspondence, are included in the student’s load.

Students having a grade-point average of 3.0 or higher for the most recent semester in which they completed at least 15 semester hours may register for a load exceeding 19 semester hours with the approval of the associate dean.

**Pass/Fail**
A maximum of 16 hours of a combination of business and/or nonbusiness course work may be taken on a pass/fail basis and credited toward the bachelor’s degree in business. Transfer students are limited to 1 semester hour of pass/fail for every 8 attempted at the University. For business majors, pass/fail courses may not be included in “core” courses or in the area of emphasis. Advanced standing and CLEP examinations will count toward the 16 hours of option.

**REQUIREMENTS FOR ADMISSION**

**Admission of Freshmen**
The College of Business and Administration expects entering freshmen to present 15 units of the following secondary course work:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics (college preparatory)</td>
<td>2</td>
</tr>
<tr>
<td>Natural science (lab-science course)</td>
<td>2</td>
</tr>
<tr>
<td>Social science (including history)</td>
<td>2</td>
</tr>
<tr>
<td>Electives (areas such as foreign languages, additional courses in English, mathematics, natural or social sciences; may include up to 2 credits in business)</td>
<td>6</td>
</tr>
</tbody>
</table>

**Preferred Admission.** Students given first consideration are those who rank in the upper half of their high school graduating class, have a combined Scholastic Aptitude Test (SAT) score of 1000 or above or a composite American College Test (ACT) score of 23 or above, and have completed the high school course units as recommended by the appropriate college.

**Considered on an Individual Basis.** Students considered on an individual basis are those who rank in the lower half of their high school graduating class, and/or have combined SAT scores below 1000 or a composite ACT score below 23 and show variations from the high school course unit expectations.

**Admission of Transfer and Former Students**
Students who have attended another college or university are expected to meet the general requirements for admission of transfer students to the University of Colorado (see General Information section). Former students who have attended another college or university and who have completed 12 or more semester hours must reapply as transfer students and must present a 2.0 cumulative grade-point average on all collegiate work attempted to be eligible for readmission.

A maximum of 60 semester hours taken at junior colleges may be applied toward the B.S. degree in business.

**Intrauniversity Transfer**
Students seeking admission to the College of Business and Administration from another college or school of the University must formally apply at the Office of Admissions and Records. Application for admission to the college must be on file in the Office of Admissions and Records at least 90 days prior to the appropriate deadlines.

**Recommended Preparation for Study in Business**
Prospective students in business are encouraged to pursue a broad college preparatory program in high school, with particular emphasis on English, mathematics, the social sciences, and speech.

Candidates for the Bachelor of Science (Business) degree normally enter as freshmen. In the first two years they acquire a broad background in mathematics, communications, and the social and behavioral sciences. They will complete required basic courses in each of the core areas of business study, for the most part, during their junior year. The remainder of their degree program will consist of courses selected to further their professional preparation through more advanced work and electives.

**REQUIREMENTS FOR B.S. (BUSINESS) DEGREE**
The Bachelor of Science (Business) degree is conferred after completion of these requirements:

**Total Credits.** A minimum of 120 acceptable semester hours of credit, of which at least 51 hours must be in nonbusiness courses (including 9 hours of upper division work) and at least 51 hours in business courses. The remaining 18 hours may be in either, or some combination of both. This does not include remedial work, repetition of courses, courses failed, or activity physical education courses. ROTC work is acceptable up to a maximum of 12 hours for advanced work, and only if the ROTC program is completed. All incomplete grades and correspondence course grades must be completed and recorded at the Office of Admissions and Records no later than four weeks.
prior to graduation. It is the student’s responsibility to contact the instructor concerning the removal of *incomplete* grades.

**Residence.** Completion of at least one full academic year’s work (normally 30 semester hours, usually in the senior year, after admission to the College of Business and Administration, and including the 12 hours in the area of emphasis). Courses completed at any University of Colorado campus after the candidate has been admitted to the college are acceptable toward this requirement.

**Grade Average.** A scholastic grade-point average of at least 2.0 (C) for all courses attempted at the University acceptable toward the B.S. (Business) degree; an average of at least 2.0 for all business courses; an average of at least 2.0 in the student’s area of emphasis.

**Graduation With Honors.** Upon recommendation of the faculty of the College of Business, students who demonstrate superior scholarship are given special recognition at graduation.

Those students who achieve an overall grade-point average of 3.3 and a grade-point average of 3.5 in all business courses taken at the University of Colorado while completing 30 hours after admission to the College of Business and Administration will be graduated *cum laude*.

Those students who achieve an overall grade-point average of 3.5 and a grade-point average of 3.7 in all business courses taken at the University of Colorado while completing 30 hours after admission to the College of Business and Administration will be graduated *magna cum laude*.

### Course Requirements

<table>
<thead>
<tr>
<th>Political science</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory sociology or cultural anthropology</td>
<td>3</td>
</tr>
<tr>
<td>Principles of economics</td>
<td>6</td>
</tr>
<tr>
<td>General psychology</td>
<td>6</td>
</tr>
<tr>
<td>Communication and/or English</td>
<td>6</td>
</tr>
<tr>
<td>College algebra and calculus</td>
<td>6</td>
</tr>
<tr>
<td>Core requirements (basic courses in accounting, business law, business statistics, business and society, marketing, finance, organizational behavior, operations analysis, business policy)</td>
<td>30</td>
</tr>
<tr>
<td><strong>Area of emphasis</strong></td>
<td>12</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td>9</td>
</tr>
<tr>
<td>Nonbusiness (to include 9 hours upper division work)</td>
<td>18</td>
</tr>
<tr>
<td>Free electives</td>
<td>18</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>120</td>
</tr>
</tbody>
</table>

All graduating seniors are encouraged to contact the College of Business and Administration for a complete academic evaluation prior to registering for the last term on campus.

An intent to graduate (Diploma Card) must be filed with the College of Business and Administration at least 90 days prior to the desired graduation.

### Model Degree Program

The following sequence of courses is suggested as a guide to registration:

#### Freshman Year

<table>
<thead>
<tr>
<th>Course Requirement</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Communications</em></td>
<td>6</td>
</tr>
<tr>
<td>College algebra (Math. 107)</td>
<td>3</td>
</tr>
<tr>
<td>College calculus (Math. 108)</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Political Science (Pol.Sci. 100)</td>
<td>3</td>
</tr>
<tr>
<td>American Political System (Pol.Sci. 110)</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Sociology (Soc. 111)</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Business (B.Ad. 100)</td>
<td>3</td>
</tr>
<tr>
<td>Nonbusiness electives</td>
<td>30</td>
</tr>
</tbody>
</table>

#### Sophomore Year

<table>
<thead>
<tr>
<th>Course Requirement</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Economics—macro/micro (Econ. 201, 202)</td>
<td>6</td>
</tr>
<tr>
<td>General Psychology (Psych. 203 and 204)</td>
<td>6</td>
</tr>
<tr>
<td>Business Information and the Computer (B.Ad. 200)</td>
<td>3</td>
</tr>
<tr>
<td>Business Statistics (Q.M. 201)</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Financial Accounting (Acct. 200)</td>
<td>3</td>
</tr>
<tr>
<td>Nonbusiness electives</td>
<td>9</td>
</tr>
</tbody>
</table>

*Courses selected from the following: Engl 100 and either C.T. 302 or C.T. 210.

#### Junior Year

<table>
<thead>
<tr>
<th>Course Requirement</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Marketing (Mk. 300)</td>
<td>3</td>
</tr>
<tr>
<td>Basic Finance (Fin. 305)</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Management and Organization (Or.Mg. 330)</td>
<td>3</td>
</tr>
<tr>
<td>Operations Analysis (Pr.Mg. 300)</td>
<td>3</td>
</tr>
<tr>
<td>Business Law (B.Law 300)</td>
<td>3</td>
</tr>
<tr>
<td>Nonbusiness electives</td>
<td>3</td>
</tr>
<tr>
<td>Business electives</td>
<td>3</td>
</tr>
<tr>
<td>Either business or nonbusiness electives</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Senior Year

<table>
<thead>
<tr>
<th>Course Requirement</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Policy (B.Ad. 450, 451, or 452)</td>
<td>3</td>
</tr>
<tr>
<td>Business and Government (B.Ad. 410) or Business and Society (B.Ad. 411)</td>
<td>3</td>
</tr>
<tr>
<td>Area of emphasis</td>
<td>12</td>
</tr>
<tr>
<td>Business electives</td>
<td>3</td>
</tr>
<tr>
<td>Either business or nonbusiness electives</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Area of Emphasis

Each candidate for the B.S. (Business) degree must complete the prescribed courses in an area of emphasis comprising 12 semester hours taken at the University of Colorado. This is intended to provide the educational experience of concentrated study in depth.

Although only one area of emphasis will be listed on the student’s official records, students so desiring may accomplish the effect of a dual area of emphasis by careful selection of courses.

### Accounting

The accounting area of emphasis builds on the foundation of required background courses in the College of Business and Administration and the core courses required of all business students. Accounting courses are offered in the several fields of professional accountancy at the intermediate, advanced, and graduate levels.

The professional accountant practices in one or more of the following fields:

- Net income determination
- Financial reporting
- Internal auditing
- Auditing financial statements and reports to investors
- Tax determination and tax planning
- Data processing and computer systems
- Budgetary planning and control systems
- Information systems for management planning and control
- University teaching and research in accounting

In addition to thorough knowledge of their field, accountants need a broad understanding of the social, legal, economic, and political environment of business. A high degree of analytical ability and communication skill is indispensable.

The undergraduate area of emphasis in accounting is based upon two introductory courses, Acct. 200 and 202, required for all students intending to major in this area.

*Courses selected from the following: Engl 100 and either C.T. 302 or C.T. 210.

*Applies as a business elective. It is recommended, but not required.

For completion of the B.S. (Bus.) degree requirements, the student's program must include at least 9 semester hours in upper-division nonbusiness courses.
Students planning to enter professional accountancy as a career should take more than the required 12 semester hours. There are more than enough semester hours of electives available for this purpose. Students are urged to work closely with their adviser in planning their accounting programs.

Those students planning to sit for the uniform national C.P.A. examination should be aware of the comprehensive range of subject matter covered in the examination. The student also should note that the Colorado Accountancy Law requires completion of 30 semester hours of accounting courses to sit for the national uniform C.P.A. examination in Colorado. (Six of these 30 semester hours may be Business Law courses.)

Accounting students meeting the admission requirements to the Graduate School of Business Administration should seriously consider continuing their education at the graduate level. For more detailed advice and information on careers in professional accountancy, C.P.A. certificate requirements, and Graduate School, the student should see his adviser or any accounting professor.

Finance

The area of emphasis in finance is intended to give students an understanding of fundamental theory pertaining to finance and to develop their ability to make practical applications of the principles and techniques of sound financial management in business and personal affairs. Every endeavor is made to train students to think logically about financial problems and to formulate sound financial decisions and policies.

To accomplish these objectives, it is necessary to understand the importance of finance in the economy and to acquire a grasp of the functions and purposes of monetary systems, credit, prices, money markets, and financial institutions. All of these are considered in the various courses of the finance curriculum. Emphasis is placed on financial policy, management, control, analysis, and decision making.

The methods of instruction employed include lectures, class discussions, field trips, case studies, and seminars. In the latter, students engage in advanced individual research on selected or assigned topics pertaining to personal, business, or governmental finance.

Since finance plays an important role in all forms of business and governmental endeavor, employment opportunities for graduates trained in finance are many and varied. These graduates are limited only by their energy, perseverance, and resourcefulness. Many leading business executives are men and women with broad financial backgrounds. Numerous opportunities are to be found with financial institutions and in the field of business finance.

The principal areas of study in finance are financial management, banking, investments, and insurance.

International Business

The internationalization of American business has been one of the most dramatic changes on the business scene in the last decade. In recent years, companies have completely re-oriented their thinking, planning, and operations to capitalize on the opportunities offered in the world marketplace. Every phase of business operation is affected by this re-orientation, and individuals who offer the appropriate skills, training, and orientation are in great demand.

By emphasizing core requirements and technical area training, the University of Colorado program reflects the basic principle that effectiveness in international business is based on a thorough training in business administration. The international business program provides the opportunity to build on these skills. The student electing this area must complete at least 12 semester hours as follows:

Required Courses

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Econ. 441. International Trade</td>
<td>3</td>
</tr>
<tr>
<td>plus three of the following courses:</td>
<td></td>
</tr>
<tr>
<td>B. Ad. 440. International Business Seminar</td>
<td>3</td>
</tr>
<tr>
<td>Fin. 440. International Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>Or. Mg. 458. International Transportation</td>
<td>3</td>
</tr>
<tr>
<td>Mk. 490. International Marketing</td>
<td>3</td>
</tr>
</tbody>
</table>

A second area of emphasis in business is highly recommended. The course requirements for the second area can be included as part of the business and free elective hours. Foreign language study is also recommended and foreign language skills are much sought after by business recruiters for this field. Other courses emphasizing international affairs may be elected from the following departments: anthropology, economics, geography, history, political science, psychology, and sociology. International business area advisers have lists of recommended courses. Students interested in this area may start their preparation by electing language and other arts and sciences courses in their program.

Marketing

Marketing has been defined as the "delivery of a standard of living." Today, the administrative policies and practices of any well-managed firm should be marketing oriented toward the customer. One of the major problems facing business is how to meet the market output of productive capacity. A marketing manager is concerned, therefore, with analyzing the market for his product or service, planning and developing that product, determining the most appropriate distribution channels, pricing the product, and promoting it.

The career opportunities in marketing reflect the businessman's awareness of the importance of this field. Today, many men are rising to top executive positions by the marketing route. There are more executive and other job opportunities for women in the marketing field than in any other single area outside teaching or secretarial work. One out of every four persons gainfully employed in this country is in a marketing position. Career opportunities abound in personal selling, advertising, sales management, marketing research, retailing, marketing by manufacturers, international marketing, etc.

To meet the requirements for an area of emphasis in marketing, students must complete 12 semester hours in marketing courses beyond Mk. 300 as follows:

Required Courses

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fin. 401. Business Finance I</td>
<td>3</td>
</tr>
<tr>
<td>Fin. 402. Business Finance II</td>
<td>3</td>
</tr>
<tr>
<td>Fin. 433. Investment and Portfolio Management</td>
<td>3</td>
</tr>
<tr>
<td>Fin. 455. Monetary and Fiscal Policy</td>
<td>3</td>
</tr>
</tbody>
</table>

Recommended Elective Courses

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fin. 440. International Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>Fin. 434. Security Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Fin. 453. Bank Management</td>
<td>3</td>
</tr>
<tr>
<td>Fin. 454. Mortgage Financing</td>
<td>3</td>
</tr>
<tr>
<td>Ins. 484. Principles of Insurance</td>
<td>3</td>
</tr>
</tbody>
</table>
Minerals Land Management

The Rocky Mountain states possess a wide range of mineral resources which are essential to the economic welfare of the United States. The utilization of these resources will require increasing numbers of business and technical specialties in a number of fields.

The curriculum in minerals land management is designed to incorporate the primary course patterns of the College of Business and Administration along with certain field area preparation in geology, chemistry, economics, and land management.

With this preparation, the graduate is a candidate for entry into employment as a landman, exploration trainee, lease broker, and other jobs related to the minerals industry. Colorado is presently the headquarters for a wide assortment of resource-based companies operating throughout the western United States and Canada. These companies need qualified employees and have helped in the preparation of this program.

The four-year program will consist of all College of Business requirements and must include the following:

1. Nonbusiness Courses
   Semster Hours
   Geol. 151. Man and Environment .......................... 4
   Chem. 101. General Chemistry .............................. 4
   Geol. 463. Principles of Geomorphology .................. 4
   Geol. 493. Introduction to Geophysical Prospecting .... 4
   Econ. 453. Natural Resource Economics or Econ. 454. Environmental Economics ........................ 3

2. Business Courses
   Acct. 202. Introduction to Managerial Accounting .... 3
   R.Es. 300. Principles of Real Estate ....................... 3
   Fin. 355. Financial Markets or Fin. 401. Business Finance I ........................................... 3

3. A minimum of 12 hours for the major area is required as specified below:
   Required Courses (The following three courses)
   M.L. Mg. 485. Mineral Land Management Administration .......... 3
   R.Es. 473. Legal Aspects of Real Estate Transactions ........... 3
   Acct. 441. Income Tax Accounting ........................................ 3
   Recommended Elective Courses
   (Three semester hours minimum)
   R.Es. 430. Real Estate Appraisal ............................. 3
   B.Law 412. Business Law ........................................... 3
   B.Ad. 411. Business and Society ................................ 3
   Mk. 485. Physical Distribution .................................... 3
   Tr.Mg. 450. Survey of Transportation Operation and Procedure ... 3

Organization Management

The study of organization management offers opportunities to develop understanding and skill in managing human resources in organizations. The curriculum provides the foundation for supervisory and general management careers.

In addition to regular lectures and discussions, appropriate laboratory exercises are used for the study of individual behavior, group processes, interpersonal skills, and problem solving.

A minimum of 12 hours is required as specified below. In addition, elective courses may be selected in consultation with the student's adviser.

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Semester Hours</th>
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</thead>
<tbody>
<tr>
<td>Mk. 330. Marketing Research</td>
<td>3</td>
</tr>
<tr>
<td>Marketing electives (beyond Mk. 300)</td>
<td>9</td>
</tr>
</tbody>
</table>

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<thead>
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<th>Required Courses</th>
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<td>Geol. 463. Principles of Geomorphology</td>
<td>4</td>
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<tr>
<td>Geol. 493. Introduction to Geophysical Prospecting</td>
<td>4</td>
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<td>Econ. 453. Natural Resource Economics or Econ. 454. Environmental Economics</td>
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<table>
<thead>
<tr>
<th>Recommended Electives</th>
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<tbody>
<tr>
<td>Geol. 493. Introduction to Geophysical Prospecting</td>
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<td>Geol. 454. Environmental Economics</td>
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<tr>
<td>Geol. 454. Environmental Economics</td>
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<tr>
<td>Geol. 493. Introduction to Geophysical Prospecting</td>
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</tr>
<tr>
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<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.L. Mg. 485. Mineral Land Management Administration</td>
<td>3</td>
</tr>
<tr>
<td>R.Es. 473. Legal Aspects of Real Estate Transactions</td>
<td>3</td>
</tr>
<tr>
<td>Acct. 441. Income Tax Accounting</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended Elective Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.Es. 430. Real Estate Appraisal</td>
</tr>
<tr>
<td>B.Law 412. Business Law</td>
</tr>
<tr>
<td>B.Ad. 411. Business and Society</td>
</tr>
<tr>
<td>Mk. 485. Physical Distribution</td>
</tr>
<tr>
<td>Tr.Mg. 450. Survey of Transportation Operation and Procedure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required Courses (The following three courses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ps. Mg. 434. Labor Relations: Policy and Practice</td>
</tr>
<tr>
<td>Ps. Mg. 438. Personnel Management: Policy and Practice</td>
</tr>
<tr>
<td>Ps. Mg. 439. Personnel Management: Legal and Social Issues</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Recommended Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pr. Mg. 443. Work Design and Measurement</td>
</tr>
<tr>
<td>Pr. Mg. 447. Policy Analysis in Production and Operations Management</td>
</tr>
<tr>
<td>Pr. Mg. 447-3. Policy Analysis in Production and Operations Management</td>
</tr>
<tr>
<td>Tr.Mg. 450-3. Transportation Operation and Management</td>
</tr>
<tr>
<td>Tr.Mg. 450-3. Transportation Operation and Management</td>
</tr>
<tr>
<td>B.Ad. 470. Small Business—Management and Operations</td>
</tr>
</tbody>
</table>

Personnel Management

The study of personnel management offers opportunities to students to develop professional competence in the areas of personnel administration and labor relations. Students develop understanding and skill in implementing personnel systems including recruitment, selection, evaluation, training, and motivation of employees. Students also develop understanding and skills in union-management relations in the private and public sectors.

A minimum of 12 hours is required for students selecting this area of emphasis. Ps. Mg. 434, 438, and 439 are required. Three additional hours are to be selected in consultation with advisers from the choices provided below.

<table>
<thead>
<tr>
<th>Required Courses (The following three courses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ps. Mg. 434. Labor Relations: Policy and Practice</td>
</tr>
<tr>
<td>Ps. Mg. 438. Personnel Management: Policy and Practice</td>
</tr>
<tr>
<td>Ps. Mg. 439. Personnel Management: Legal and Social Issues</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ps. Mg. 434. Labor Relations: Policy and Practice</td>
</tr>
<tr>
<td>Ps. Mg. 438. Personnel Management: Policy and Practice</td>
</tr>
<tr>
<td>Ps. Mg. 439. Personnel Management: Legal and Social Issues</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pr. Mg. 443. Work Design and Measurement</td>
</tr>
<tr>
<td>Pr. Mg. 447. Policy Analysis in Production and Operations Management</td>
</tr>
<tr>
<td>Pr. Mg. 447-3. Policy Analysis in Production and Operations Management</td>
</tr>
<tr>
<td>Tr.Mg. 450-3. Transportation Operation and Management</td>
</tr>
<tr>
<td>Tr.Mg. 450-3. Transportation Operation and Management</td>
</tr>
<tr>
<td>B.Ad. 470. Small Business—Management and Operations</td>
</tr>
<tr>
<td>Econ. 461-3. Labor Economics</td>
</tr>
<tr>
<td>Psych. 487-3. Personality Assessment</td>
</tr>
<tr>
<td>Soc. 479-3. Industrial Sociology</td>
</tr>
</tbody>
</table>

Production and Operations Management

The area of emphasis in production and operations management is designed to prepare the student for a career as a production manager, operations manager, management analyst, or systems analyst in a broad range of private sector organizations in manufacturing, banking, insurance, hospitals, and construction, as well as in a variety of municipal, state, and federal organizations.

Production or operations managers could be charged with the design, implementation, and maintenance of the productive systems in an organization so that it runs smoothly yet responds to the demand of its market. The product may range from a manufactured item to health care to urban services. Managerial activities could include forecasting demand, production planning and inventory control, scheduling manpower and equipment, job design and labor standards, quality control, purchasing, and facilities location and layout.
A management or systems analyst could be in a staff position similar to a production or operations manager and be involved in management studies of activities similar to those listed above where analytic, communication, and managerial skills would be challenged.

The courses are taught with a heavy emphasis on experiential learning through the application of analytic skills to case studies, simulation games, and field research in local firms and governmental organizations. The use of quantitative methods and computers as tools to aid in decision making is also stressed.

**Required Courses**

(The following three courses)

- Pr. Mg. 440. Planning and Control Systems in Operations Management .......... 3
- Pr. Mg. 447. Policy Analysis in Production and Operations Management .......... 3

*(One of the following courses)*

- Pr. Mg. 444. Work Design and Measurement .......................................... 3
- Pr. Mg. 460. Purchasing and Materials Management .................................. 3

**Recommended Electives**

- I.S. 345. Information Systems ............................................................. 3
- Or. Mg. 335. Managing Work Groups .................................................... 3
- Or. Mg. 437. Managing Complex Organizations ....................................... 3
- Ps. Mg. 434. Labor Relations: Policy and Practice ................................... 3
- Ps. Mg. 438. Personnel Management: Policy and Practice ......................... 3
- Tr. Mg. 450. Transportation Operation and Management ........................... 3
- Mk. 485. Physical Distribution Management ........................................... 3
- Acct. 332. Cost Accounting ............................................................... 3

**Public Agency Administration**

In our modern economy, public agencies provide an increasingly important contribution to the economic vitality of society. The area of emphasis in public agency administration is designed to prepare the student for a career in management of governmental or other nonprofit service organizations. The curriculum in public agency administration provides the student with a foundation of core courses upon which to construct an area of emphasis which will focus on the type of service organization the student desires to enter upon graduation.

A minimum of 12 hours is required beyond the normally required business curriculum, as specified below. In addition, elective courses may be selected based upon individual interest and in consultation with the program adviser.

**Required Courses**

- Acct. 480. Business and Governmental Budgeting and Control ................... 3
- Ps. Mg. 438. Personnel Administration .................................................. 3

**Small Business Management and Entrepreneurship**

The study of small business management provides understanding, knowledge, and skills in organizing and managing small business. The emphasis in the curriculum is on the managerial aspects of the wide range of activities required of the entrepreneur.

A minimum of 12 semester hours is required as specified below. It is also recommended that students take B. Ad. 452 (Small Business Strategy, Policy and Entrepreneurship) in satisfying their business policy requirement. Additional courses in management, finance, accounting, and marketing should be planned in consultation with the adviser to serve the career needs of each student.

**College of Business and Administration**

**Required Courses**

*Semester Hours*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Ad. 470</td>
<td>Small Business—Management and Operation</td>
<td>3</td>
</tr>
<tr>
<td>(Two of the following four courses)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fin. 401</td>
<td>Business Finance I</td>
<td>3</td>
</tr>
<tr>
<td>Acct. 332</td>
<td>Cost Accounting</td>
<td>3</td>
</tr>
<tr>
<td>Ps. Mg. 438</td>
<td>Personnel Management: Policy and Practice</td>
<td>3</td>
</tr>
<tr>
<td>Mk. 480</td>
<td>Marketing Policies and Strategies</td>
<td>3</td>
</tr>
</tbody>
</table>

**Recommended Electives**

- Ps. Mg. 434. Labor Relations: Policy and Practice ................................ 3
- Pr. Mg. 440. Planning and Control Systems in Production and Operations Management .................................................. 3
- Pr. Mg. 447. Policy Analysis in Production and Operations Management .......... 3
- Tr. Mg. 450. Transportation Operation and Management ........................................ 3
- Pr. Mg. 460. Purchasing and Materials Management ....................................... 3
- Mk. 485. Physical Distribution Management ................................................. 3
- O. Ad. 440. Principles of Office Management ............................................... 3
- Fin. 402. Business Finance II .................................................................. 3

**Transportation and Traffic Management**

In our interdependent economy, transportation services provide an increasingly important contribution to the economic life of society. The curriculum in transportation management includes the role of transportation in society and the problems of traffic management within specific industries as well as the management of firms in the transportation industry, such as airlines, trucking firms, railroads, and urban transit firms. International transportation management problems and policies are analyzed.

A minimum of 12 hours is required as specified below. One of the following recommended elective courses may be substituted with permission of the adviser for one of the below-mentioned required courses if there is a schedule conflict, if the course is not given that year, or if a student demonstrates a career need for such a course.

**Required Courses**

*Semester Hours*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Any four of the following six courses)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tr. Mg. 450</td>
<td>Transportation Operation and Management</td>
<td>3</td>
</tr>
<tr>
<td>Tr. Mg. 452</td>
<td>Problems in Traffic Management</td>
<td>3</td>
</tr>
<tr>
<td>Tr. Mg. 456</td>
<td>Air Transportation</td>
<td>3</td>
</tr>
<tr>
<td>Tr. Mg. 457</td>
<td>Urban Transportation</td>
<td>3</td>
</tr>
<tr>
<td>Tr. Mg. 458</td>
<td>International Transportation</td>
<td>3</td>
</tr>
<tr>
<td>Mk. 485</td>
<td>Physical Distribution Management</td>
<td>3</td>
</tr>
</tbody>
</table>

**Recommended Electives**

- Ps. Mg. 434. Labor Relations: Policy and Practice ................................ 3
- Ps. Mg. 438. Personnel Management: Policy and Practice ......................... 3
- Tr. Mg. 451. Survey of Transportation .................................................. 3
- Pr. Mg. 460. Purchasing and Materials Management ................................... 3
- B. Ad. 470 | Small Business—Management and Operation | 3 |
- O. Ad. 440 | Principles of Office Management | 3 |

**Real Estate**

The real estate businessman must be prepared to make decisions in the midst of powerful conflicting forces: environmental groups who advocate prohibiting further development of land for housing, others who call for more and better and often lower cost housing, and investors and lenders who demand an adequate return on investment funds. To function in this climate requires knowledge of real estate investments, urban land economics, real estate law, appraising, finance, taxes, management, sales, and accounting.

A minimum of 12 hours is required as specified below. It is also recommended that students take B. Ad. 452 (Small Business Strategy, Policy and Entrepreneurship) in satisfying their business policy requirement. Additional courses in management, finance, accounting, and marketing should be planned in consultation with the adviser to serve the career needs of each student.
reward, or independence as his own boss, real estate can be a very gratifying career. The real estate area of emphasis is designed to help prepare the student for this profession.

Required Courses* Semester Hours
R.E. 430. Real Estate Appraising ........................................... 3
R.E. 475. Legal Aspects of Real Estate Transactions .................. 3
R.E. 401. Urban Land Analysis ............................................. 3
or
Fin. 454. Mortgage Financing ........................................... 3

Recommended Elective Courses
(Three semester hours minimum)
R.E. 533. Real Estate Investments ....................................... 3
Acct. 441. Income Tax Accounting ...................................... 3
Ins. 484. Principles of Insurance ....................................... 3
Fin. 401. Business Finance I ............................................. 3
Fin. 402. Business Finance II ........................................... 3
Fin. 455. Monetary and Fiscal Policy .................................. 3
Mt.F. 310. Salesmanship ................................................... 3
*B.A. 452. Small Business Strategy, Policy and Entrepreneurship .... 3
†Arch. 420. Planning ...................................................... 3
‡Arch. 451. Seminar in Urban Design .................................. 3
§Arch. Eng. 240. Building Construction ................................ 3

COMBINED PROGRAMS
Numerous career opportunities exist for persons trained in both a specialized field and management. For this reason, students may be interested in combined programs of study leading to completion of degree requirements concurrently in two fields. Such combined programs have been arranged for engineering and business, pharmacy and business, and environmental design and business. Programs may be arranged for other professional combinations also.

The two programs of study proceed concurrently, terminating together with the award of two degrees. Each combined program, the requirements for the degree in business are as follows:

1. Completion of at least 48 semester hours in business and economics, to include Econ. 201 and 202 (6 semester hours), required courses in business (30 semester hours), and a business area of emphasis (12 semester hours).

2. Completion of at least 30 of these semester hours at the University of Colorado while concurrently enrolled in the College of Business.

3. Completion of nonbusiness requirements in mathematics, communications, and the social and behavioral sciences in a degree program approved in advance by the College of Business. In addition, for some courses and areas of emphasis, there are prerequisite requirements which must be met.

4. At least a 2.0 grade average must be earned in all courses undertaken in the College of Business.

Shown below is the combined engineering-business program. For other combinations, students must consult with the associate dean of the College of Business.

The requirements for all combined business and engineering programs are as follows:

Courses Semester Hours
Econ. 201 and 202. Principles of Economics (Should be completed during the student's sophomore or junior year.) .................................................. 6
Acct. 200. Introduction to Financial Accounting .......................... 3
B.A. 200. Business Information and the Computer ..................... 3
Q.M. 201. Business Statistics .............................................. 3
Mk. 300. Principles of Marketing .......................................... 3
Fin. 305. Basic Finance ..................................................... 3

Pr.Mg. 300. Operations Analysis ........................................... 3
Or.Mg. 330. Introduction to Management and Organization .......... 3
B.Law 300. Business Law .................................................. 3
B. Ad. 450. Business Policy (Cases and Concepts in Business Policy); or B. Ad. 451 (Management Games and Cases in Business Policy); or B. Ad. 452 (Small Business Strategy, Policy and Entrepreneurship) ........................................... 3

Courses in an area of emphasis in one of the following fields: accounting, computer-based information systems, finance, international business, marketing, office administration, operations management, organizational behavior, real estate, small business management, statistics, or transportation management. All work in the area of emphasis must be taken at the University of Colorado College of Business.

Areas of emphasis .......................................................... 12
48

GRADUATE DEGREE PROGRAMS
The graduate programs leading to the Master of Business Administration degree are offered through the faculty of the Graduate School of Business Administration. (Note: An application for admission to the Graduate School of Business Administration must be accompanied by a non-refundable fee of $20 when the application is submitted.)

Graduate programs leading to the Doctor of Business Administration, Master of Science, and Master of Business Education are offered through the University of Colorado Graduate School. Master’s degree programs in business are accredited by the American Assembly of Collegiate Schools of Business.

Requirements for Admission—Master’s Programs

Admission to the master’s programs will be determined by the following criteria:

1. Applicant’s academic record.

2. The applicant’s score on the Graduate Management Admission Test (GMAT). (This test is given four times each year at numerous centers throughout the country. For information and to make an appointment for the test, write to the Educational Testing Service, P. O. Box 966, Princeton, New Jersey 08540.)

Applicants are encouraged, but not required, to submit letters of evaluation from college instructors or employers.

Because of the large number of applications which must be processed, the deadlines set out below are strictly adhered to, and applicants should be careful to observe them. Personal interviews are not required or encouraged. Applicants should submit in writing any additional information or statements which they wish to have considered by the admissions committee.

In general, students failing to meet minimum standards are not admitted on provisional status. Under exceptional circumstances, a student may be admitted on a provisional status for a specified probationary term. At the end of the probationary period, the Business Graduate Committee will review the student’s performance and recommend to the dean whether the student should be admitted to regular degree status or dropped from the graduate program.

Only graduate students admitted as regular degree or provisional students and senior undergraduates in engineering who intend to pursue graduate study in business will be permitted to register for any of the 500-level “fundamentals” courses (which are specifically for degree candidates). Only graduate degree candidates will be permitted...
to register for the 600-level courses.

Students who were registered as special students before the fall semester 1970 may request that work completed as a special student be applied toward a graduate degree. Students registering as special student after the fall semester of 1970 can request that work taken as a special student be applied toward a degree only if they are admitted to the Graduate School during the term in which they are taking work as a special student.

Seniors in this University who have satisfied the undergraduate residence requirements, and who need not more than 6 semester hours of advanced subjects and 12 credit points to meet their requirements for bachelor's degrees, may be admitted to the Graduate School of Business Administration by special permission of the director of graduate studies.

Complete applications, including GMAT scores and transcripts, must be in the Office of Graduate Studies, Graduate School of Business Administration, by February 1 for summer admission, by March 1 for fall admission, and by October 1 for spring admission.

**Background Requirements**

Students applying for graduate programs in business do not need to have an undergraduate degree in business; however, they must acquire an adequate background preparation in:

- Accounting
- Business finance
- Business law
- Financial institutions
- Management science

Statistics, management science, and operations analysis are not required for candidates for the Master of Business Education degree.

An undergraduate degree program in business administration usually provides the minimal necessary background in most of these fields. At the University of Colorado, a student who has had the following courses will be considered to have the minimal necessary background:

- Acct. 200. Introduction to Financial Accounting
- Acct. 202. Introduction to Managerial Accounting
- B.Law 300. Business Law
- Econ. 201 and 202. Principles of Economics
- Fin. 305. Basic Finance
- Pr. Mg. 300. Operations Analysis
- Or.Mg. 330. Introduction to Management and Organization
- Mk. 300. Principles of Marketing and one additional 3-hour marketing course approved by adviser
- Stat. 200. Business Statistics (note exception below)

For students lacking such preparation, 3-credit graduate fundamentals courses are offered in each of the background fields: B.Ad. 501 (Acct.), B.Ad. 502 (Stat.), B.Ad. 503 (Mk.), B.Ad. 504 (Or.Mg.), B.Ad. 505 (Fin.), B.Ad. 506 (Law), and B.Ad. 507 (Mg.Sc.). These fundamentals courses do not carry graduate business degree credit, nor may they be used to satisfy requirements for the bachelor's degree in business. They are open only to graduate students admitted on a regular or provisional status and qualified nonbusiness senior undergraduates who intend to pursue graduate study in business and who have the written approval of the Office of Graduate Studies.

All students entering any of the graduate programs (except Master of Business Education) are required to take either B.Ad. 502 (Fundamentals of Business Statistics) or to pass satisfactorily a qualifying examination covering this subject matter. In addition, all graduate students are required either to take B.Ad. 500 (Sources of Information and Research Methods) for no credit or to pass satisfactorily a qualifying examination covering this subject matter.

A student with a bachelor's degree in business normally can complete the requirements for the master's degree in one calendar year. Students with no undergraduate work in business normally require two years.

**Advising.** An advisory committee is appointed for each Master of Science and Master of Business Education degree candidate. Students should initially meet with the graduate student adviser in the Office of Graduate Studies for the purpose of ascertaining their principal field of interest and the particular degree program they should follow. A chairman selected for the student's advisory committee then acts as the student's faculty adviser. Other committee members are appointed during the student's first semester in residence. Master of Business Administration degree candidates should report to the head of the division of their area of emphasis for advising.

During the first term of residence, each student should prepare a degree plan. This plan with appropriate signatures should be filed in the Office of Graduate Studies.

**Qualifying Examinations.** Satisfactory performance on the Graduate Management Admissions Test and admission into a master's program with the status of a regular degree student will constitute the qualifying examination for graduate study.

**Course Load.** The normal course load for graduate students is 12 semester hours. Additional hours may be taken upon approval of the student's adviser, subject to the general rules of the Graduate School.

**Minimum Hours Required as Regular Degree or Provisional Student.** A candidate for a master's degree in business must complete a minimum of 24 semester hours of course work after being admitted to the program. This requirement in no way changes the minimum of 30 semester hours needed for a degree.

**Comprehensive Examination.** Each candidate for a Master of Science or Master of Business Education degree is required to take a comprehensive final examination after the other requirements for the degree have been completed. This examination is given near the end of the candidate's last semester of residence. * Comprehensive examinations are given in November, April, and July. A comprehensive examination is not required for students pursuing the Master of Business Administration degree program.

Students must file an Application for Admission to Candidacy with the Office of Graduate Studies during the first month of the final term of their residency.

**Minimum Grade-Point Average.** A minimum cumulative grade-point average of 3.0 must be achieved in courses taken after the student's admission to the graduate program. If the student's cumulative grade-point average falls below 3.0, he will be placed on academic probation and given one regular semester (summer terms excluded) in which to achieve the required 3.0 cumulative average. Failure to achieve the required average within the allotted time period will result in dismissal.

Work receiving the lowest passing grade, D, may not be counted toward a degree, nor may it be accepted for the removal of deficiencies.

To earn a grade of W (withdrawal) in a course, a graduate student must be earning a grade of C or better in that course. Graduate students will not be permitted to withdraw from courses after the tenth week of the semester.

*Students must be registered when they take this examination.
An IP (in progress) grade shall be a valid grade only until the end of the regular semester (summer terms excluded) following that in which the grade of IP is given. By the end of that interval, the instructor concerned shall have turned in a final grade of A, B, C, D, or F. If no reports are received from the instructor within the allotted time the IP shall be converted to an F.

**Time Limit.** All work, including the comprehensive final examination, should be completed within five years or six successive summers. Candidates for the master’s degree are expected to complete their work with reasonable continuity.*

### Master of Business Administration

The Master of Business Administration program is devoted to the concepts, analytical tools, and communication skills required for competent and responsible administration. The administration of an enterprise is viewed in its entirety and within its social, political, and economic environment.

In addition to the background requirements for a master’s degree listed above, the candidate for the M.B.A. degree must complete the specific requirements of the M.B.A. curriculum (30 semester hours) as follows:

<table>
<thead>
<tr>
<th>Core Requirements</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Business and Its Environment</td>
<td>3</td>
</tr>
<tr>
<td>b. Analysis and Control</td>
<td>3</td>
</tr>
<tr>
<td>c. Human Factors</td>
<td>3</td>
</tr>
<tr>
<td>d. Planning and Policy</td>
<td>3</td>
</tr>
<tr>
<td>e. Area of Emphasis</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

Areas of emphasis include accounting, finance, management science (shown below), marketing§, office administration, operations management, organizational behavior, and transportation management.

Courses comprising the area of emphasis must be approved by the head of the division or his designated representative.

### M.B.A. Management Science Program

For students selecting management science as their area of emphasis, the M.B.A. program is as follows:

#### Policy Formulation and Administration (12 semester hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Ad. 615. Business and Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>B.Ad. 640. Organizational Behavior</td>
<td>3</td>
</tr>
<tr>
<td>B.Ad. 650. Business Policy</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Area of Emphasis (9 semester hours)

At least three courses from the following:  

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mg.Sc. 615. Decision Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Mg.Sc. 625. Computer Oriented Decision Modeling</td>
<td>3</td>
</tr>
<tr>
<td>Mg.Sc. 635. Mathematical Programming</td>
<td>3</td>
</tr>
<tr>
<td>Mg.Sc. 675. Seminar in Management Science</td>
<td>3</td>
</tr>
<tr>
<td>Mg.Sc. 685. Advanced Topics in Management Science</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Electives (9 semester hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>One 600-level course in the area of Acct., Fin., Mk., Pr.Mg., Or.Mg., or Tr.Mg.</td>
<td>3</td>
</tr>
</tbody>
</table>

**Under unusual circumstances, students whose residence is interrupted for legitimate reasons, such as military service, may apply for an extension of time.**

No thesis is required in the M.B.A. program. In the total program there must be a minimum of 24 semester hours of course work at the 600 level. Independent study courses (499 or 699) are normally not acceptable for credit in the final 30 semester hours of the M.B.A. program.

Students may start their graduate programs at the beginning of the fall, spring, or summer terms.

### Master of Science

The Master of Science degree affords opportunity for specialization and depth of training within a particular major field and a related minor field.

#### Major Fields

For detailed information concerning requirements and recommended programs for each of the major fields, students should consult the following professors:

<table>
<thead>
<tr>
<th>Area of Emphasis</th>
<th>Professor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>Professor Schattke</td>
</tr>
<tr>
<td>Business education</td>
<td>Office administration</td>
</tr>
<tr>
<td>Finance</td>
<td>Professor Jedamus</td>
</tr>
<tr>
<td>Management science</td>
<td>Professor Goeldner</td>
</tr>
<tr>
<td>Organization management</td>
<td>Professor Reed</td>
</tr>
</tbody>
</table>

#### Minor Fields

Fields available in the College of Business for selection as a minor are:

<table>
<thead>
<tr>
<th>Area of Emphasis</th>
<th>Professor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>Marketing</td>
</tr>
<tr>
<td>Business education</td>
<td>Office administration</td>
</tr>
<tr>
<td>Finance</td>
<td>Organization management</td>
</tr>
<tr>
<td>Management science</td>
<td>Real estate</td>
</tr>
<tr>
<td>Organization management</td>
<td>Transportation management</td>
</tr>
</tbody>
</table>

With the approval of the student's adviser, minor fields may be chosen from among other business subjects, from the social sciences, or from law. In exceptional cases, minors are permitted in other subject matter areas on recommendation of the Graduate Committee of the College of Business and Administration and with the approval of the dean of the Graduate School.

### Minimum Requirements

The minimum requirements for the M.S. degree, after all undergraduate background deficiencies have been removed, are normally met by Plan I, shown below. Candidates may be permitted to fulfill the degree requirements under Plan II, upon approval in advance by their advisory committee.

**Plan I.** In this plan, the requirement is 30 semester hours of graduate credit including a thesis (4 to 6 hours credit) based upon original research by the candidate. A minimum of 20 semester hours of credit, including B.Ad. 630 (Business Research), is required of all candidates and, including the thesis, must be earned in a major field. A minimum of three courses, normally 9 semester hours but not fewer than 6, must be completed in a minor field.

**Plan II.** In this plan a minimum of 30 semester hours of course work must be completed in courses numbered at the 500 level or above. Requirements must be met in both a major and a minor field. No thesis is required.

Candidates for the M.S. degree, whether following Plan I or Plan II, may not receive credit for 600-level courses

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*Elective courses must be 500- or 600-level and cannot be taken in the area of emphasis.**

**Under unusual circumstances, students whose residence is interrupted for legitimate reasons, such as military service, may apply for an extension of time.**
with B.Ad. prefix, except B.Ad. 630 (Business Research) and in some cases, B.Ad. 620 (Administrative Controls).

For both Plan I and Plan II there will be written comprehensive examinations covering major and minor fields. The candidate’s committee may require an oral final comprehensive examination subsequent to the written examination.

Programs in Major Fields

Accounting

At the undergraduate level, most accounting majors take 24 or more semester hours, either to prepare themselves for the CPA exam or because most employment opportunities in professional accounting require a heavy major. For these students the M.B.A. program with an area of emphasis in accounting is recommended. With so many semester hours in accounting at the undergraduate level, the student is well prepared to enter the graduate level seminars in accounting.

The M.S. program is more suited for those students who have minimal background in accounting at the undergraduate level. At the minimum, B.Ad. 501 (Accounting) and Acct. 612, or their equivalents, are necessary prerequisites for the 500-level and 600-level accounting courses that constitute the major field of study in the M.S. program.

Management Science

<table>
<thead>
<tr>
<th>Required Courses (15 hours)</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stat. 570. Elements of Mathematical Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Mg.Sc. 625. Computer-Oriented Decision Modeling</td>
<td>3</td>
</tr>
<tr>
<td>Mg.Sc. 635. Mathematical Programming</td>
<td>3</td>
</tr>
<tr>
<td>Mg.Sc. 675. Management Science Seminar</td>
<td>3</td>
</tr>
<tr>
<td>Or.Mg. 601. Organizational Behavior as a System</td>
<td>3</td>
</tr>
</tbody>
</table>

The remaining 15 or more semester hours are to be selected, in consultation with the student’s adviser, with the following courses recommended:

- B.Ad. 620. Administrative Controls
- Or.Mg. 640. Operations Management
- Or.Mg. 647. Seminar in Operations Management Policy and Administration
- Or.Mg. 632. Behavior of Task Groups
- Mk. 530. Quantitative Marketing Analysis
- Mg.Sc. 685. Advanced Topics in Management Science
- Fin. 603. Seminar in Business Financial Policy
- Acct. 626. Seminar in Managerial Accounting

If Plan I is to be followed, B.Ad. 630 (Business Research) is required as 3 of the remaining 15 or more semester hours, and Mg.Sc. 700 is substituted for Mg.Sc. 675.

Organizational Behavior

A student majoring in organizational behavior is required to demonstrate competency in the general area of organization theory and behavior, and in the applied areas of labor relations and personnel management. A minimum of 15 semester hours is to be selected, in consultation with the student’s adviser, from the following courses:

<table>
<thead>
<tr>
<th>Courses</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Or.Mg. 601. Organizational Behavior as a System</td>
<td>3</td>
</tr>
<tr>
<td>Or.Mg. 602. Individual Behavior in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>Or.Mg. 534. Labor Relations: Policy and Practice</td>
<td>3</td>
</tr>
<tr>
<td>Or.Mg. 532. Behavior of Task Groups</td>
<td>3</td>
</tr>
<tr>
<td>Or.Mg. 634. Seminar in Industrial Relations</td>
<td>3</td>
</tr>
<tr>
<td>Or.Mg. 636. Behavior in Complex Organizations</td>
<td>3</td>
</tr>
</tbody>
</table>

The remaining 15 or more semester hours are to be selected, in consultation with the student’s adviser, with the following courses recommended:

- B.Ad. 620. Administrative Controls
- Pr.Mg. 544. Sociotechnical Work Systems: Synthesis and Design
- Pr.Mg. 640. Operations Management
- Mg.Sc. 625. Computer-Oriented Decision Modeling

If Plan I is to be followed, B.Ad. 630 and Or.Mg. 700 are required among the remaining 15 or more semester hours.

Master of Business Education

The Master of Business Education program provides preparation for careers in secondary school and college teaching of business subjects.

Specific Prerequisites

For advanced work in business education, the candidate must possess a bachelor’s degree, or its equivalent, from an approved institution, and also must present the following courses or their equivalents:

<table>
<thead>
<tr>
<th>Description of Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Econ. 201 and 202. Principles of Economics</td>
</tr>
<tr>
<td>Acct. 200. Introduction to Financial Accounting</td>
</tr>
<tr>
<td>Fin. 305. Basic Finance</td>
</tr>
<tr>
<td>Mk. 300. Principles of Marketing</td>
</tr>
<tr>
<td>B.Law 300. Business Law</td>
</tr>
<tr>
<td>Or.Mg. 330. Introduction to Management and Organization Education courses—12 semester hours of credit.*</td>
</tr>
</tbody>
</table>

Deficiencies in accounting, finance, marketing, business law, and organizational behavior may be fulfilled by taking the fundamental courses in the respective areas: B.Ad. 501 (Acct.), B.Ad. 503 (Mk.), B.Ad. 504 (M&O), B.Ad. 505 (Fin.), B.Ad. 506 (Law).

Doctor of Business Administration

Students should refer to the College of Business and Administration and Graduate School of Business Administration Bulletin for information regarding the Doctor of Business Administration (D.B.A.) program.

Description of Courses

The College of Business and Administration and Graduate School of Business Administration offer courses in the subject areas shown below:

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>Organization Management</td>
</tr>
<tr>
<td>Business Administration</td>
<td>Personnel Management</td>
</tr>
<tr>
<td>Business Education</td>
<td>Production and Operations</td>
</tr>
<tr>
<td>Business Law</td>
<td>Management</td>
</tr>
<tr>
<td>Finance</td>
<td>Public Agency Administration</td>
</tr>
<tr>
<td>Insurance</td>
<td>Quantitative Methods</td>
</tr>
<tr>
<td>Management Science</td>
<td>Real Estate</td>
</tr>
<tr>
<td>Marketing</td>
<td>Small Business Management</td>
</tr>
<tr>
<td>Minerals Land Management</td>
<td>Transportation and Traffic</td>
</tr>
<tr>
<td>Office Administration</td>
<td>Management</td>
</tr>
</tbody>
</table>

Courses numbered from 100 to 299 are intended for lower division students.

Courses numbered from 300 to 399 are intended for upper division students. Sophomores in the College of Liberal Arts and Sciences also will be admitted if they are considered eligible by that college to register for upper division courses.

Courses numbered from 400 to 499 are intended for upper division students. Courses numbered from 500 to 599 are intended for graduate students. Courses numbered *Not a prerequisite for a degree with a community college teaching emphasis.
in the 600s and 700s are open only to graduate students.

For each course there is indicated the course prefix; the course number and, after the hyphen, the number of credits carried by the course; the course title and description; and, following, the course prerequisites.

Schedules of classes are issued before the start of each semester. These provide a complete list of offerings for the forthcoming semester, together with names of instructors, class hours, and room assignments.

ACCOUNTING

Undergraduate Courses


Acct. 442-3. Advanced Income Tax Accounting. Continuation of Acct. 441, with special emphasis on the income tax problems of partnerships, corporations, and estates and trusts. Consideration is also given to federal estate and gift taxes. Prer., Acct. 441.

Acct. 454-3. Accounting Systems and Data Processing. The design and analysis of management information systems; automated data processing methods with special emphasis on computers and computer programming; and the role of accounting in the management process. Prer., 9 sem. hrs. of accounting.

Acct. 462-3. Auditing. Generally accepted auditing standards and the philosophy supporting them; auditing techniques available to the independent public accountant. Pertinent publications of the AICPA reviewed. Prer., Acct. 322 or 323.


Acct. 542-3. Advanced Income Tax Accounting. Continuation of Acct. 441, with special emphasis on the income tax problems of partnerships, corporations, and estates and trusts. Consideration is also given to federal estate and gift taxes. Prer., Acct. 441 or 541.

Acct. 554-3. Accounting Systems and Data Processing. The design and analysis of management information systems; automated data processing methods with special emphasis on computers and computer programming; and the role of accounting in the management process. Prer., 9 sem. hrs. of accounting.

Acct. 562-3. Auditing. Generally accepted auditing standards and the philosophy supporting them; auditing techniques available to the independent public accountant. Pertinent publications of the AICPA reviewed. Prer., Acct. 323 or 612.


Acct. 612-3. Financial Accounting Practice and Procedures. Designed to be a graduate level treatment of substantially the same material covered in Acct. 322 and 323. Should not be taken by students who have taken Acct. 322 and 323 or their equivalent. Restricted to graduate students. Prer., B. Ad. 501 or equivalent.

Acct. 626-3. Seminar: Managerial Accounting. In-depth exploration of the broad professional field of managerial accounting, especially as related to organizational decision making, planning, and control. Development and current problems of the managerial accounting function analyzed. Prer., Acct. 332 and 454 or 554 or equivalents.


BUSINESS ADMINISTRATION

Undergraduate Courses

B.Ad. 100-3. Introduction to Business. Nature of business enterprise; role of business in our society; problems confronting business management. Career opportunities in business. Business students are advised to take this course during their freshman year. Open only to freshmen and sophomores.


B.Ad. 410-3. Business and Government. The study of government regulation of the business system. Topics include regulation of business concentration, markets for labor, money, other resources, and final products. Prer., Econ. 201 and 202. Completion of Pol. Sci. 110 is recommended before taking this course.


B.Ad. 450-3. Cases and Concepts in Business Policy. Emphasis is on integrating the economic, market, social-political, technological, and competition components of the external environment with the internal characteristics of the firm; and deriving through analysis the interaction between the firm and its environment to facilitate accomplishment of the firm's objectives. Extensive use of actual case studies from business supplemented by readings in business policy and strategy. Priority for enrollment will be given to business seniors in their final semester prior to graduation. Students should register for this course only after completion of all other core course requirements for the B.S. degree. Does not carry graduate credit. Prer., Fin. 305, Mkt. 300, Pr. Mg. 300, Mg. Or. 330, and Q. M. 201.

B.Ad. 485-3. Public Relations. Image of public relations; potential power of public relations with media, press conference, stock holders, employees, dealers, distributors and suppliers, and the local community; intradepartmental and interpersonal relations; the public relations of
political parties and candidates; lobbying; the public relations of ideas; international public relations; the lie, or negative public relations.

Graduate Courses

The following graduate fundamentals courses do not carry graduate business degree credit, nor may they be used to satisfy requirements for the bachelor's degree in business. They are open only to graduate students admitted on a regular or provisional status. Qualified nonbusiness senior undergraduates who intend to pursue graduate study in business may be admitted with the written approval of the Office of Graduate Studies.

B.Ad. 500-noncredit. Sources of Information and Research Methods. The objective of this course is to provide the M.B.A. student with the basic research techniques needed to locate, use, and evaluate secondary resource materials. The approach will be to emphasize techniques rather than actual titles. Open only to M.B.A. graduate degree candidates.


B.Ad. 502-3. Fundamentals of Business Statistics. Provides basic understanding of business statistics essential for graduate study of business. This course may be waived by successfully passing the statistics qualifying examination.

B.Ad. 503-3. Fundamentals of Marketing. Provides basic understanding of marketing essential for graduate study of business. This course may be waived if the student has completed Mk. 300 and one additional 3-hour marketing course approved by an adviser.

B.Ad. 504-3. Fundamentals of Management and Organization. Provides basic understanding of organization theory, personnel management, labor relations, and organizational behavior essential for graduate study in business.


B.Ad. 506-3. Legal Environment of Business. Provides basic understanding of the private and public law essential for graduate study of business.

B.Ad. 507-3. Fundamentals of Management Science. A survey of the analytical methods of management science operations research as applied to decision problems in business. A major objective of the course is to develop an understanding of the power and the limitations of mathematical-statistical models and to develop skills in problem formulation. Prer., B.Ad. 502 or equivalent.

The following graduate courses are open only to admitted graduate students. Students should have completed all of the fundamental requirements or be currently registered for them before enrolling in any of the 600-level courses.

B.Ad. 610-3. Business, Government, and Society. The interaction and interdependence of business and its executives with societal, governmental, and economic environments, including analytic elements such as the forecasting and analysis of business conditions. Explores the firm's and its executives' social and ethical responsibilities to various internal and external publics: employees, organized labor, stockholders, suppliers, customers, the financial community, and the general public. Considers the relationship between business and government at federal, state, and local levels, and the control and regulation of business activities by various statutes and by social pressures, and specifically includes the study of anti-trust policy. Considers the problems and opportunities of operating in the international environment. Prer., by course work or waiver, completion of at least half (12 hours) of the B.Ad. 500 series of fundamentals.

B.Ad. 615-3. Business and Economic Analysis. A presentation of the concepts, tools, and methods of economic analysis relevant to a broad cross-section of decisions within the business firm. Particular attention will be given to market demands and the interrelationships between price policy and costs. Prer., economics.


B.Ad. 640-3. Organizational Behavior. Application of behavioral sci-
Fin. 540-3. International Financial Management. Considers international capital movements and balance of payments problems. Emphasizes special problems of international operations as they affect the financial planning and control problems of public and private foreign and international institutions as well as the foreign exchange process. Considers financial requirements, problems, sources, and policies of firms doing business internationally. Prereq., Fin. 305 or B. Ad. 505.

Fin. 554-4. Mortgage Financing. Functions and practice of various real estate mortgage financing institutions. Embraces mortgage lending, servicing, and mortgage banking relative to all types and uses of real estate. Prereq., Fin. 305 or B. Ad. 505.

Fin. 601-3. Problems and Policies in Financial Management I. Emphasizes analysis of financial condition, planning and control of current assets and current liabilities, and long-term financial arrangements. Analytical skills are developed by analyzing case studies covering a broad range of policies and problems. Specific topics include management of working capital; short, intermediate, and long-term financing; and capital structure policies. Prereq., B. Ad. 505 or equivalent.

Fin. 602-3. Problems and Policies in Financial Management II. A continuation of Financial Management I. Specific topics include long-term financing (hybrid securities and leasing), marketing securities, capital budgeting, internal and external expansion or acquisitions, and capital structure adjustments. Prereq., Fin. 601.

Fin. 633-3. Investment Management and Analysis. Develops the theory of investment management and security values; portfolio management, including the analysis of investment risks and constraints for both short- and long-term investment policies and objectives; the analysis and use of investment information; and the development and application of the tools for determining security values. Prereq., Fin. 601; coreq., Fin. 602.

Fin. 655-3. Business Fluctuations and Monetary Policy. Theoretical and empirical study of forces governing business fluctuations in the U.S., and the effectiveness of monetary and fiscal policies as major control vehicles. Attention is given to the analytical tools essential for understanding business indicators and the various policy alternatives to attain stated economic goals and objectives. Prereq., B. Ad. 505.

INSURANCE

Undergraduate Course

Ins. 484-3. Principles of Insurance. Fundamental principles of insurance and their application to life, disability, property, and liability insurance. Provides the basic knowledge for intelligent solution of personal and business insurance problems as well as for further specialized study of insurance.

Graduate Course

Ins. 584-3. Principles of Insurance. Fundamental principles of insurance and their application in life, disability, property, and liability insurance. Provides the basic knowledge for intelligent solution of personal and business insurance problems as well as for further specialized study of insurance.

MANAGEMENT SCIENCE

Mg.Sc. 625-3. Computer-Oriented Decision Modeling. Application of the methods of computer science to problems in industrial management. Emphasis is placed on simulation as a method for studying the behavior of dynamic systems and the use of optimization models for their control. Prereq., B. Ad. 507 or equivalent.

Mg.Sc. 635-3. Mathematical Programming. A study of linear and nonlinear programming algorithms, both deterministic and chance-constrained, including linear programming, dynamic programming, integer programming, quadratic programming, and related techniques. Prereq., B. Ad. 507 or equivalent.

Mg.Sc. 675-3. Seminar: Management Science. Application of operations research methods to problems of business and industry, with emphasis on the functional fields of marketing, financial management, and production. Prereq., B. Ad. 507 or equivalent, plus 6 additional semester hours of management science or statistics at the 400 level or higher.

MARKETING

Undergraduate Courses

Mk. 300-3. Principles of Marketing. Analytical survey of problems encountered by businessmen in distributing goods and services to markets. Takes a marketing-management approach in attacking problems related to product planning, channels of distribution, pricing, advertising, and personal selling. Emphasizes the role of the consumer in the marketing process and the social responsibility of the marketer.


Mk. 340-3. Marketing Institutions and Retailing. A study of the macroeconomic foundations of marketing intermediaries, middlemen, and institutional arrangements. Emphasis placed on the development and change of institutional structures and functions and the roles played by various institutions involved in moving goods from origin to ultimate consumer, with particular focus on retailing functions and strategies. Prereq., Mk. 300.

Mk. 350-3. Principles of Advertising. Analysis of principles and practices in national and retail advertising from executive's point of view. Considers whether a firm should advertise; product and market analysis as planning phase of advertising program; media; survey of creation and production of advertisements; advertising budgets, copy testing, and organization. Prereq., Mk. 300.

Mk. 360-3. Industrial Marketing. Major activities involved in marketing of industrial goods. Analysis of industrial market structures, habits and motives of industrial purchasers, types of industrial products, pricing problems, and distribution channels. Problems in selling to agencies of government. Oriented to engineers and others who may enter the fields of industrial marketing. Prereq., Mk. 300.

Mk. 420-3. Consumer Behavior. Survey of noteworthy contributions of the behavioral sciences to the understanding and prediction of consumer behavior. Contributions of various research techniques in the social sciences to the understanding of consumer purchasing and decision-making processes. With particular attention to formal and informal influence patterns. Survey of models of consumer purchasing behavior, brand loyalty, and product cycles. Prereq., Mk. 300.


Mk. 470-3. Sales Management. Problems involved in managing a sales force. Includes sales organization, operating a sales force, recruiting, selection, training, compensation, supervision, stimulation), sales planning (forecasting, budgeting, territories), and sales analysis and control. Prereq., Mk. 300.


Mk. 490-3. Physical Distribution Management. Investigation and analysis of the logistics of distribution systems for firms engaged in manufacturing and marketing. Component parts of each system are studied and analytical tools are presented for selecting those alternatives which will attain the distribution goals of the firm. Prereq., Mk. 300.

Mk. 493-3. International Marketing. Studies managerial marketing policies and practices of firms marketing their products and services in foreign countries. An analytical survey of institutions, functions, policies, and practices in international marketing. Relates marketing activities to the market structure and marketing environments. Prereq., Mk. 300 or consent of instructor.

Graduate Courses

Mk. 520-3. Consumer Behavior. Survey of noteworthy contributions of the behavioral sciences to the understanding and prediction of consumer behavior. Contributions of various research techniques in the social sciences to the understanding of consumer purchasing and decision-making processes, with particular attention to formal and informal influence patterns. Survey of models of consumer purchasing behavior, brand loyalty, and product cycles. Prereq., Mk. 300 or B. Ad. 503.


Mk. 570-3. Sales Management. Problems involved in managing a sales force. Includes sales organization, operating a sales force, recruiting, selection, training, compensation, supervision, stimulation), sales planning (forecasting, budgeting, territories), sales analysis and control. Prereq., Mk. 300 or B. Ad. 503.

Mk. 585-3. Physical Distribution Management. Investigation and analysis of the logistics of distribution systems for firms engaged in
manufacturing and marketing. Component parts of each system are studied and analytical tools are presented for selecting those alternatives which will attain the distribution goals of the firm. Prer., Mk. 300 or B.Ad. 503.

Mk. 590-3. International Marketing. Studies managerial marketing policies and practices of firms marketing their products and services in foreign countries. An analytical survey of institutions, functions, policies, and practices in international marketing. Relates marketing activities to the market structure and marketing environment. Prer., Mk. 300 or B.Ad. 503 or consent of instructor.

Mk. 600-3. Marketing Management. Analysis of marketing problems and policies requiring decisions by marketing executives. Integrates all areas of marketing management and relates the marketing activities of a firm to finance, production, and other major policy areas. Prer., Mk. 300 or B.Ad. 503.

Mk. 605-3. M.B.A. Seminar: Marketing. A comprehensive survey of current problems and issues in marketing from the perspective of the firm. An analysis of the firm’s process of adjustments to market changes. (Required of all M.B.A. students with an area of emphasis in marketing.) Prer., Mk. 600.

MINERALS LAND MANAGEMENT

Undergraduate Course

M.L.Mgt. 485-3. Minerals Landman Administration. A thorough and detailed examination of the wide range of administrative duties performed by the minerals landman. Leasing, property rights, easements, participating interests, taxation, and pay-out schedules are included. Emphasis is on the various governmental agencies and private interests that are dealt with in acquiring land for exploration and development.

Graduate Course

M.L.Mgt. 585-3. Minerals Landman Administration. A thorough and detailed examination of the wide range of administrative duties performed by the minerals landman. Leasing, property rights, easements, participating interests, taxation, and pay-out schedules are included. Emphasis is on the various governmental agencies and private interests that are dealt with in acquiring land for exploration and development.

OFFICE ADMINISTRATION

Undergraduate Course


Graduate Course


ORGANIZATION MANAGEMENT

Undergraduate Courses

Or. Mg. 330-3. Introduction to Management and Organization. An introductory study of management fundamentals and organizational behavior. How individuals adapt to organizations, managers motivate and lead in work situations, and organizations are designed and managed. Students are urged to complete Psych. 203 and 204 and Soc. 111 before taking this course.

Or. Mg. 335-3. Managing Work Groups. The course examines leadership and supervision of individuals and small work groups in organizations, including the study of group formation and operation, analysis of group member roles, group structure and norms, leadership, and intergroup relationships Prer., Or. Mg. 330.

Or. Mg. 437-3. Managing Complex Organizations. From the perspective of a general manager, the course explores organizational design and management processes for effective organizational performance. Prer., Or. Mg. 330.

Graduate Courses

Or. Mg. 601-3. Organizational Behavior as a System. An introductory study of task organizations concentrating on individuals, groups, and complex formal organizations, and their interrelationships and means of mutual adaptation in a systems context. Prer., B.Ad. 504 or equivalent.

Or. Mg. 602-3. Individual Behavior in Organizations. Analysis of individual differences including issues such as perception, cognition, motivation, human judgment and problem solving, learning, achievement, emotions, value and attitude formulation, abilities, alienation, and integrating the personality into organizations. Prer., B.Ad. 640 or Or. Mg. 601 or equivalent.

Or. Mg. 632-3. Behavior of Task Groups. A study of interpersonal competence in organization. Topics include group formation and development, leadership, power conflict, conformity, cohesiveness, and task effectiveness. Prer., B.Ad. 640 or Or. Mg. 601 or equivalent.

Or. Mg. 636-3. Behavior in Complex Organizations. Analysis of behavior and structure required for total organizational functioning. Issues discussed include bureaucracy, technological and environmental influences, organizational socialization, structure, goals, adaptation, information, communication and control systems, lateral relationships, system integration, conflict resolution, change, organizational development, and organizational decision processes. Prer., B.Ad. 640 or Or. Mg. 601 or equivalent.

PERSONNEL MANAGEMENT

Undergraduate Courses


Ps.Mg. 439-3. Personnel Management: Legal and Social Issues. A study of legal and social issues related to personnel administration, such as equal employment opportunity and affirmative action, with emphasis on program implementation and evaluation. Reviews both federal and state laws, guidelines and procedures, and their administration by governmental regulatory agencies. It is recommended that students take Ps.Mg. 434 and 438 before taking this course. Prer., Or. Mg. 330.

Graduate Courses


Ps.Mg. 536-3. Personnel Management: Policy and Practice. Study of development and implementation of personnel systems, including selection, training, motivation, and performance appraisal. Prer., Or. Mg. 330 or B.Ad. 504.

Ps.Mg. 539-3. Personnel Management: Legal and Social Issues. A study of legal and social issues related to personnel administration, such as equal employment opportunity and affirmative action, with emphasis on program implementation and evaluation. Reviews both federal and state laws, guidelines and procedures, and their administration by governmental regulatory agencies. It is recommended that students take Ps.Mg. 534 and 538 before taking this course. Prer., Or. Mg. 330 and B.Ad. 504.

Ps.Mg. 634-3. Seminar: Industrial Relations. The application of theory and research integrating labor relations and personnel management into the total manpower system. Topics may include manpower research and policy, public policy, collective bargaining trends and patterns, integrating the organization's manpower system, and current issues. Emphasis on national and organizational manpower research and research designs. Prer., Ps.Mg. 534 and 538 or equivalent.

PRODUCTION AND OPERATIONS MANAGEMENT

Undergraduate Courses

Pr.Mg. 300-3. Production and Operations Management. An introduction to the design and analysis of production systems in manufacturing, service, and public organizations. Topics include facility location and layout, design, safety, and work standards; production and inventory planning and control; quality control; simulation; waiting line analysis; and linear programming. Prer., Acc.t. 200; coreq., B.Ad. 200.

Pr.Mg. 440-3. Planning and Control Systems in Production and Operations Management. Study of the design, implementation, information, and control of production, inventory, and service delivery systems. Topics include computer-based scheduling and control systems, analytic models for design of operating systems, and material requirements planning (MRP). Organizations studies include manufacturing, services (including
Graduate Courses

Pr.Mg. 444-3. Work Design and Measurement. Study of the design of jobs in manufacturing, service, and public organizations. Topics include job specialization vs. job enlargement, work measurement, determining job standards, job health and safety, and the impact of automation on job design. Prereq., Pr.Mg. 300; Or.Mg. 330.


PUBLIC AGENCY ADMINISTRATION
The program will encompass the following subject areas: budgeting, personnel management, administration, and quantitative methods.

QUANTITATIVE METHODS (FORMERLY STATISTICS)

Undergraduate Courses


REAL ESTATE

Undergraduate Courses


R.Es. 401-3. Urban Land Analysis. The nature of urban real estate and the market forces affecting its utilization. Prereq., R.Es. 300.

R.Es. 430-3. Real Estate Appraising. Methods of real estate appraising are studied and applied by a field problem in appraising. Prereq., R.Es. 300.


Graduate Courses


R.Es. 530-3. Real Estate Appraising. Methods of real estate appraising are studied and applied by a field problem in appraising. Prereq., R.Es. 300.

R.Es. 553-3. Real Estate Investments. Emphasizes problems and methodology for making the real estate investment decision. Includes real estate versus other investments; real estate user and investor requirements; decision models; local, state, and federal regulations; tax factors; and syndication. For M.B.A. and graduate students with real estate emphasis. Prereq., R.Es. 300 for undergraduate students, Fin. 401 or 601 for graduate students.

R.Es. 573-3. Legal Aspects of Real Estate Transactions. Business and legal aspects. Estates in land, purchase and sales contracts, conveyances, mortgage and trust deed transactions, property taxes, landlord and tenant, wills and inheritance. Prereq., B.Law 300 or B.Ad. 506 and R.Es. 300.

TRANSPORTATION AND TRAFFIC MANAGEMENT

Undergraduate Courses

Tr.Mg. 450-3. Transportation Operation and Management. Economics of transportation service and rates. History and patterns of regulation. Explanation of various forms in common use in freight and passenger transportation. Introduction to tariffs and their use. Service and management problems of industrial traffic managers. Prereq., Econ 201 and 202 or consent of instructor.

Tr.Mg. 457-3. Urban Transportation. Analysis of the two aspects of urban transportation—freight and people. Issues in policy, modes, governmental actions and structure, investment and costs, and effect upon urban environment.

Graduate Courses


Tr.Mg. 557-3. Urban Transportation. Analysis of the two aspects of urban transportation—freight and people. Issues in policy, modes, governmental actions and structure, investment and costs, and effect upon urban environment.
School of Education
RICHARD E. WYLIE, Associate Dean

INFORMATION ABOUT THE SCHOOL

UCD offers undergraduate and graduate programs to prepare teachers and other educational workers. The education of school personnel has long been a recognized responsibility of the University. No program of studies involves the coordination of more scholastic disciplines than does teacher education. None is more fundamental, more significant, more far-reaching, or more enduring in its impact on society.

The teacher education program, both undergraduate and graduate, is fully accredited by the North Central Association of Colleges and Secondary Schools and by the National Council for the Accreditation of Teacher Education. Membership also is held in the American Association of Colleges of Teacher Education.

Students interested in pursuing a program of studies leading to initial teacher certification should consult the School of Education Office. Those desiring to pursue graduate programs or to take courses as graduate students should consult the Graduate School Bulletin.

All students wishing to take work in professional education are urged to seek advice from a faculty member of the School of Education to insure that requirements for both certification and the degree program sought are fully understood.

All application forms for School of Education programs are available in the School of Education Office, ext. 276.

Initial Certification Program

Undergraduate students desiring to pursue degree and certification programs should contact the School of Education Office and become familiar with the requirements and other information provided. The first two years of college work are taken in the College of Liberal Arts and Sciences. However, all students are urged to consult appropriate School of Education advisers in their freshman and sophomore years if they plan to become teachers.

Approximately half the students in the Initial Certification Program at UCD enter with bachelor’s degrees. For such students the Initial Certification Program leads to a teaching certificate but not to a graduate degree.

The Initial Certification Program is designed to prepare classroom teachers for one of two levels of certification: elementary or secondary. To foster a K-12 perspective, all program candidates have school-based tutoring experiences in both elementary and secondary situations. Although the program is not designed to meet the requirements of certification simultaneously at both levels, it facilitates such certification if the candidate desires to invest additional time for the completion of necessary work in special methods courses, academic disciplines, and student teaching. A key feature of the program is extensive experience in both school and community agencies in addition to professional course work. Further information can be obtained from the School of Education Office.

Initial certification is available at UCD in the following areas: elementary education, and secondary education in the fields of English, German, Spanish, mathematics, science, social studies, and communication and theatre.

A personal interview with the student adviser and one or more faculty members in the specific area of the student’s interest is mandatory prior to admission to the Teacher Education Program.

Rehabilitation Services Program

The School of Education offers a two-year program in rehabilitation services to juniors and seniors, focusing strongly on the recruitment and training of minorities. Students entering the program must have completed 60 semester hours by September of the year for which application is made and should consult with the School of Education regarding entrance requirements. The program leads to a B.S. degree, but not a teaching certificate.

The program combines didactic and experiential facets of rehabilitation counseling. Trainees spend a minimum of two days per week working in settings such as drug and alcohol treatment centers, juvenile probation, and rehabilitation service agencies. The program requires 30 hours of core curriculum courses during the two years.

Application Deadlines

Applications for admission to the Initial Certification Program are accepted each year until July 31. All applicants who have been interviewed by the student adviser and a faculty member in the School of Education and accepted into the program by July 31 will be able to start professional education courses the following semester. Any student accepted for a particular fall semester must begin his professional work that semester. Reapplication will be required if enrollment is not accomplished for the semester the student is accepted.

All students in the Initial Certification Program (elementary and secondary) are required to make application for student teaching no later than March 1 preceding the fall semester of student teaching.

Graduate Programs

Refer to the Graduate School section of this bulletin for information regarding graduate programs in education.

Description of Courses

The value of each course in semester hours is given as part of the identifying department number: for example, T.Ed. 306-3 identifies Foundations of American Education as a 3-semester-hour course.

Candidates preparing to teach are expected to follow the sequence and placement of courses outlined by the School of Education.

With some exceptions, chiefly in the curriculum for elementary majors, courses numbered from 400 to 499 are usually taken during the senior year.

Courses numbered from 500 to 599 are graduate courses and are open to qualified seniors only with the consent of the instructor and the associate dean. Courses numbered 600 and above are open only to graduate students.

The Schedule of Courses is available several weeks before the beginning of each semester. It provides a complete list of offerings and a statement of time and place.

These courses are open only to students who have been admitted to the Teacher Education Program. Students interested in elementary or secondary undergraduate pro-
grams may obtain a copy of the program from the School of Education Office.

For courses in the education series numbered 500 and above see the Graduate School section of this bulletin.

UNDERGRADUATE TEACHER EDUCATION

T.Ed. 306-3. Foundations of American Education. A study of Ameri-
can education in its cultural setting and its nature, role, and function in
society. Includes school-based tutorial experience.

T.ED. 313-3. General Educational Psychology. An introduction to
the practitioners of psychology to education. Designed for teachers-to-be; em-
phasis is on selected topics (objectives, motivation, retention and transfer
and cognitive, affective, and psychomotor outcomes, etc.). Special attention
is given to problems of mentally retarded children and to slow learners.

T.Ed. 314-1. Communication: Human Relations and Group Pro-
cesses I. Examines the principles of underlying effective inter- and
intra-personal communication. The class will examine the cognitive,
affective, and psychomotor aspects of human interaction. The emphasis will
be on how to be helpful to another person who is experiencing problems.

T.Ed. 315-1. Communication: Human Relations and Group Pro-
cesses II. Examines various models of altering the behavior of others
which is unacceptable to the teacher. Classroom management techniques
as well as conflict resolution models will be presented.

T.Ed. 336-3. Teaching Reading in Urban Schools. Designed to de-
scribe the reading process as it relates to and affects inner-city children.
General topics include foundations of reading instruction K-12, current
approaches for teaching reading, and materials for reading instruction.

T.Ed. 370-2. The City as a Cultural Laboratory I. Develops a
first-hand awareness and understanding of the nature and culture of a city
and builds a better appreciation of the possibilities for human
and environmental growth within. Acquaints students with the educational
resources and opportunities and further exploration and utilization of a
city as a cultural laboratory for education. Weekly field experiences
combined with a seminar-workshop.

T.Ed. 371-2. The City as a Cultural Laboratory II. Further field
exploration of and activity within the city as a cultural-educational
laboratory.

T.Ed. 375-2. School-Based Group Tutorial. Teaching experience in
small groups in an elementary or secondary school setting. Includes a
weekly seminar.

T.Ed. 404-2. Educational Measurement. Introduction to principles and
practice of measurement and evaluation in public schools. Consideration
of standardized tests and informal evaluation techniques; emphasis on
construction and use of teacher-made tests. (Effective at the undergraduate level.)

T.Ed. 414-3. Senior Seminar: Urban Education, Bilingual/Bicultural
Education, and Special Education. Team-taught workshops, e.g., in
communications, reading skills, teaching English as a second language,
psychology, foundations, and special learning handicaps.

T.Ed. 415-9. Elementary Block. Curriculum, materials, methods,
evaluation, and related aspects of instruction for elementary pupils in
language arts, mathematics, media, reading, science, social studies, and
special education.

T.Ed. 434-3. Language Arts for Urban Schools. Adaptation of intact
sense for listening, speaking, reading, and writing. Diagnosis for weak-
nesses in listening, speaking, and coordination and application of dramatic
play, oracy procedures, sensory imagery, and creative expression.
Preparation of cases, records, and application of differential instruction.
(Effective at the undergraduate level.)

Characteristics of young children. Daily and weekly program and plan-
ting. Testing and evaluation, and parent-teacher cooperation. (Effective at
the undergraduate level.)

T.Ed. 439-4. Seminar: Elementary Education. Accompanies the stu-
dent teaching assignment and yields undergraduate credit only.

T.Ed. 440-1. Seminar: Secondary Student Teaching. Accompanies the
student teaching assignment and yields undergraduate credit only.

T.Ed. 443-3. Teaching Reading in Content Areas at the Secondary
Level. Teaching techniques to improve reading skills in content fields.
Current secondary school reading program. (Effective at the undergraduate level.)

T.Ed. 444-3. Literature for Adolescents. (Same as Eng. 481.) Reading
and evaluation of books for junior and senior high school pupils. Emphasis on modern literature.

Teachers. (Same as Eng. 480.) Emphasis on evaluation, criticism, and
improvement of writing.

T.Ed. 452-3. Methods and Materials in English. (Same as Eng. 482.)
Curriculum, materials, methods, evaluation, and related aspects of in-
struction. Integration of content and methodology. Secondary level.

T.Ed. 453-3. Methods and Materials in Social Studies. Curriculum, materi-
als, methods, evaluation, and related aspects of instruction. Integration of
content and methodology. Secondary level.

T.Ed. 454-3. Methods and Materials in Science. Curriculum, mate-
rials, methods, evaluation, and related aspects of instruction. Integration of
content and methodology. Secondary level.

T.Ed. 456-3. Children's Literature. Reading and evaluation of books for
children, information about children's books, children's interest in
reading, important authors and illustrators, and problems in the guidance of
reading. (Effective at the undergraduate level.)

T.Ed. 470-8. Student Teaching—Elementary School. Kindergarten and
grades one through six. Student teacher attends an elementary school in
Denver metropolitan area.

attends a senior or junior high school in Denver metropolitan area.

T.Ed. 473-4. Assignment—Elementary School. This is the final experi-
ence in the elementary professional year. It involves a wide number of
possibilities for the students, and arrangements are made on an individual
student basis. Prereq., admission to elementary professional year.

T.Ed. 484-1 to 4. Workshop in the Application of Psychological
Development to Education. Principally for in-service education dealing
with school-oriented application of psychological principles. (Effective at
the undergraduate level.)

T.Ed. 490-1 to 6. Independent Study. (Effective at the undergraduate
level.)

UNDERGRADUATE REHABILITATION SERVICES

R.S. 312-3. Introduction to Rehabilitation Services and Community
Resources. Introductory course to prepare students for careers in voca-
tional rehabilitation, social work, employment counseling, probation and
parole, and other helping professions. Also included will be a review of
community services and their uses and effectiveness.

Introduction to the theory and practice of rehabilitation counseling and to
interviewing techniques. Verbal and nonverbal communication skills will be
presented and several theories and systems of counseling will be
examined.

R.S. 331-2. Theories of Personality. An introduction to the major
theories of personality. An overview of the nature of the theories and
their scope, utility, and history will be presented.

Designed to acquaint students with the basic concepts of appraisal and
evaluation as applied to the rehabilitation client. Students will be exposed
to tests and evaluation procedures in the areas of aptitude, intelligence,
vocational interest, personality, etc. Prereq., T.Ed. 312.

R.S. 373-3. Seminar and Field Experience in Rehabilitation I. Experi-
ence is designed to provide practical training with social and rehabilita-
tion services agencies. The agencies and the University provide on-the-
job instruction and supervision to the student. Class time will be devoted
to discussion of field experiences and professional role expectations.

R.S. 374-3. Seminar and Field Experience in Rehabilitation II. Experi-
ence is designed to provide practical training with social and rehabilita-
tion services agencies. The agencies and the University provide on-the-
job instruction and supervision to the student. Class time will be devoted
to casework write-ups, presentations, and decision-making pro-
cesses and procedures and to discussion of the field experiences and
professional role expectations.
College of Engineering and Applied Science

PAUL E. BARTLETT, Associate Dean

INFORMATION ABOUT THE COLLEGE

Engineering is the art and science by which the resources of nature are used for the benefit of man and the resources of society are used to preserve a wholesome global environment. The engineer has the primary duty to undertake research and study of the effects of present and prospective technology on man and his environment, to communicate his findings effectively to decision-making groups, and to implement decisions and designs which will shape tomorrow's world.

Engineering study and practice requires qualities such as initiative, energy, willingness to take responsibility, reliability, rigorous honesty, good judgment, and the ability to work and cooperate with others and to work through to the conclusion of an assignment. Obviously, the fundamentals of sound citizenship are a necessity in any profession.

Today the key decisions affecting the future of mankind are increasingly complex and technological or quantitative in nature. Engineers require a broad social orientation which will enable them to participate in the decision-making process.

The prospective engineering student should enjoy mathematics and also have a keen interest in science and its methods. Sound curiosity about the principles governing the behavior of forces and materials and the ability to visualize structures and machines are necessary prerequisites. The ability to express ideas in both written and spoken form is of primary importance.

Career of Service

Engineering offers wide opportunities for a professional career. Upon graduation, the young engineer normally enters employment that provides basic practical training in the field he has studied. Professional progress depends on hard work, initiative, and demonstrated capacity for increased responsibility.

More representation by women and minority groups is urgently needed in engineering today, because of the increasing role of the engineer in social decision making.

Few college graduates have employment opportunities equaling those of the engineer. The best estimates available indicate that the nation is not producing as many engineers as it will need. Many serious social problems require engineering answers. Most engineers are versatile men and women who can transfer as needed from one field to another and who progress readily into administration and management. The need is becoming especially acute for engineers capable of dealing with problems of pollution, ecological and urban planning, and computer modeling.

Registered Professional Engineer

Currently, registration is required in all states for the legal right to practice professional engineering. Although there are variations in the state laws, graduation from an accredited curriculum in engineering, subscription to a code of ethics, and four years of qualifying experience are required. In addition, two days of examinations, covering the engineering sciences and the applicant's practical experience, are required in most states. Those who cannot qualify for registration are expected to work under experienced registered professional engineers.

Educational Opportunities—Degrees

The College of Engineering and Applied Science at UCD offers complete four-year courses leading to the B.S. degree in civil and environmental engineering, electrical engineering, electrical engineering and computer science, and applied mathematics. Many of the courses leading to the B.S. degree in aerospace engineering sciences, architectural engineering, chemical engineering, engineering design and economic evaluation, mechanical engineering, and engineering physics are offered at UCD. Students who plan to complete a portion of their program at UCD and then transfer to the Boulder Campus for the remaining requirements are encouraged to obtain and familiarize themselves with the College of Engineering and Applied Science Bulletin. It gives a comprehensive listing of all curricula, course descriptions, and programs offered by the College of Engineering and Applied Science.

The course requirements during the freshman year are essentially the same throughout the College of Engineering and Applied Science.

About two-thirds of the sophomore year is common to all, and the remainder of the courses begin to point to the various fields of engineering taught; however, real specialization begins in the junior year and carries on through the senior year. A fifth year of study leading to the master's degree is strongly urged for students of more than usual ability who feel they can profit from additional study. Those in this category are likely to achieve greater ultimate success in the engineering profession.

At the University of Colorado, it is also possible for a student to obtain the bachelor's degree in both engineering and business in five years plus one or two summer terms.

Most departments offer varied programs in each of these degree fields—some of these amounting to joint degrees in computing and engineering or, with additional work, two engineering degrees. Also, any of these degree programs can be modified for an excellent premedical program.

If subjects in the liberal arts courses, such as science and mathematics, and engineering subjects, such as graphics and certain specialized courses, have been elected, a graduate of the College of Liberal Arts and Sciences may obtain an engineering degree in four semesters.

The College of Engineering and Applied Science at UCD offers complete M.S. degree programs in civil engineering, electrical engineering, and applied mathematics. Graduate courses in other fields also are offered.

For information regarding courses and requirements leading to the degree Master of Engineering and Master of Science or to the Ph.D. degree, see the Graduate School Bulletin and the Graduate School section of this bulletin.

Undergraduate Research

Research is an important part of many, if not most, engineering careers. Recent years have seen a strong movement in the College of Engineering and Applied Science to include undergraduates in the type of research programs formerly restricted to graduate students. Undergraduates, including some freshmen, have helped to carry out valuable projects in pollution control, bioengineering, solid state electronics, and other fields, including systems analysis and many areas of computerization.
At the same time, instructional laboratories are moving from routine apparatus manipulation to placing major emphasis upon experimentation and original projects. Students and faculty alike have responded to this change with new zest, achieving in many cases socially or scientifically valuable results along with an enhanced understanding of research methods.

Summer Courses
Summer term courses are planned for regular students who must clear deficiencies and for transfer students. Courses also are offered for high school graduates who wish to enter as freshmen and for those who need to remove subject deficiencies. For information about courses, students should write to the dean of the College of Engineering and Applied Science, UCD, for the Schedule of Summer Courses.

For many students there are several advantages in starting their college careers during the summer term. Some required freshman and sophomore courses are normally offered at UCD during the summer and are taught by the regular staff. Generally, the summer classes are smaller than regular academic-year classes, which means that students can get more individual attention. Beginning during the summer term gives the student a head start and enables him to take a lighter load during the fall semester, or to take additional courses to enrich his program.

Scholarships, Fellowships, and Loan Funds
Money contributed to the University Development Foundation for assistance to engineering students is deposited in appropriate accounts and used according to the restrictions imposed by the donors. Numerous industries match employee contributions. A list of companies contributing to scholarships and fellowships and different loan funds available can be obtained from the dean's office.

Student Organizations
The following honorary engineering societies have active student chapters in the College of Engineering and Applied Science:

- Alpha Chi Sigma, professional chemical fraternity
- Chi Epillon, civil and architectural fraternity
- Eta Kappa Nu, electrical engineering society
- Phi Tau Sigma, society of mechanical engineers
- Sigma Tau, engineering society
- Tau Beta Pi, engineering society

Student chapters of the following professional societies are well established at UCD:

- American Society of Civil Engineers
- Association for Computing Machinery
- Institute of Electrical and Electronic Engineers

The following societies have chapters on the Boulder Campus; however, UCD students are eligible for membership:

- American Institute of Aeronautics and Astronautics
- American Institute of Chemical Engineers
- American Society of Mechanical Engineers
- Society of Manufacturing Engineers
- Society of Industrial and Applied Mathematics
- Society of Women Engineers and Architects

REQUIREMENTS FOR ADMISSION
In order to enroll, the student must meet the admission requirements of the College of Engineering and Applied Science and the admission requirements described in the General Information section of this bulletin. Persons of sufficient maturity and experience who do not meet the prescribed requirements for admission may be admitted upon approval of the dean.

Women and minority students are encouraged to include the field of engineering in their educational plans, and are urged to contact an engineering adviser to find out what opportunities in engineering are available to them.

Beginning students in engineering should be prepared to start analytic geometry-calculus. No credit toward a degree will be given for algebra or trigonometry (courses will be offered to allow a student to make up deficiencies). Any student who questions the adequacy of his pre-college background in mathematics should see the applied mathematics coordinator for suggestions.

To be prepared for the type of mathematics courses that will be taught, the student must be competent in the basic ideas and skills of ordinary algebra, geometry, and plane trigonometry. These include such topics as the fundamental operations with algebraic expressions, exponents and radicals, fractions, simple factoring, solution of linear and quadratic equations, graphical representation, simple systems of equations, complex numbers, the binomial theorem, arithmetic and geometric progressions, logarithms, the trigonometric functions and their use in triangle solving and simple applications, and the standard theorems of geometry, including some solid geometry. It is estimated that it will usually take seven semesters to cover this material adequately in high school.

Freshmen

<table>
<thead>
<tr>
<th>Subjects Required for Admission</th>
<th>Required Units*</th>
<th>Recommended Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics distributed as follows:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algebra</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Geometry</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Trigonometry and higher mathematics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural sciences</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Physics</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Chemistry</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Social studies and humanities</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Foreign languages and additional units of English, history, and literature are included in the humanities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives*</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Totals</td>
<td>15</td>
<td>16</td>
</tr>
</tbody>
</table>

Transfer Students
Students transferring from other accredited collegiate institutions are admitted if they meet the requirements outlined in the General Information section of this bulletin and the freshman requirements for entering the College of Engineering and Applied Science.

In general, a resident of Colorado will be granted admission provided an overall grade-point average above 2.0 (C) has been attained (above 2.5 for nonresidents).

* A unit of work in high school is defined as a course covering a school year of not fewer than 36 weeks, with five periods of at least 40 minutes each per week. (Two periods of manual training, domestic science, drawing, or laboratory work are equivalent to one period of classroom work.) This is equivalent to 180 actual periods per unit. Fractional credits of value less than one-half unit will not be accepted. Not less than one unit of work will be accepted in a foreign language, elementary algebra, geometry, physics, chemistry, or biology.

**Electives may be chosen from any of the high school subjects (except physical education) which are accepted by an accredited school for its diploma and which meet the standards as defined by the North Central Association. However, not more than two units will be considered from drawing, shop, or other vocational work; courses that have descriptive geometry features may be considered for elective units beyond the recommended units.
Transfer from within the University to the College of Engineering and Applied Science will be approved if one of the three following conditions is fulfilled:

1. Transfer may be effected at the end of the first semester in residence at the University of Colorado (without regard to grades earned here) provided the prior academic record fulfills the admission requirements of the College of Engineering and Applied Science.

2. A transfer will be approved if the student has attained an overall grade average of 2.0 (C) in all work attempted at the University of Colorado.

3. Other transfers may be approved by the dean of the College of Engineering and Applied Science (or his designee) after a formal petition has been submitted.

Transfer hours of credit may be accepted upon approval by the Office of Admissions and Records and the major department. The grade-point average of the student transferring from another institution does not transfer into the College of Engineering and Applied Science. Transfer credit hours must be evaluated by the major department before they may be applied to the student’s engineering degree requirements.

Advanced Placement

Advanced placement and college credit may be granted on the basis of the College Entrance Examination Board’s advanced placement tests or by special examinations administered by the department involved. For students who have taken an advanced placement course in high school and who make scores of 4 or 5 in the CEEB’s Advanced Placement Examination, advanced placement as well as college credit will be granted. Students who make scores of 3 may be considered for advanced placement and college credit by the department concerned. All placement and credit must be validated by satisfactory performance in subsequent course work, in accordance with the practices being followed in the transfer of credits from other colleges and universities. These stipulations concerning advanced placement may differ from those stated for other colleges and schools of the University.

College Level Examination (CLEP) Credit

Prospective students may earn college level credit through the College Level Examination Program (CLEP) examinations, provided that they score at the 66th percentile or above. The number of credits so earned must be within the limits of the number of elective hours of the individual department. Prospective students desiring recognition of such credit must request that scores be reported to the Office of Admissions, University of Colorado at Denver, 1100 Fourteenth Street, Denver, Colorado 80202. Notification that the credit has been approved will be returned.

A list of subjects in which CLEP examination credit will be accepted may be obtained at the College of Engineering and Applied Science. The currently approved list includes 23 subjects in the fields of computing, business, science, mathematics, the humanities, and social sciences.

ACADEMIC POLICIES

Freshman Year

Fundamentals taught in the freshman year are of prime importance in the more advanced classes, and every effort is made to register a beginning freshman in the proper courses. (Course requirements for freshmen are detailed within the curriculum given under each department.)

All freshmen are urged to consult their instructors whenever they need help in their assignments.

Course Load Policy

Full-time Students.

Undergraduate students employed less than 10 hours per week should register for the regular work as outlined in the departmental curricula. Additional courses may be allowed when there is satisfactory evidence that these extra courses can be taken profitably and creditably. Permission to take more than 21 hours or fewer than 12 hours may be granted only after written petition to the associate dean. The petition must carry the approval of the departmental faculty adviser.

Employed Students.

Suggested course loads for undergraduate students employed 10 or more hours per week are as follows:

- Employed 40 or more hours per week—two courses (maximum of 9 semester hours).
- Employed 30 to 39 hours per week—three courses (maximum of 12 semester hours).
- Employed 20 to 29 hours per week—four courses (maximum of 15 semester hours).
- Employed 10 to 19 hours per week—five courses (maximum of 18 semester hours).

Course Scheduling and Abbreviations

For information on scheduling of courses, write to the associate dean of the College of Engineering and Applied Science, UC D, or consult the Schedule of Courses issued at the beginning of each semester.

The University reserves the right to cancel any listed course or to make a substitution in instructors. Courses for which there is insufficient enrollment may be cancelled by the college.

The 1-credit lecture-recitation period is 50 minutes long. A laboratory period includes two to four hours per week in the laboratory, drafting room, or field.

Unless the course descriptions specify laboratory or other work, it is understood that classes will consist of lectures and discussions.

The value of a course in semester-hour credits is indicated by that part of the course number which follows the dash. Example: Chem. 103-5. "Chem. 103" is the identifying department number, and "5" indicates that the course is for 5 semester hours credit.

Refer to the College of Engineering and Applied Science Bulletin for the complete list of course descriptions.

Credits

Students may receive credit for only those courses for which they have officially registered. Exceptions to this are credits obtained through special examinations, correspondence courses, CLEP, and transfer credits from other institutions. Students who have had extensive experience in the work covered by any required course and feel they would be able to pass an examination over the course may apply for such an examination. Credit will be allowed upon successful completion of the test. See General Information section for complete details.

Schedule Changes

All official changes of registration are made by processing the appropriate Change of Schedule Form. Courses may be added on or before the tenth day of each semester. After the second week, courses may be added only by special approval of the instructor and department offering the course. Courses may be dropped without penalty before the end of the second week of the semester. After the second week, but before the end of the tenth academic week, a student may drop a course without penalty if he is passing the course; otherwise a grade of F will be entered on his record. After the tenth academic week, a student...
may not drop a course except under circumstances clearly beyond his control. A student may not drop or add a course if in so doing he violates any other rule.

Repetition of Courses
A student may not register for credit in a course in which he already has received a grade of C or better. When a student takes a course for credit more than once, all grades are used in determining his grade-point average. An F grade in a required course necessitates a subsequent satisfactory completion of the course.

Sequence of Courses
Full-time students should complete the courses in the department in which they are registered according to the order shown in the College of Engineering and Applied Science Bulletin. (Part-time students may need to modify the order of courses with adviser approval.) Any course in which there is a failure or an unremoved incomplete should, upon the first recurrence of such course, take precedence over other courses; however, each student must be registered so that departmental requirements will be completed with the least possible delay.

Students who do not earn a grade of C or better in a course that is prerequisite to another, may not register for the succeeding course unless they have the permission of both the department and the instructor of the succeeding course.

Students may enroll for as much as 50 percent of their courses in work that is not a part of the prescribed curricula of the College of Engineering and Applied Science, provided they have at least a 2.0 grade average in all college work attempted. Exceptions to this policy may be made by petition and may be made for students taking the combined engineering-business program.

Withdrawal
A student may withdraw from the University without academic penalty before the end of the second week of the semester. After the end of the tenth week of the semester, a student will not be allowed to withdraw officially from the University except for circumstances clearly beyond his control. If the student interrupts his course of study, he may be required to take any preparatory courses that have been changed or added in his absence, or repeat any courses in which his preparation is thought to be weak.

Changing Departments
Students who wish to change to another department must apply for transfer by petition, and this petition must have the approval of both departments concerned and of the dean.

Class Standing
To be classified as a sophomore in the College of Engineering and Applied Science, a student must have passed 30 semester hours; to be classified as a junior, 60 hours; and to be classified as a senior, 90 hours of credit. All transfer students will be classified on the same basis according to their hours of credit accepted at the University of Colorado.

Class Attendance
Successful work in the College of Engineering and Applied Science is dependent upon regular attendance in all classes. Students who are unavoidably absent should make arrangements with instructors to make up the work missed. Students who, for illness or other good reason, miss a final examination must notify the instructor or the Office of the Dean no later than the end of the day on which the examination is given. Failure to do so will result in an F in the course.

Counseling
Freshman students are counseled by the associate dean’s office, and by representatives from each academic department. These representatives are readily available to assist students with academic, vocational, or personal concerns.

Students are assigned specific departmental advisers for academic planning and should consult with the departmental associate chairman or designated representative for assignment.

Scholastic Deficiency
To remain in good standing in the College of Engineering and Applied Science a student must maintain a cumulative grade-point average of at least 2.0. The student who fails to meet this requirement will be subject immediately to the authority of the Committee on Academic Progress. When semester grades become available, the committee will review all cases of scholastic deficiency and notify each student of its decision.

Pass/Fail Option
See the General Information section of this bulletin for University of Colorado uniform grading system and pass/fail and drop/add procedures. Below are specific pass/fail regulations for the College of Engineering and Applied Science.

The primary purpose of offering courses in which the undergraduate may be graded pass or fail (P/F) rather than A, B, C, D, or F, is to encourage the undergraduate student to broaden his educational experience by electing challenging courses without serious risk that his academic record might be jeopardized.

A grade of P in a course means that the course hours may be counted toward the 136 credit hours required for graduation, but the course hours will not be used in the computation of the student’s grade-point average. A grade of F for a student enrolled P/F in a course will be recorded, and the credit hours of the course will be used in the calculation of the student’s grade-point average just as is done with a grade of F in a normal registration.

Pass/Fail Rules
A maximum of 16 pass/fail hours may be included in a student’s total program. A maximum of 6 may be taken in one semester, but it is recommended that not more than one course at a time be taken pass/fail. Courses that a student may elect to take pass/fail shall be designated by the student’s major department. If courses not so designated are taken, the earned grade will be recorded in place of the P or F grade. An engineering student who has not designated a major field will not be allowed the pass/fail option. The pass/fail request form must be processed during the first two weeks of the term.

A transfer student may count toward graduation 1 credit hour of P/F courses for each 9 credit hours completed in the college; however, the maximum number of P/F hours counting toward graduation shall not exceed 16 credit hours, including courses taken in the Honors Program under the program’s P/F grading system.

PLANNING AN ENGINEERING PROGRAM

It is the student’s responsibility to be sure he has fulfilled all the requirements, to file his intended date of
graduation in his departmental office at the close of his third year, to fill out a Diploma Card at registration at the beginning of his last year, and to keep his departmental adviser and the dean's office informed of any changes in his plans throughout his last year.

In order to become eligible for one of the bachelor's degrees in the College of Engineering and Applied Science, a student, in addition to being in good standing in the University, must meet the following minimum requirements:

Courses. The satisfactory completion of the prescribed and elective work in any curriculum as determined by the appropriate department.

Hours. A minimum of 136 semester hours, of which the last 30 shall be earned after matriculation and admission as a degree student, is required for students in the four-year curricula; however, many students will need to present more than the minimum hours because of certain departmental requirements and because they may have enrolled in courses which do not carry full credit toward a degree. The hours required for students in the combined business and engineering program vary by departments; as a guide, 166 semester hours are considered a minimum, but most students follow programs that bring the total above this figure.

Grade Average. A minimum grade-point average of 2.0 (C) for all courses attempted. A department may require a minimum grade of C in all major courses.

Faculty Recommendation. The recommendation of the faculty of the department offering the degree and the recommendation of the faculty of the College of Engineering and Applied Science.

Incompletes and Correspondence Courses. It is the student's responsibility to insure that all incompletes and correspondence courses are officially completed before the tenth week of the student's final semester in school.

Simultaneous Conferring of Degrees. For combined business and engineering students, the degree B.S. in business and the degree B.S. in engineering must be conferred at the same commencement.

Commencement Exercises. Commencement exercises are held in May and August on the Boulder Campus. Students finishing in December may attend commencement the following May or receive diplomas by mail.

Graduation With Honors
Honors at graduation are conferred in recognition of high scholarship and professional attainments. Honors and special honors are recorded on diplomas and indicated on the commencement program.

Seniors with an average of 3.8 or above are usually graduated with special honors, and those with an average of 3.5 to 3.79 with honors. Grades earned during the semester of graduation will not be considered in the determination of honors.

Social-Humanistic Content of the Engineering Curriculum
The faculty of the College of Engineering and Applied Science recommends that 24 semester hours should be considered the minimum social-humanistic content of the degree-granting departments. (Up to 6 hours of English composition may be used to satisfy this requirement.)

A minimum of 6 hours of literature is required. Six hours of social-humanistic subjects should be taken in the junior year and 6 in the senior year. These subjects should be taken from the following categories, with not fewer than 6 hours from category 2 below.

1. Literature (including foreign literature either in the original or in translation).
2. Economics, sociology, political science, history, and anthropology.
3. Fine arts and music (critical or historical).

Such courses as public speaking, elementary foreign languages, technical writing, accounting, contracts, and management should be considered as technical and should be submitted for technical electives where applicable with departmental approval.

Qualified students will be permitted to take appropriate honors courses as substitutes for social-humanistic courses.

English for Engineering
Note: The English courses recommended for engineering students at UCD have new course numbers, effective summer 1975.

Engineering students may choose combinations of courses: (a) Engl. 258, 259, 260, 261; or (b) Engl. 258, 259, and the two following introductory literature courses: Engl. 120 (Introduction to Fiction), Engl. 130 (Introduction to Drama and Poetry). Students who achieve a B average in two of the following English courses (120, 130, 258, and 259) may take immediately thereafter any literature courses listed by the Department of English. No social humanistic credit will be given for courses dealing with English as a foreign language. See English in the College of Liberal Arts and Sciences section of this bulletin for course descriptions. Students having questions about the English requirement should see their departmental adviser.

COMBINED BUSINESS AND ENGINEERING CURRICULA
Undergraduates in the College of Engineering and Applied Science with career interests in administration may complete all of the requirements for both a B.S. degree in engineering and a B.S. degree in business by extending their study programs to five years, including one or two summer terms. The 48 semester credits required in the College of Business and Administration may be started in the second, third, or fourth year, depending upon the curricular plan for the particular field of engineering in which the student is enrolled.

It is also possible for qualified graduates (GPA: 2.75 or better) to complete the requirements for a master's degree in business within one year after receiving the baccalaureate degree in engineering. Before deciding upon the business option, a student should carefully consider, in consultation with departmental advisers, the relative advantages of the combined B.S. business-engineering curriculum, the degree program of the Graduate School of Business Administration, and the M.S. degree program in the student's own engineering discipline.

Combined business and engineering programs are available for students in aerospace engineering sciences, applied mathematics, architectural engineering, chemical engineering, civil engineering, electrical engineering, electrical engineering and computer science, engineering design and economic evaluation, engineering physics, and mechanical engineering.

The student taking a combined undergraduate program is not required to submit formal application for admission to the College of Business. He is permitted to enroll in business courses on the basis of a program approved by his adviser in the College of Engineering and Applied Science and by an assigned adviser from the College of Business.
Requirements for both the undergraduate business and engineering degrees must be completed concurrently. At least a 2.0 grade average must be earned in all courses undertaken in the College of Business. Not fewer than 30 semester credits in business courses must be earned to establish residency credit. Courses offered by the College of Business may be used in lieu of electives required for undergraduate engineering degrees, subject to the approval of the individual department.

The requirements for all combined business and engineering programs are as follows:

**Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Econ. 201 and 202. Principles of Economics</td>
<td>6</td>
</tr>
<tr>
<td>(Should be completed during the student's sophomore or junior year.)</td>
<td></td>
</tr>
<tr>
<td>Acct. 200. Introduction to Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>B.Ad. 200. Business Information and the Computer</td>
<td>3</td>
</tr>
<tr>
<td>Q.M. 201. Business Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Mk. 300. Principles of Marketing</td>
<td>3</td>
</tr>
<tr>
<td>Fin. 305. Basic Finance</td>
<td>3</td>
</tr>
<tr>
<td>Pr. Mg. 300. Operations Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Or. Mg. 330. Introduction to Management and Organization</td>
<td>3</td>
</tr>
<tr>
<td>B.Law 300. Business Law</td>
<td>3</td>
</tr>
<tr>
<td>B.Ad. 410. Business and Government; or B.Ad. 411. Business and Society</td>
<td>3</td>
</tr>
<tr>
<td>B.Ad. 450. Entrepreneurship (Cases and Concepts in Business Policy); or B.Ad. 451 (Management Game and Cases in Business Policy); or B.Ad. 452 (Small Business Strategy, Policy and Entrepreneurship)</td>
<td>3</td>
</tr>
<tr>
<td>Courses in an area of emphasis in one of the following fields: accounting, computer-based information systems, finance, international business, marketing, office administration, operations management, organizational behavior, or transportation management. All course work in the area of emphasis must be taken in the University of Colorado College of Business and Administration.</td>
<td>12</td>
</tr>
</tbody>
</table>

The student should note that for some courses, and for some areas of emphasis, there are prerequisites which must be met. Since some of the courses may be taken as engineering electives, it is possible to obtain the two degrees in as few as 166 semester hours; however, most students will require more.

**JOINT ENGINEERING DEGREES**

A student may obtain two engineering degrees by meeting the requirements and obtaining the approval of both departments concerned. Thirty hours of elective or required subjects in addition to the largest minimum number required by either of the two departments must be completed.

**PREMEDICINE OPTION**

A professional school in a field such as medicine requires a student to have a college education prior to pursuing its professional courses. In practically all cases, medical students are university graduates, although occasionally a student may enter medical school after three years of university training. A student can prepare for medical school either in the College of Liberal Arts and Sciences or in the College of Engineering and Applied Science. The desirability of obtaining an engineering education prior to undertaking a study of medicine is increasing continually, as medicine itself is evolving. A great deal of additional equipment, much of it electronic, is being developed to assist the medical practitioner in his treatment of patients. Bioengineering, engineering systems analysis, probability, and communication theory are highly applicable to medical problems. Improved communication techniques also are allowing the storage and retrieval of information not previously available to the medical doctor. An advanced knowledge of basic mathematics and computing techniques, along with increased understanding of physical chemistry, are improving the scientific basis upon which medical knowledge rests. It is therefore desirable that the medical practitioner and researcher in the future be well equipped with the tools which engineering can offer.

An engineering background with a premedicine option is a valuable combination for admission to medical school. There are two equally important goals for the student who plans to enter medical school. The first is acquisition of the knowledge and vocabulary necessary to proceed with the courses at medical school. The second is to become an educated and well-balanced man or woman.

Concerning the first goal, it is clear that without some knowledge of the basic sciences and the ability to formulate thoughts, the student will be unable to profit from the courses at medical school. To provide at least a minimum of the necessary knowledge, the additional courses listed below are prescribed and must be completed with superior grades. General overall requirements for entry into most medical schools are given. Students can meet these requirements by careful substitution of electives in the engineering curriculum. In some cases where additional hours may be required, interested students should consult with the department chairman.

- General chemistry (103-106) 2 sem. (8-10 sem. hrs.)
- Organic chemistry (341, 342, 343, 344) 2 sem. (8-10 sem. hrs.)
- General biology (205-206) 2 sem. (8 sem. hrs.)
- General chemistry (205-206) 1 sem. (8 sem. hrs.)
- English composition 1 sem. (3 sem. hrs.)

The second goal, becoming a well-educated, well-balanced man or woman, is of particular importance. The student entering medical school is confronted with a mass of new knowledge and techniques. These fully occupy his or her time and give little opportunity for the pursuit of the broader aspects of education.

Three features of the university education are stressed here. The first is the possession of an active critical mind—a mind which can discern problems, find out what is known about them, and draw relevant and unprejudiced conclusions from this knowledge. Students will be expected to show a thorough knowledge of chosen subjects and a true understanding of the problems presented and the solutions that have been advanced. Study of courses that will be taken at medical school is strongly discouraged.

Second, a student must acquire understanding of mankind. This is particularly important for the physician whose life is spent in caring for people and whose effectiveness is increased in proportion to the degree of this understanding. The study of man involves a vast number of intellectual disciplines—from anthropology to the arts; from psychology to world history; from political economy to the study or religion—and is properly the study of a lifetime. The student must obtain the foundations of such a study at his university. Present-day developments in the field of medicine suggest that far more people with an engineering background should continue their education and enter the practice of medicine. Whatever the person decides to study, he must be aware of the importance of this study for future effectiveness as a human being.

Finally, a student should carry away from the university a scholarly enthusiasm. Intellectual curiosity and ardent pursuit of truth are prime requisites for knowledge. Without these, neither the individual practice of medicine nor the general understanding of medical science can progress farther.
The School of Medicine requires no set courses for the second and third features of the university education beyond those required by the student’s college or university, but it stresses their great importance. To complete this program in the College of Engineering and Applied Science, it is strongly recommended that the student follow a full four-year college course (with the equivalent of at least 136 semester hours) and earn a B.S. degree. It would be possible for a student who applied himself with unusual vigor to prepare for medical school in three years. In such cases, a minimum of 15 semester hours should be devoted to a major field of learning, instead of the 30 hours required for the four-year student. This student, of course, will not receive a degree in the premedical field. The study and practice of medicine require persistent hard effort, and so should the premedical education.

The Admissions Committee of the University of Colorado School of Medicine welcomes inquiries and visits from prospective students, particularly at the time of their first interest in medicine as their chosen profession. Students desiring to enter a premedical program should consult the representative of the department involved. At UCD, premedical advising is available through the Health Sciences Committee, Room 508.

GRADUATE STUDY IN ENGINEERING

The College of Engineering and Applied Science at UCD offers complete M.S. degree programs in civil engineering, electrical engineering, and applied mathematics. Graduate courses in other fields are also offered. For information regarding courses and requirements leading to the degrees Master of Engineering and Master of Science or to the Ph.D. degree, see the Graduate School Bulletin and the Graduate School section of this bulletin.

Education for Employed Professional Engineers

Continuing education for employed engineers grows more important each year. Therefore, the college puts great emphasis upon making graduate courses available through night and televised courses. A new degree, the Master of Engineering, permits graduate students more flexibility in defining specialized interdisciplinary fields that meet their professional needs. This degree has standards fully equivalent to those of the Master of Science degree.

In addition to credit course work, the college works jointly with the Division of Continuing Education to offer noncredit courses of interest to practicing engineers.

Concurrent B.S. and M.S. Degree Program in Engineering

Students who plan to continue in the Graduate School after completing the requirements for the B.S. degree may apply for admission to the concurrent degree program through their department early in the second semester of their junior year (after completion of at least 84 semester hours). Requirements are the same as for the two degrees taken separately: 136 credit hours for the B.S. degree and 24 hours plus thesis (Plan I) or 30 credit hours (Plan II) for the M.S. degree. Social-humanistic requirements must be completed within the first 136 credit hours. A 3.0 grade-point average for all work attempted through the first six semesters (at least 96 credit hours) and written recommendations from at least two major-field faculty members are required.

The purpose of the concurrent degree program is to allow the student who qualifies for graduate study and expects to continue for an advanced degree to plan his graduate program from the beginning of the senior year rather than from the first year of graduate study. The student can then reach the degree of proficiency required to begin research at an earlier time, and can make better and fuller use of courses offered in alternate years.

The student will be assigned a faculty adviser to help him develop the program best suited to his particular interests. Those in the program will be encouraged to pursue independent study on research problems or in areas of specialization where no formal courses are offered. A liberal substitution policy will be followed for courses normally required in the last year of the undergraduate curriculum. The program selected must be planned so that the student may qualify for the B.S. degree after completing the credit-hour requirements for the degree if the student so elects, or if the student’s grade-point average falls below the 3.0 required to remain in the program. In this case, all hours completed with a passing grade while in the program will count toward fulfilling the normal requirements for the B.S. degree. There will be no credit given toward a graduate degree for courses applied to the B.S. degree requirements; however, students are still eligible to apply for admission to the Graduate School under the rules set forth in the Graduate School Bulletin. Normally, however, the student will apply for admission to the Graduate School when at least 130 of the 136 credit hours required for the B.S. degree have been completed, and will be awarded the B.S. and M.S. degrees simultaneously upon meeting the requirements set forth for the concurrent degree program.

Graduate Work in Business

Undergraduates in engineering who intend to pursue graduate study in business may complete some of the business background requirements as electives in their undergraduate programs. Seniors in engineering who have such intentions and appear likely to qualify for admission to graduate study in business will be permitted to register for any of the graduate fundamentals courses which are designed to provide qualified students with needed background preparation in business.

Major Departments

AEROSPACE ENGINEERING SCIENCES

The primary objective of the aerospace engineering sciences curriculum is to provide sound general training in subjects fundamental to the practice of and research in this branch of engineering sciences. The major part of the first three years is devoted to the study of mathematics, physics, mechanics, chemistry, and the humanities. The fourth year is devoted to the professional courses in the fields of physics of fluids (fluid dynamics); propulsion and energy conversion; flight dynamics, control, and guidance; space system analysis; materials and structural mechanics; space environment; and bio-engineering.

Planning of graduate study for students having sufficient ability and interest should begin by the start of the junior year. Such a plan should consider the foreign language requirements of appropriate graduate schools, and an advanced mathematics program included in technical electives consisting of Math. 431-432 and Math. 481 or 443.

The minimum total number of semester hours for the B.S. degree is 136. Students who wish to combine the business and aerospace engineering sciences curricula are advised to consider obtaining the B.S. degree in aerospace and the M.S. degree in business rather than a combined
B.S. degree. Business courses may not be substituted for technical electives in the aerospace curriculum.

**Transfer to Boulder**

The complete aerospace engineering sciences program is not available at UCD. Therefore, students wishing to complete this program should plan on transferring to the Boulder Campus at the start of the junior year. The complete curriculum degree requirements, and descriptions of courses may be found in the College of Engineering and Applied Science Bulletin.

**Curriculum for B.S. (Aerospace Engineering Sciences)**

The minimum total number of hours for the degree is 136.

### FRESHMAN YEAR

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Semester Hours</th>
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<tr>
<td>Math. 140. Analytic Geometry and Calculus I ..................</td>
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<tr>
<td>E.Phys. 111. General Physics ..................</td>
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<td>Engl. 258. Great Books I (See note 1.) ..................</td>
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<tbody>
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<td>Math. 241. Analytic Geometry and Calculus II ..................</td>
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<td>E.Phys. 112. General Physics ..................</td>
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<tr>
<td>E.Phys. 114. Experimental Physics ..................</td>
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</tr>
<tr>
<td>Engl. 259. Great Books II (See note 1.) ..................</td>
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### SOPHOMORE YEAR

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<td>Math. 319. Applied Linear Algebra ..................</td>
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<td>C.E. 212. Analytical Mechanics I ..................</td>
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<td>Engl. 260. Great Books III (See note 1.) ..................</td>
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<td>E.Phys. 213. General Physics ..................</td>
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<td>E.Phys. 215. Experimental Physics ..................</td>
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<tbody>
<tr>
<td>Math. 443. Ordinary Differential Equations ..................</td>
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<td>E.E. 201. Introduction to Computing ..................</td>
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<tr>
<td>C.E. 213. Analytical Mechanics II ..................</td>
<td>3</td>
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<tr>
<td>Engl. 261. Great Books IV (See note 1.) ..................</td>
<td>3</td>
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<tr>
<td>Engr. 101. Thermodynamics ..................</td>
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<td>Chem. 202. General Chemistry (See note 3.) ..................</td>
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**Notes for B.S. (Aerospace Engineering)**

1. For other options in English, see the English listings in the College of Liberal Arts and Sciences section of this bulletin.
2. Students may take electives pass/fail, subject to the regulations of the College of Engineering and Applied Science.
3. Or Chem. 103, or Ch.E. 210.

**APPLIED MATHEMATICS**

CHARLES I. SHERRILL, Coordinator

The Division of Natural and Physical Sciences in the College of Liberal Arts and Sciences offers all courses in mathematics, both required and elective, for undergraduate and graduate students in the College of Engineering and Applied Science. Three curricula leading to the degree B.S. (A.Math.) are offered. In Option I, the student takes a minor in a specific engineering department, satisfying an adviser from that department. In Option II, the student takes distributed course work in engineering departments, including a solid grounding in mechanics, electronics, and materials. (This option is intended for the above-average student.) Option III is a joint mathematics-computer science program. Regardless of the option chosen, each student is expected to complete a minimum of 45 semester hours of course work in mathematics.

Math. 300 is not a required course for the major. However, students who have done a work in calculus have reported that Math. 300 has proved to be very helpful in subsequent mathematics courses. Therefore, such students are strongly advised to take Math. 300.

Modern industrial and scientific research is so dependent on advanced mathematical concepts that applied mathematicians are needed today by almost all concerns which are engaged in such research.

The undergraduate curriculum is designed to give training in mathematics and in engineering and science. The use of numerical methods and electronic computers is included.

Nontechnical electives should be broadening and have cultural value. Courses in the humanities and the social sciences are required. Students interested in research should take a foreign language as early as possible. Beginning language courses are considered technical electives and do not count toward the social-humanistic electives. Some 300- and 400-level language courses may be counted. Under all circumstances, a student must plan a complete program and obtain the approval of a departmental adviser at the beginning of the sophomore year.

**Description of Courses**

Refer to mathematics in the College of Liberal Arts and Sciences section of this bulletin for complete descriptions of all mathematics courses.

**Curriculum for B.S. (Applied Mathematics)**

The minimum total number of hours for the degree is 136. In addition to E.E. 201, E.D.E.E. 101, and Engr. 301, the student must take a minimum of 18 hours in approved elective engineering courses excluding chemistry, mathematics, and physics courses.

### FRESHMAN YEAR

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<tr>
<th>Fall Semester</th>
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<tr>
<td>Engl. 258. Great Books I (See note 1.) ..................</td>
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<td>E.Phys. 111. General Physics ..................</td>
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<td>E.Phys. 114. Experimental Physics ..................</td>
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<td>Engl. 259. Great Books II (See note 1.) ..................</td>
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<tr>
<td>Engr. 301. Thermodynamics ..................</td>
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<tr>
<td>Approved elective ..................</td>
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### SOPHOMORE YEAR

<table>
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<tr>
<th>Fall Semester</th>
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<tr>
<td>Engl. 260. Great Books III (See note 1.) ..................</td>
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<td>E.Phys. 213. General Physics ..................</td>
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<td>E.Phys. 215. Experimental Physics ..................</td>
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Spring Semester
Engl. 261, Great Books IV (See note 1.) ........................................ 3
Chem. 103, General Chemistry ....................................................... 5
Approved electives ..................................................................... 9
  17
JUNIOR YEAR
Fall Semester
Math. 319, Applied Linear Algebra .................................................. 3
Math. 431, Advanced Calculus I ...................................................... 3
Approved electives .................................................................... 12
  18
Spring Semester
Math. 443, Ordinary Differential Equations .................................... 3
Math. 481, Introduction to Probability Theory ................................ 3
Approved electives .................................................................... 12
  18
SENIOR YEAR
Fall Semester
Approved electives .................................................................... 18
Spring Semester
Approved electives .................................................................... 18

Requirements under each option are as follows:

Option I  Semester Hours
Specialty in a specific engineering department 18-30
Technical electives ................................................................. 15-22
Other electives ........................................................................ 11-30
Required social-humanistic electives (See note 2.) .................. 12
(Electives should include Math. 432.)

Option II  Semester Hours
Distributed engineering courses in the engineering college ............ 18-30
(A minimal program would consist of the following courses:
Aero. 304, Aero. 311, C.E. 212, C.E. 213, E.E. 303, M.E. 301,
or their equivalents. Each of these courses is for 3 hours credit.)
Technical electives .................................................................... 15-22
Other electives ........................................................................... 11-30
Required social-humanistic electives (See note 2.) .................. 12
(Electives should include Math. 432.)

Option III  Semester Hours
Specific courses required under Option III:
E.E. 257 ................................................................................... 3
Aero. 546 (C.S. 546) ................................................................ 3
E.E. 401 (C.S. 401) ................................................................ 3
E.E. 453 (C.S. 453) ................................................................ 3
E.E. 459 (C.S. 459) ................................................................ 3
E.E. 554, 555, or 557 .............................................................. 3
Math. 311 ................................................................................ 3
Math. 465 .............................................................................. 3
Math. 466 ................................................................................ 3
Technical electives .................................................................... 6-22
Other electives ........................................................................... 11-30
Required social-humanistic electives (See note 2.) .................. 12

Notes for B.S. (Applied Mathematics)
1. For other options in English, see the English listings in
   the College of Liberal Arts and Sciences section of this
   bulletin.
2. Students may take social-humanistic electives pass/ fail,
   subject to the regulations of the College of Engineering
   and Applied Science.

Bachelor of Science Degree in
Applied Mathematics

The B.S. degree in applied mathematics requires the
completion of a minimum of 136 credit hours of course
work with an average grade of C or better (a 2.0 grade-
point average) and a grade of C or better in all mathema-
tics courses. Course work in the social-humanistic elective
area must be approved by the student's adviser. Work in
certain other areas may be acceptable toward the social-
humanistic elective requirement, but must first be ap-
proved by the student's adviser. Of the 12 hours required
in the social-humanistic area in addition to the literature
courses, at least 6 hours must be in courses at the 300 level
or higher (see page 0000).

Note: Math. 101, 111, and 112 do not count toward the
B.S. (A.Math.) degree.

ARCHITECTURAL ENGINEERING

JOHN R. MAYS, Coordinator

The architectural engineering curriculum is devised and
administered jointly by the Department of Civil and En-
vironmental Engineering of the College of Engineering and
Applied Science and the College of Environmental Design.
The purpose of the program is to prepare a student for a
career in the building industry and for research at the
graduate level on building-related topics. The building
industry is the largest single industry in the United States
and includes many diverse skills and fields of knowledge.
This course of study fulfills the academic requirements for
registration as a professional engineer.

The architectural engineering curriculum is recom-
manded for those wishing to specialize within the building
industry in engineering design, construction and contract-
ing, or sales engineering. The architectural engineering
student may select any one of three areas of specialization
offered: construction engineering, environmental engineer-
ing, or structural engineering.

Specialization in construction is for students planning a
career in contracting and building construction. This pro-
gram offers courses in construction management, planning
and scheduling techniques, cost accounting, estimating and
pricing, and in building materials and construction
methods.

Those students interested in environmental design may
concentrate their efforts in the fields of illumination and
building electrical systems design, heating-ventilating-air
conditioning systems design, sanitation and water supply,
or acoustics. A broad range of courses covering these
subjects is available.

The third area of specialization is for those who are
interested in the design of structural systems for buildings.
Courses available are structural analysis; indeterminate
structures; and steel, concrete, and timber design, among
others.

The five-year course leading to the combined degree in
architectural engineering and business offers opportunity
for complementing the architectural engineering back-
ground with study in one of the major areas of busi-
ness administration, such as personnel and business man-
agement, marketing, and finance.

The freshman year in architectural engineering is similar
to that for all engineering students. In the sophomore year,
the student is introduced to the functions of the specialty
divisions within the building industry and is provided a
basis for understanding architecture and the relationship
and contribution of architectural engineering to architec-
ture. In addition, there is more advanced work in
mathematics and physics. The junior year is devoted
largely to the engineering sciences with a continuation of
those courses fundamental to understanding architecture
and building. The last year is devoted to engineering
analysis, design, or construction of buildings, the field of
specialization being determined by the student’s choice of
his technical electives. In the senior year, 6 hours of
social-humanistic courses are required as nontechnical
electives.

The junior, senior, and fifth years of the combined
curriculum in architectural engineering and business are

College of Engineering and Applied Science/69
devoted to pursuit of the full requirements for the architectural engineering degrees, as well as the course work necessary to a specific major study area within the College of Business and Administration.

Transfer to Boulder
The complete architectural engineering program is not available at UCD. Students wishing to complete this program should plan to transfer to the Boulder Campus to complete the requirements.

Curriculum for B.S. (Architectural Engineering)
The minimum total number of hours for the degree is 136.

FRESHMAN YEAR

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Semester Hours</th>
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<tbody>
<tr>
<td>Math. 140. Analytic Geometry and Calculus I</td>
<td>3</td>
</tr>
<tr>
<td>Literature elective (See note 1.)</td>
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<tr>
<td>E.Phys. 111. General Physics</td>
<td>4</td>
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<tr>
<td>C.E. 130. Introduction to Civil and Environmental Engineering</td>
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<td>Math. 241. Analytic Geometry and Calculus II</td>
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<td>E.D.E. 102. Fundamentals of Design II</td>
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<td>E.E. 201. Introduction to Computing</td>
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SOPHOMORE YEAR

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<th>Fall Semester</th>
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<tr>
<td>Math. 242. Analytic Geometry and Calculus III</td>
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<td>Math. 319. Applied Linear Algebra</td>
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<td>Social-humanistic elective</td>
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<td>C.E. 212. Analytical Mechanics I</td>
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<tr>
<td>Specialty requirement (structures and construction majors) take C.E. 221; environmental majors take Arch.E. 362.</td>
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<tbody>
<tr>
<td>Math. 443. Ordinary Differential Equations</td>
<td>3</td>
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<tr>
<td>Ch.E. 210. Chemical and Physical Properties of Materials (See note 3.)</td>
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<td>Arch.E. 240. Building Materials and Construction</td>
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<tr>
<td>C.E. 312. Mechanics of Materials</td>
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<td>C.E. 316. Materials Testing Laboratory (not required of environmental majors)</td>
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<td>Social-humanistic elective</td>
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JUNIOR YEAR

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<tr>
<td>C.E. 213. Analytical Mechanics II</td>
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<tr>
<td>Arch.E. 330. Basic Structural Analysis and Design (structures majors substitute C.E. 350.)</td>
<td>3-4</td>
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<tr>
<td>Arch.E. 354. Illumination I</td>
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<tr>
<td>Arch. 320. Architectural Appreciation and Design</td>
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<tbody>
<tr>
<td>Arch.E. 363. Environmental Acoustics</td>
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<td>Arch. 321. Architectural Appreciation and Design</td>
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<td>Engr. 301. Thermodynamics</td>
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<tr>
<td>Technical elective</td>
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<tr>
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SENIOR YEAR

<table>
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<tbody>
<tr>
<td>Arch.E. 441. Construction Costs, Estimating, Pricing</td>
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Arch. 470. History/Philosophy | 3 |
Arch.E. 362. Mechanical Systems for Building (environmental majors substitute technical elective) | 3 |
Social-humanistic elective (construction majors required to take Econ. 201) | 3 |
Specialty requirement (structures—C.E. 456, 457; environmental—technical elective; construction—E.D.E. 351, Engr.Sci. elective) | 5-6 |

Spring Semester

| Arch.E. 470. Applied Structural Design (construction majors substitute Arch.E. 446) | 3 |
| Arch. 471. History/Philosophy | 3 |
| Technical elective | 6 |
| Social-humanistic elective (construction majors required to take Econ. 202) | 3 |
| Specialty requirement (structures—C.E. 458, technical elective; environmental-technical elective; construction—C.E. 497) | 3-4 |

Notes for B.S. (Architectural Engineering)
1. Great Books series recommended; see the English listings in the College of Liberal Arts and Sciences section of this bulletin.
2. E.Phys. 213 and 215 recommended.
3. Chem. 103-5 may be substituted for Ch.E. 210-4, in which case the technical elective requirement is reduced by 1 credit hour.

Courses Available for Specialization
Upon consultation with his adviser, the student must select courses applicable to his areas of interest and specialization. The areas of specialization are construction engineering, environmental engineering, and structural engineering. In addition to the courses listed below, other courses, not listed, may be proposed by a student and approved by his adviser if they are found to be applicable.

Arch. 330-4. Basic Structural Analysis and Design
Arch.E. 446-3. Construction Planning and Scheduling
Arch.E. 455-3. Illumination II
Arch.E. 458-3. Building Electrical Systems Design II
Arch.E. 470-3. Applied Structural Design
Acct. 200-3. Introduction to Financial Accounting
Acct. 202-3. Introduction to Managerial Accounting
B.Ad. 410-3. Business and Government
B.L. 300-3. Business Law
C.E. 221-3. Plane Surveying
C.E. 332-3. Applied Fluid Mechanics
C.E. 350-3. Structural Analysis
C.E. 433-3. Computer Techniques in Engineering
C.E. 456-2. Design of Timber Structures
C.E. 457-3. Design of Steel Structures
C.E. 458-3. Reinforced Concrete Design
C.E. 459-3. Applied Structural Design
C.E. 481-2. Intermediate Soils Engineering
C.E. 497-3. Engineering Economy
Econ. 201-3. Principles of Economics I
Econ. 202-3. Principles of Economics II
E.E. 313-3. Electromagnetic Fields I
E.E. 316-3. Energy Conversion I
E.E. 354-2. Power Laboratory I
E.E. 451-3. Introduction to Probability Theory
E.E. 452-2. Power Laboratory II
E.E. 452-2. Power Systems Laboratory
E.E. 471-2. Power Transmission Laboratory I
E.E. 472-2. Power Transmission Laboratory II
Fin. 305-3. Basic Finance
Fin. 401-3. Business Finance
M.E. 314-2. Measurements I
M.E. 316-2. Measurements II
M.E. 372-3. Systems Analysis II
M.E. 421-3. Air Conditioning
M.E. 424-3. Refrigeration
M.E. 442-3. Mechanical Engineering Laboratory
Mk. 300-3. Principles of Marketing
R.Es. 300-3. Principles of Real Estate Practice


Arch.E. 400-1 to 6. Independent Study.

Arch.E. 441-3. Construction Costs, Estimating, and Prices. Introduction to building construction cost accounting and controls, analysis of direct and indirect cost fundamentals and collecting systems, methods engineering and value engineering. Also included is a study of the types of estimates, quantity take-off techniques and pricing applications, and the preparation of a detailed estimate for a building project including all cost analyses, a complete quantity survey, development of unit prices, and the final assembly of the bid proposal. Prer. Arch.E. 240, senior standing, or consent of instructor.

Arch.E. 446-3. Construction Planning and Scheduling. A comprehensive study of construction management including the contractor's role in pre-construction activities; the construction contract; bonds and insurance; prime and subcontractor; contractor's central office and job organization; plant, tools, and equipment; methods engineering; value engineering; labor relations and hiring; and the particular application of CPM/PERT techniques to the planning, scheduling, and control of a construction project. Prer. Arch.E. 240 and 441, senior standing, or consent of instructor.


CHEMICAL ENGINEERING

WILLIAM C. HUGHES, Coordinator

Meeting the crisis in oil and energy, depolluting the water and air, producing new and better materials to replace those that are limited or scarce—these are jobs in which one will find the chemical engineer.

Chemical plants (including refineries and gasification plants) convert natural resources into industrial and consumer products. Among their products are many that often are not identified with chemical engineering—oils, metals, glass, plastic, rubber, paints, soaps and detergents, foods, beverages, synthetic and natural fibers, nuclear and exotic fuels, medicines, and many others.

The department is very much interested in research directed toward ecologically sound development of chemical processes. It is also working hard on energy problems and is stressing problems of energy conversion in its instructional program.

Many essentials of life originate in chemical engineering. Recycling of wastes and resources is not a new idea in chemical engineering but a long-standing principle. Since the earth now is perceived as a self-renewing system, intelligent generalization of the recycle theory to the entire cycle of natural resources is a challenge and opportunity for chemical engineers. Cleaning up pollution from chemical plants and from most other sources is largely a chemical engineering problem. The chemical engineer efficiently uses and conserves natural resources to create valuable end products and to preserve environmental values.

Thus, chemical engineering continually changes and progresses. The Department of Chemical Engineering therefore helps students to prepare to be immediately valuable to industry and eventually to lead future developments in industry and research. Whether they plan to go into industry or on to graduate work, students are urged to watch, understand, and enjoy the sparkle and interplay of new ideas and new technologies.

Chemical engineering is an ideal premedical course, and a special premedical and bioengineering program is offered. Paralleling the technical courses are studies in literature, social sciences, and humanities.

Each student is offered the opportunity for close and careful counseling by the faculty and by other members of the University community. Several students each year plan programs that will qualify them not only as chemical engineers but also for professional training in medical, law, or business schools or for graduate work in systems engineering or computing science. (The department has its own analog computer and a process-control computer built around a standard digital minicomputer.) In chemical engineering, students may choose combined five-year programs leading to double degrees with chemical engineering and such diverse fields as business, philosophy, or Asian studies. The department believes that, since no two students are alike, no two programs should be alike either.

Transfer to Boulder

The complete chemical engineering program is not available at UCD. Therefore, students wishing to complete this program should plan to transfer to the Boulder Campus at the start of their junior year. The complete curriculum, degree requirements, and descriptions of courses may be found in the College of Engineering and Applied Science Bulletin.

Curriculum for B.S. (Chemical Engineering)

The minimum total number of hours for the degree is 136.

FRESHMAN YEAR

Spring Semester

Math. 140. Analytic Geometry and Calculus I 4
Chem. 103. General Chemistry 3
Engl. 258. Great Books I (See note 1.) 3
Ch.E. 130. Introduction to Chemical Engineering (See note 2.) 2

Fall Semester

Math. 141. Analytic Geometry and Calculus II 4
Chem. 106. General Chemistry 3
Engl. 259. Great Books II (See note 1.) 3

Sophomore Year

Spring Semester

Math. 241. Analytic Geometry and Calculus III 4
Chem. 341. Organic Chemistry 3
Engl. 260. Great Books III (See note 1.) 3
Chem. 343. Organic Chemistry Laboratory I 1
Chem. 319. Applied Linear Algebra 3

College of Engineering and Applied Science/71
Notes for B.S. (Chemical Engineering)

1. For other English options, see the English listings in the College of Liberal Arts and Sciences section of this bulletin.
2. Or C.E. 130 or E.E. 130.

CIVIL AND ENVIRONMENTAL ENGINEERING

ERNEST C. HARRIS, Associate Chairman

Civil and environmental engineering covers the broadest field of engineering generally studied in American universities today. Civil and environmental engineering offers an interesting and highly challenging career to the student interested in the design and construction of buildings, bridges, dams, aqueducts, and other structures; in transportation systems including highways, canals, pipe lines, airports, rapid transit lines, railroads, and harbor facilities; in the transmission of water and the control of rivers; in the development of water resources for urban use, industry, and land reclamation; in the control of water quality through water purification and proper waste treatment; in the construction and contracting industry; and in general in the rapidly expanding problems concerned with man's physical environment and the growth of cities. Furthermore, civil-and-environmental-engineering-educated students frequently find very rewarding employment in other fields: for example, in aerospace structures, electric power generation, city planning, the process industries, industrial engineering, business management and law or medicine (after appropriate education in law or medical school). The breadth of the civil and environmental engineering undergraduate program provides an excellent educational background for many fields of endeavor.

The curriculum is designed to give the student, besides a good background in the humanities, a broad knowledge of the basic engineering sciences of chemistry, mathematics (including differential equations), physics, mechanics (including fluid mechanics and soil mechanics), electrical engineering, and thermodynamics. A minimum of 24 semester hours is allocated to the subject area of social-humanistic studies. These hours may be devoted to literature, the social sciences, or to selected courses in engineering which emphasize the impact of engineering on people and their problems (see page 65).

Specialized training is achieved through certain required courses followed by advanced technical courses which may be elected in the senior year. Random selection of these technical electives is not advisable and in general is not allowed, the objective being to permit a graduate to enter the engineering profession with a firm groundwork in fundamental engineering science and sufficient knowledge in specialized fields to cope intelligently with the technical problems of present-day expanded civil and environmental engineering.

A five-year program has been arranged for those students who wish to pursue the combined curriculum for the civil engineering and business degrees.

A student interested in a premedical option should consult with an advisor and the department chairman at the earliest possible time in order to make proper plans for an acceptable program. See Premedical Option.

Curriculum for B.S. (Civil and Environmental Engineering)

The minimum total number of hours for the degree is 136.

FRESHMAN YEAR

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<td>E. Phys. 111. General Physics</td>
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<td>E.E. 201. Introduction to Computing</td>
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SOPHOMORE YEAR

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<td>C.E. 212. Analytical Mechanics I</td>
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<td>C.E. 221. Plane Surveying</td>
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<td>C.E. 312. Mechanics of Materials</td>
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JUNIOR YEAR

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<td>C.E. 350. Structural Analysis</td>
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<td>C.E. 341. Sanitary Engineering I</td>
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<td>C.E. 360 Transportation Engineering</td>
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<tr>
<td>C.E. 457. Design of Steel Structures</td>
<td>3</td>
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<tr>
<td>C.E. 380. Soils and Foundations Engineering</td>
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SENIOR YEAR

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<td>C.E. 458. Reinforced Concrete Design</td>
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</table>
Notes for B.S. (Civil and Environmental Engineering)

1. Courses from Great Books series recommended; see the English listings in the College of Liberal Arts and Sciences section of this bulletin.
2. E.Phys. 213-3 and 215-1 recommended.
3. Civil and environmental engineering electives shall be chosen to form an integrated program, subject to the approval of the department.
4. Engineering science electives shall be taken from the list of courses approved by the Department of Civil and Environmental Engineering.

C.E. 130-2. Introduction to Civil and Environmental Engineering. A survey of the broad subject area of civil, environmental, and architectural engineering designed to assist the student in selecting his subject area specialty. Prer. or coreq., Math. 242.
C.E. 212-3. Analytical Mechanics I. A vector treatment of force systems and their resultants: equilibrium of frames and machines, including internal forces and three-dimensional configurations; static friction; properties of surfaces, including first and second moments; hydrostatics; minimum potential energy and stability. Prer. or coreq., Math. 242.
C.E. 213-3. Analytical Mechanics II. A vector treatment of dynamics of particles and rigid bodies including rectilinear translation, central-force free and forced vibration, and general motion of particles, kinematics of rigid bodies; the inertia tensor; Euler’s equations of motion; energy and momentum methods for particles, systems of particles, and rigid bodies. Prer., C.E. 212.
C.E. 221-3. Plane Surveying. Observation, analysis, and presentation of basic linear, angular, area, and volume field measurements common to civil engineering endeavor. Prer., Math. 140.
C.E. 312-3. Mechanics of Materials. Mechanical properties of materials; stresses and strains in members subjected to tension, compression, and shear; flexural and shearing stresses in beams; deflections of beams, column analysis, principal stresses, static equivalent load, fatigue. Prer., C.E. 212.
C.E. 316-1. Materials Testing Laboratory. One 3-hr. lab. per wk. Lab. emphasizing mechanical properties of commonly used structural materials, such as steel, aluminum, timber, and concrete, and the testing and research techniques necessary to obtain these properties. Prer. or coreq., C.E. 312.
C.E. 340-2. City Planning. Essential principles of city planning, with particular emphasis on the contribution that can be made by civil engineers. Includes detailed discussion of land use, land use boundaries, transportation, street systems, public buildings, parks and recreation, utility design, and zoning. Prer., junior standing.
C.E. 341-4. Sanitary Engineering I. Elements of hydrology, public water supplies, and sewerage. Elements of hydrology include rainfall-runoff relationships, stream discharge, and ground water. Public water supplies include the study of rates of consumption, quality, source of supplies, methods of treatment and disinfection. Sewerage includes collection, treatment, and disposal of wastes; study of characteristics of sewage; design and operation of storm and sanitary sewers. Prer. or coreq., C.E. 331.
C.E. 359-3. Transportation Engineering. Introduction to the technology, operating characteristics and relative merits of highway, airway, waterway, railroad, pipeline, and conveyor transportation systems. Evaluation of urban transportation systems. Recent transportation system innovations. Prer., C.E. 359.
C.E. 380-3. Soils and Foundations Engineering. Introduction to physical and mechanical properties of soils; seepage, consolidation, shear strength, bearing capacity, lateral earth pressures, stability, and pile behavior, with preliminary analysis of structures affected by soil properties. Prer., C.E. 312 and 331. The latter may be taken concurrently.
C.E. 400-1 to 6. Independent Study.

C.E. 442-4. Municipal Design Projects. Analysis and design of municipal public works, including: street systems; drainage and flood control systems; water collection, treatment, and distribution systems; sewage collection and treatment systems. The interplay between these systems and their correlation with land characteristics and use. Prer., C.E. 340, 341, and 360.
C.E. 449-3. Introduction to Environmental Pollution. A multidisciplinary examination of the problems of environmental pollution. The course focuses particularly on the chemical, social, biological, economic, and engineering aspects of environmental pollution: composition and sources; health and social costs; methods of reduction and control. Open to any nonengineering or engineering student having at least junior standing. Prer., upper division standing.
C.E. 495-1 to 6. Special Topics. This category is intended for special topics which students may wish to pursue on their own initiative, with guidance from a professor who agrees to limited consultation on the work and to award credit when the project is completed.
C.E. 499-2. Engineering Contracts. Law is met by the practicing engineer, types of contracts, specification writing, laws on contracts, agency, partnership, sales, and property, with primary emphasis on rights and duties of the engineer. Prer., senior standing in civil or architectural engineering.

Electives for Qualified Undergraduates

The following graduate courses are open to qualified undergraduates to meet the requirements for technical or professional electives. Description of courses primarily for undergraduates may be found in the Graduate School section of this bulletin and in the Graduate School Bulletin.
C.E. 511-3. Introduction to Structural Dynamics. Introduction to the dynamic response of structural systems, both linear and nonlinear. Prer., consent of instructor.
ELECTRICAL ENGINEERING

WILLIAM D. MURRAY, Associate Chairman

The professional possibilities in electrical engineering include teaching and research in a university; research and development of new electrical or electronic devices, instruments, or products; production and quality-control of electrical products for private industry or government; sales or management for a private firm or branch of government. More specific ways in which modern electrical engineering graduates may use their talents include the following:

1. They might emphasize their logic circuit and computer software training, in which case they would be occupied with the design of electronic computers and with their application to data handling and the solution of engineering problems.

2. If they choose communication theory, the work might involve signal processing of data from biological, seismic, or space probe experiments; or they could work in the design of classical systems such as a radio-telephone link. Their knowledge of communication theory would provide a solid base to study such diverse fields as propagation of information in biological systems or the design of high-speed data links between computers.

3. New opportunities are developing in the area of system modeling for urban and environmental problems and in instrumentation for pollution measurement.

4. Many graduating engineers are interested in electrical devices—in the conversion of the latest scientific discoveries into useful tools or instruments. Engineers now working with lasers exemplify this aspect of the profession.

5. They might choose to go into biomedical electronics. In this field they would be working closely with the medical profession in the design of better measuring instruments, or in the design of more sophisticated prosthetic devices.

6. Alternatively, graduates might be interested in continuing their training in electromagnetic fields. This work would then lead to the study of how radio waves propagate from one point to another on the earth, or perhaps between man-made satellites.

What should the student expect in an electrical engineering course of study at the University of Colorado? A sound background based on the time-tested principles of physics, chemistry, and mathematics forms the core of his lower division work. An early, intensive training in the theory and laboratory application of electrical circuits is followed by more fundamentals in electronic circuits, electromagnetic wave transmission theory, electrical machines and transformers, heat, and mechanics. Many students find an opportunity to put their knowledge to work with jobs in industry or research projects being conducted at the University. The student may also elect courses from a wide variety of subject matter to fit his particular interests. Throughout his entire course of study, he reinforces his understanding of the theory in well-equipped laboratories.

Students are encouraged to develop interests outside of their electrical engineering specialty, thus providing themselves with a well-rounded background and a sense of awareness and responsibility for their later role in society. They are urged to attend meetings of their student professional society, where practicing engineers from many engineering specialties speak of their experiences.

The curriculum is arranged so that transfer students may join the program without appreciable loss of time or credit. For example, a transfer student who has completed the mathematics and physics of the freshman and sophomore years and who has a total of about 68 credit hours acceptable to the department could obtain the degree in four semesters.

The areas of specialization that electrical engineering students may enter upon graduation are so numerous it is impossible for the undergraduate training to cover them in detail. Intense specialization may be left to possible additional training graduates may receive when they assume positions with industrial firms, or acquired by specialization in a research field through graduate work beyond the bachelor’s degree. Students who have earned a B average or better in their undergraduate work and who have elected courses in their senior year that strengthen particularly their mathematical background may decide to take additional graduate work. The curriculum in electrical engineering is designed to make it possible for the graduating senior with high scholarship to finish a master’s degree in electrical engineering in about one additional full year of work at any of the nation’s major universities.

Curriculum for B.S. (Electrical Engineering)

In the standard curriculum the student has considerable freedom in the senior electives. The student may select these electives to provide a good foundation in several of the seven electrical engineering areas listed: communications, digital electronics, fields, materials, power, and systems. Some of these electives may be courses in other branches of engineering or in other colleges. Those students primarily interested in taking courses in the digital or computer area may do so in this curriculum or in the joint E.E. and computer degree option discussed below. If they do not care to take all the courses required in the latter curriculum, they may prefer to use the standard curriculum to specialize in computers.

Combined Business Option

Students wishing to take the combined engineering-business program should not start this program until their fourth year, with the exception of electing Econ. 201 and 202 for two of their social-humanistic electives. Students with a B average may wish to consider obtaining a master’s degree in business administration. For both of these programs, students should refer to the College of Engineering and Applied Science introductory section of this bulletin.

Premedical Option

A program has been developed which permits the student to satisfy the entrance requirements for medical school, such as those of the University of Colorado, while earning a B.S. in electrical engineering.
There are several possible ways of satisfying the medical school requirements of genetics, plus 6 or 8 hours each of biology and organic chemistry.

Students interested in this program should inquire at the departmental office as early as possible, preferably before taking Chem. 103, 202, or equivalent.

Curriculum for B.S. (Electrical Engineering and Computer Science)

The joint degree in electrical engineering and computer science is a comprehensive program covering both hardware and software aspects of computer system design. This program is administered in cooperation with the Department of Computer Science. It is directed to students whose major interests are in the computer itself and in a broad range of applications. The program leads to a B.S. (E.E. and C.S.) and can be extended for one year to obtain an M.S. in computer science or an M.S. in electrical engineering.

A student need not make a decision to enter this program until the second semester of the sophomore year. The details of the program are listed in the section following the normal curriculum. The purpose of the changes is to add to the mathematics background in such a way as to provide a basis for graduate work in computer-related fields and to permit inclusion of courses in scientific application of computers, logic structure of computers, and assembly language programming. The student also will obtain actual operating experience with the departmental computers. Should students leave the program in favor of returning to the standard curriculum, they will need to satisfy the departmental requirements of mechanics and E.E. 354, which have been waived in the E.E. computer option curriculum. For other computer-related programs, see the Graduate School Bulletin.

Curriculum for B.S. (Electrical Engineering)

The minimum total number of hours for the degree is 136.

FRESHMAN YEAR

Fall Semester

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<th>Semester Hours</th>
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<td>General Physics</td>
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<td>E.D.E.E. 101</td>
<td>Fundamentals of Design I</td>
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<td>E.E. 130</td>
<td>Problems and Methods of Modern Electrical</td>
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Spring Semester

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<td>Math. 319</td>
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JUNIOR YEAR

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<td>E.E. 321</td>
<td>Electronics I</td>
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<td>E.E. 381</td>
<td>Introduction to Probability Theory</td>
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Spring Semester

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<td>Energy Conversion I</td>
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<td>E.E. 354</td>
<td>Power Laboratory I</td>
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<td>E.E. 362</td>
<td>Electronics Laboratory II</td>
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<td>C.E. 313</td>
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SENIOR YEAR

Fall Semester

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Spring Semester

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Notes for B.S. (Electrical Engineering)

1. Of the 24 hours of required social-humanistic electives a student must have a minimum of 6 hours in literature and a minimum of 6 hours in social sciences. The electrical engineering department does not require a sequence of two courses in one area (see page 000).

2. For some students, the material in these courses may be a repetition of material covered in high school or through practical experience. If this seems to be the case, the student should request waiver of the course from his adviser prior to or during the first week of the semester in which he is registered for the course.


4. The mechanics requirement may be satisfied by the 3-hour course, C.E. 313, or the 6-hour sequences of either C.E. 212 and C.E. 213, or E.Phys. 221 and E.Phys. 332. Students who first take E.E. 313 may, with permission, take only C.E. 213.

5. The purpose of these electives is to allow the student to develop some breadth in electrical engineering as well as to develop some depth in areas in which he is most likely to concentrate after graduation. Usually these courses will be taken in electrical engineering, mathematics, and physics at the 300, 400, or 500 levels. In all cases the student needs the approval of his undergraduate adviser.

Electrical engineering courses at the 400 and 500 levels are separated into the following seven areas: communications (C), digital (D), electronics (E), fields (F), materials (M), power (P), and systems (S). Seniors are free to elect courses from any of these areas, but in order to insure a minimum breadth of studies, every student's program must include at least 12 semester hours of electrical engineering theory courses in at least three areas and a minimum of three laboratory courses in three areas. These distribution requirements could be met through E.E. 400 (1 to 3), and E.E. 500 (1 to 3), shown in each area, only if the subject matter studied is actually in the appropriate area. E.E. 400 (1 to 3) and E.E. 500 (1 to 3) may be used only once to satisfy part of the distribution requirements.
The student who has good grades and is interested in graduate work should certainly take additional mathematics. Some preliminary consulting with a department graduate adviser is desirable.

Some students, after satisfying their minimum electrical engineering requirements, may wish to use some of their remaining elective hours in areas other than electrical engineering, mathematics, or physics. With the approval of their adviser, they can take additional courses in other departments of the University. One restriction on these electives is that there may be no performance courses such as in music or physical education.

### Curriculum for B.S. in Electrical Engineering and Computer Science

The minimum total number of hours for the degree is 136.

#### FRESHMAN YEAR

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<thead>
<tr>
<th>Semester</th>
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<td>E.Phys. 111. General Physics</td>
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<td>E. E. 130. Problems and Methods of Modern Electrical Engineering</td>
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<td>E.Phys. 114. Experimental Physics</td>
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<td>E. E. 201. Introduction to Computing (or E. E. 210)</td>
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#### SOPHOMORE YEAR

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<td>E. E. 213. Circuit Analysis I</td>
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<td>E. E. 253. Circuits Laboratory I (See note 2.)</td>
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<td>E. E. 257. Logic Circuits</td>
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<td>E. E. 214. Circuit Analysis II</td>
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<td>E. E. 453. Assembly Language Programming</td>
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<td>Chem. 103. General Chemistry (See note 3.)</td>
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#### JUNIOR YEAR

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<td>E. E. 321. Electronics I</td>
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<td>E. E. 361. Electronics Laboratory I</td>
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<td>E. E. 381. Introduction to Probability</td>
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<td>Engr. 301. Thermodynamics</td>
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<td>E. E. 458. Logic Laboratory</td>
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<td>E. E. 401. Introduction to Programming Language and Processors</td>
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<td>E. E. 314. Electromagnetic Fields II</td>
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<td>E. E. 322. Electronics II</td>
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<td>E. E. 362. Electronics Laboratory II</td>
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<td>E. E. 316. Energy Conversion I</td>
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<td>Math. 300. Intro. Abstract Math (See note 4.)</td>
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#### SENIOR YEAR

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<td>E. E. 459. Computer Organization</td>
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<td>Math. 465. Numerical Analysis (See Note 6.)</td>
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<td>Electives (See note 5.)</td>
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**Notes for B.S. in Electrical Engineering and Computer Science**

1. Of the 24 hours of social-humanistic electives a student must have a minimum of 6 hours in literature and a minimum of 6 hours in social sciences. The electrical engineering department does not require a sequence of two courses in one area (see page 0000).

2. For some students, the material in these courses may be a repetition of material covered in high school or through practical experience. If this seems to be the case, the student should request waiver of the course from his adviser prior to or during the first week of the semester in which he is registered for the course.


4. Or equivalent mathematics substitution with approval of adviser.

5. The purpose of these electives is to allow the student to develop some breadth in electrical engineering as well as to develop some depth in areas in which he is most likely to concentrate after graduation. Usually these courses will be taken in electrical engineering, mathematics, and physics at the 300, 400, or 500 levels. In all cases the student needs the approval of his undergraduate adviser.

Electrical engineering courses at the 400 and 500 levels are separated into the following seven areas: communication (C), digital (D), electronics (E), fields (F), materials (M), power (P), and systems (S). Seniors are free to elect courses from any of these areas, but in order to insure a minimum breadth of studies, every student’s program must include at least 12 semester hours of electrical engineering theory courses in at least three areas and a minimum of three laboratory courses in three areas. These distribution requirements could be met through E.E. 400 (1 to 3), and E.E. 500 (1 to 3), shown in each area, only if the subject matter studied is actually in the appropriate area. E.E. 400 (1 to 3), and E.E. 500 (1 to 3) may be used only once to satisfy part of the distribution requirements.

The student who has good grades and is interested in graduate work should certainly take additional mathematics. Some preliminary consulting with a departmental graduate adviser is desirable.

Some students, after satisfying their minimum electrical engineering requirements, may wish to use some of their remaining elective hours in areas other than electrical engineering, mathematics, or physics. With the approval of their adviser, they can take additional courses in other departments of the University. One restriction on these electives is that there may be no performance courses such as in music or physical education.

6. E.E. 455, Computer Techniques in Engineering, may be substituted.
E.E. 130-2. Problems and Methods of Modern Electrical Engineering. Application of engineering approaches to the solution of a variety of problems from electrical engineering and related fields. Translation of engineering problems into mathematical models, and the engineering interrelation of the mathematical results. Approximation techniques. Series expansions and transcendental functions in engineering problems. Problems will include optimization techniques, feedback, resonance, etc. Prereq., algebra and trigonometry.


E.E. 210-4. Fundamentals of Computing I. (C.S. 210.) A first course in computing for those who will specialize in computers. Covers the capabilities of a computer, the elements of a programming language, and the basic techniques for designing algorithms to solve practical problems. The programming language PASCAL is used as a vehicle for expressing these concepts. Three hrs. lect. and one hr. lab. Coreq., Math. 140. (This course is an alternative to E.E./C.S. 201.)


E.E. 257-3. Logic Circuits. The design of combinational and sequential switching circuits. Includes a study of Boolean algebra, minimization techniques, circuit analysis and synthesis, state transition tables, and race conditions.

E.E. 300-1 to 3. Independent Study. An opportunity for students to do independent, creative work. Prereq., consent of instructor.


E.E. 354-2. Power Laboratory I. Basic electro-mechanical energy conversion concepts as applied to the synchronous machine, induction machine, and d.c. machine; armature windings; the transformer. Prereq., E.E. 254; prereq. or coreq., E.E. 316.

E.E. 361-2. Electronics Laboratory I. Experimental investigations of the characteristics of semiconductor devices and their applications. Prereq. or coreq., E.E. 316.


E.E. 400-1 to 3. Independent Study. An opportunity for students to do independent, creative work. Prereq., consent of instructor.

E.E. 401-3. (D) Introduction to Programming Languages and Processors. (E.E. 401.) First course to programmers and digital processors. Conceptual aspects of programming languages, translators, data structures, hardware organization and system architecture. Relationship of language features to processor features. Prereq., E.E. 201.


E.E. 415-3. (S) Nonlinear Control Systems. The analysis and design of nonlinear feedback control systems; types and characteristics of equilibrium states; limit cycle phenomena; the behavior of nonlinearities such as hysteresis, saturation, and dead zone; phase space, describing function analysis. Lyapunov and Popov stability will be introduced. Prereq., E.E. 413.


E.E. 424-3. (C) Communication Theory. Introduction to principles of modern communication theory and signal processing. Random processes will be introduced and used to compare the noise performance of AM, PM, and various digital modulation systems. The effects of noise and channel capacity. Introduction to error correcting codes and further topics in modern communication theory. Prereq., E.E. 381 and 421.

E.E. 432-3. (M) Introduction to Quantum Electronics (Lasers). Introduction to lasers and other quantum electronic devices and to the general quantum principles that govern their operation. No background in the mathematical formalism of quantum theory is required. Discussion of various laser types, applications. Prereq., E.E. 302 or equivalent and 314.

E.E. 450-3. (S) Analog Computer Simulation. (Math. 461.) Analog computing techniques including time and amplitude scaling, programming linear and nonlinear differential equations. Development of theoretical techniques to simulate dynamic systems including an introduction to iterative analog computing. Some laboratory work on an analog computer and with digital simulation languages will be required. Prereq., Math. 443 and 444.


E.E. 453-3. (D) Assembly Language Programming. (C.S. 453.) A laboratory course in programming at the machine language level. Lectures will deal with the operation of the machine, its effect on the order code, and techniques for programming in assembly language. Primary emphasis will be on preparing and running programs. Prereq., E.E. 201.

E.E. 454-2. (S) Controls Laboratory. Introductory experiments on response of control components; open- and closed-loop response of servosystems; simulation of systems on analog computers; design of compensating networks. Prereq. or coreq., E.E. 413.


E.E. 458-1. (D) Logic Circuits Laboratory. Concerned with the actual working of electronic logic circuits and with investigation of the properties and characteristics of those circuits. Circuits will be built from solid state gates and memory elements. Circuits of the type used in digital computers, data processing systems, control systems, and communication systems will be studied. Prereq., E.E. 257.

E.E. 459-3. (D) Computer Organization. (C.S. 459.) This course is concerned with computer arithmetic units, memory systems, control systems, and input-output systems. The emphasis is completely on logic structure rather than electronic circuitry. Prereq., E.E. 257, or equivalent.

E.E. 459-1. (D) Computer Organization. This course includes laboratory experience both with digital computer subsystems and with complete computer systems. The student will construct small subsystems and work with actual subsystems of a full digital computer. Prereq., E.E. 257, 458, 459, or equivalent.

*Not taught every year.
E.E. 463-2. (F) Transmission Laboratory. Experiments with transmission line and waveguide systems, slotted line, bolometer power meter, cavity frequency meter, and crystal detector. The artificial line, time-domain reflectometer, directional coupler, hybrid tee, stub impedance matching, antenna patterns, microwave superheterodyne receiver. Transmission at low frequencies, including 60 Hz. Prereq. E.E. 314.


E.E. 465-2. (C) Communications Laboratory. Laboratory experiments demonstrating and verifying material taught in E.E. 424. Extensive use is made of spectrum analyzers, oscilloscope, center frequency, news, noise, and signal processing in filters, samplers, modulators, converters, and detectors. Topics include AM, FM, PM, and noise. Prereq. or coreq., E.E. 424.


Electives for Qualified Undergraduates
Most 500-level graduate courses are open to qualified undergraduates to meet the requirements for technical or professional electives. Description of these courses and courses primarily for graduates may be found in the Graduate School section of this bulletin and in the Graduate School Bulletin.

To register for 500-level courses, a student must have a B average or consent of the instructor.

ENGINEERING DESIGN AND ECONOMIC EVALUATION

Engineers in today's world of rapidly expanding technology are expected not only to be competent planners and designers of technical devices and systems, but also significant contributors to the betterment of their environment in the social and humanistic sense as well. It is no longer sufficient to build more powerful machines, more useful devices, and more effective controlling systems if the total effect is to deplete man's resources, damage his environment, or contribute to the destruction of his economic welfare. To be effective in his modern role, the engineer, of course, must have a solid background in the natural sciences and mathematics, the engineering sciences, modern economic theory and practice, and current thought in the social sciences and humanities. He also must have opportunities to develop his judgment in the proper application of this background to contemporary problems.

The curriculum in the Department of Engineering Design and Economic Evaluation therefore stresses the importance of educational techniques which furnish opportunities to study in reasonable depth the sciences and mathematics as useful analytical tools. It also begins the expansion of the individual's concepts of the problems of the society in which he serves, and furnishes many opportunities to develop his own abilities as a thoughtful and responsible contributor to the solution of these problems.

Starting in the freshman year and continuing throughout the curriculum, graphical, mathematical, numerical (computer), and physical models are used, first to teach known principles, and ultimately as tools in themselves for the effective conceptualization of new problems. Finding a possible solution to a problem is not enough; sound judgment must be applied in reaching an optimum solution. Many engineering problems are non-numerical in character, and the engineer must learn to manage problems having elements of great uncertainty.

Graduate courses in engineering design and economic evaluation are primarily concerned with the design, improvement, and installation of integrated systems of men, mate-

ECONOMIC EVALUATION

Transfer to Boulder
The complete program in Engineering Design and Economic Evaluation is not available at UCD. Therefore, students wishing to complete this program should plan to transfer to the Boulder Campus at the start of their junior year. The complete curriculum, degree requirements, and descriptions of courses may be found in the College of Engineering and Applied Science Bulletin.

Curriculum for B.S. (Engineering Design and Economic Evaluation)

The minimum total number of hours for the degree is 136.

FRESHMAN YEAR

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<td>E.E. 201. Introduction to Computing</td>
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<td>E.D.E. 130. Introduction to Engineered Systems (See note 1.)</td>
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<td>E.D.E. 222. Introduction to Computer-Aided Design</td>
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Notes for B.S. (Engineering Design and Economic Evaluation)

1. Or any 130 course in engineering.
2. Social-humanistic electives must include a minimum of two literature courses.
3. A minimum of three elective courses must be taken from E.D.E.E. offerings.
5. Or any approved chemistry course of 3 or more hours.

ENGINEERING PHYSICS
WILLIAM R. SIMMONS, Coordinator

The purpose of the curriculum outlined by the Department of Physics and Astrophysics is to give the student a thorough, fundamental training in physics and in the applications of physics. The courses are broad in scope, and the curriculum provides many electives so that a student may supplement his general training in physics by work in other fields.

During the junior and senior years the work in physics is general, yet a thorough training in mathematics and fundamental methods and principles of the physical sciences is stressed. This leads to an appreciation of related fields and their application to engineering practice.

During the junior and senior years work in physics is amplified to conform to the versatility of the physicist’s profession. This leads to a comprehensive knowledge of the various branches of physics such as nuclear physics, atomic physics, electronics, thermodynamics, mechanics, electricity, and magnetism. Individual initiative and resourcefulness are stressed. This general knowledge of the diverse fields of physics is intended to give the student the ability to deal with industrial problems that cannot be solved by a standardized procedure in a specialized field. The training prepares the student for a career in physics where there are many and varied opportunities in development work and industrial research. It is also basic for graduate work in physics and specialized training in research.

It is recommended that students preparing for Graduate School prepare for its foreign language requirement in their undergraduate curriculum.

Applied Physics Option

It is also possible to earn the degree Bachelor of Science (Engineering Physics) with an applied physics option. This option differs from the regular engineering physics degree primarily in the fact that fewer advanced theoretical physics courses are required and in their place a versatile selection of applied science courses is required. This option should not be selected by students intending to pursue graduate study in physics, but it is appropriate for students intending to pursue graduate work or employment in related fields such as geophysics, environmental science, oceanography, nuclear engineering, medicine, and law. Students intending to pursue this option should consult the coordinator by the beginning of their junior year regarding the electives which they wish to propose. The 24 hours of electives in pure or applied natural science must be approved by the engineering physics advising committee. The committee will consider the proposed courses relative to the student’s stated educational and/or professional objectives. At least 30 semester hours of credit must be earned after the student’s proposed program is approved.

Not all of the courses required for the engineering physics program are offered at UCD. Students wishing to complete this program should see the coordinator and plan to complete courses on the Boulder Campus. Course descriptions may be found in the College of Engineering and Applied Science Bulletin and the physics section of this bulletin (see Division of Natural and Physical Sciences).

Curriculum for B.S. (Engineering Physics)

The minimum total number of hours for the degree is 136. Approved ROTC courses may be substituted for a maximum of 6 hours of electives.

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>Fall Semester</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 140. Analytic Geometry and Calculus I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social-humanistic elective (See note 1.)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>E. Phys. 111. General Physics</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
<td></td>
</tr>
</tbody>
</table>

| Spring Semester | | |
|-----------------|----------------|
| Math. 241. Analytic Geometry and Calculus II | 3 |
| Social-humanistic elective (See note 1.) | 3 |
| E. Phys. 112. General Physics | 4 |
| E. Phys. 114. Experimental Physics | 1 |
| E. E. 201. Introduction to Computing | 3 |
| Elective (See note 2.) | 3 |
| **Total** | **17** |

<table>
<thead>
<tr>
<th>SOPHOMORE YEAR</th>
<th>Fall Semester</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 242. Analytic Geometry and Calculus III</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social-humanistic elective (See note 1.)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>E. Phys. 213. General Physics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>E. Phys. 215. Experimental Physics</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Elective (See note 2.)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Math. 319. Applied Linear Algebra</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
<td></td>
</tr>
</tbody>
</table>

| Spring Semester | | |
|-----------------|----------------|
| Math. 443. Ordinary Differential Equations | 3 |
| Chem. 202. General Chemistry (See note 3.) | 4 |
| Social-humanistic elective (See note 1.) | 3 |
| E. Phys. 214. Introductory Modern Physics | 3 |
| Elective (See note 2.) | 3 |
| **Total** | **19** |

<table>
<thead>
<tr>
<th>JUNIOR YEAR</th>
<th>Fall Semester</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper division mathematics elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>E. Phys. 317. Junior Laboratory</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>E. Phys. 331. Principles of Electricity and Magnetism</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Elective (See note 2.)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social-humanistic elective (See note 1.)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
<td></td>
</tr>
</tbody>
</table>

| Spring Semester | | |
|-----------------|----------------|
| E. Phys. 318. Junior Laboratory | 2 |
| E. Phys. 322. Classical Mechanics, Relativity, and Quantum Mechanics | 3 |
| E. Phys. 332. Principles of Electricity and Magnetism | 3 |
| E. Phys. 341. Thermodynamics and Statistical Mechanics | 3 |
| Chem. 453. Physical Chemistry (See note 4.) | 3 |
| Chem. 454. Physical Chemistry Laboratory (See note 4.) | 2 |
| Social-humanistic elective (See note 1.) | 3 |
| **Total** | **19** |

<table>
<thead>
<tr>
<th>SENIOR YEAR</th>
<th>Fall Semester</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E.E. 403. Electronics</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Notes for B.S. (Engineering Physics)

1. A total of 24 hours of social-humanistic electives is required. These must include 6 hours of literature and 6 hours selected from economics, sociology, political science, history, and anthropology. The other 12 hours must be selected from the above subjects and/or fine arts and music (critical or historical only), philosophy, and psychology.

2. Of the 32 hours of electives listed, at least 14 hours must be in engineering courses other than physics or mathematics.

3. Or Chem. 103 and 106.

4. One semester of any upper division chemistry course with associated laboratory may be substituted for physical chemistry.

5. Or Phys. 455, or approved 3-hour physics elective.

Curriculum for B.S. (E.Phys.)—Applied Physics Option

The first five semesters are identical to the regular Engineering Physics Curriculum listed above. The minimum total number of hours for the degree is 136. Approved ROTC courses may be substituted for a maximum of 6 hours of electives.

JUNIOR YEAR

Spring Semester

- E Phys. 322. Classical Mechanics and Quantum Mechanics ..... 3
- E Phys. 342. Principles of Electricity and Magnetism ..... 5
- Elective (See note 2.) ..... 7
- Social-humanistic elective (See note 1.) ..... 3

18

Fall Semester

- E E. 403. Elements of Electronics ..... 3
- E E. 445. Elements of Electronics Laboratory ..... 1
- Elective (See note 2.) ..... 12

18

Notes for B.S. (E.Phys.)—Applied Physics Option

1. A total of 24 hours of social-humanistic electives is required. These must include 6 hours of literature and 6 hours selected from economics, sociology, political science, history, and anthropology. The other 12 hours must be selected from the above subjects and/or fine arts and music (critical or historical only), philosophy, and psychology.

2. The electives in the applied physics curriculum must satisfy the following four conditions: (a) at least 14 hours must be in engineering courses other than physics or mathematics; (b) 5 hours must be from among Phys. 318, 341, 361, 365, 366, 367, 446, 451, 455, 461, 462, 491, 492, 496, 500, 501, 503, 504 and 580; (c) 24 hours must be upper division laboratory courses; (d) 4 hours must be pure or applied natural sciences courses. This group of courses must meet the approval of the engineering physics advising committee, which will consider their relevance to the student's educational and professional objectives. At least 30 semester hours of credit must be earned after the student's proposed program is approved.

MECHANICAL ENGINEERING

GAYLEN A. THURSTON, Coordinator

Mechanical engineering is perhaps the broadest in scope of all the engineering fields. It is not identified with or restricted to a particular technology, vehicle, device, or system; rather, it is concerned with all such subjects, both individually and collectively.

In an era when technology is changing rapidly, the education of an engineer must provide a base for working in fields which may now not exist. The objective of the undergraduate program in mechanical engineering is to give the student a broad intellectual horizon and such habits and skills of study that learning new science as it appears and taking the initiative in applying it will be second nature.

There can be only one firm foundation for the student preparing for a career in mechanical engineering: mathematics, physics, and chemistry are the basic ingredients. Also essential is mastery of such engineering sciences as solid and fluid mechanics; thermodynamics, and heat and mass transport; materials, and systems analysis and controls. Along with the study of these fundamentals, the engineer must experience the ways in which scientific knowledge can be put to use in the development and design of useful devices and processes.

The mechanical engineering program may be roughly subdivided into two-year groupings. In the first two years, the program emphasizes the fundamentals of those engineering sciences that are essential for an understanding of most branches of professional engineering. For the final two years, the department, in recognition of the broad and varied demands which the advances of modern technology have imposed on the mechanical engineer, provides two plans, A and B, for the curriculum leading to the degree Bachelor of Science in mechanical engineering. The plans are designed to accommodate the professional objectives of the individual student.

Plan A specifies a typical mechanical engineering curriculum and is intended for those students who wish to obtain a broad, general education in mechanical engineering without an emphasis on any of the specific professional aspects.

Plan B is designed for students who know what they intend to do upon graduation. This option allows the student to pursue any course plan that meets a valid professional objective and has been approved by the advisory committee. Under Plan B, the specific requirements of the program are determined after a detailed conference with an appropriate departmental adviser. In the course of this conference, the professional objectives of the individual student are studied in detail, and a specific plan (with a minimum of 136 credit hours) is designed to meet these objectives. With liberal use of courses throughout the University, the following may be considered typical among the professional concentrations which can be achieved:
Thermodynamics  | Design  
Heat transfer  | Power  
Fluid mechanics  | Dynamics and controls  
Solid mechanics  | Materials science  
Electromechanical systems

Not all of the courses required for the mechanical engineering program are offered at UCD. Students wishing to pursue this program should plan to complete some courses on the Boulder Campus.

**Curriculum for B.S. (Mechanical Engineering)**

The minimum total number of hours for the degree is 136.

### FRESHMAN YEAR

**Fall Semester**

- Engr. 258. Great Books I (See note 1.) .................. 3
- Math. 140. Analytic Geometry and Calculus I ........... 3
- E.E. 201. Introduction to Computing ....................... 3
- Social-humanistic electives ........................... 6

**Spring Semester**

- Engr. 259. Great Books II (See note 1.) ................. 3
- Math. 111. General Physics ............................. 4
- Math. 241. Analytic Geometry and Calculus II ....... 3
- Social-humanistic elective .......................... 3

### SOPHOMORE YEAR

**Fall Semester**

- M.E. 281. Mechanics I .................................. 3
- Eng. 260. Great Books III (See note 1.) ............... 3
- E. Phys. 112. General Physics ......................... 4
- E. Phys. 213. General Physics ......................... 4

**Spring Semester**

- M.E. 282. Mechanics II ................................. 3
- Eng. 261. Great Books IV (See note 1.) ............... 3
- E. Phys. 213. General Physics ......................... 4
- E. Phys. 215. Experimental Physics .................... 1
- Math. 443. Ordinary Differential Equations ........ 3
- Engr. 301. Thermodynamics .......................... 3

### JUNIOR YEAR

**Fall Semester**

- M.E. 312. Thermodynamics II .......................... 3
- M.E. 314. Measurements I .............................. 2
- M.E. 371. Systems Analysis I .......................... 3
- Chem. 202. General Chemistry ........................ 4

**Spring Semester**

- M.E. 362. Heat Transfer ................................. 3
- M.E. 301. Introduction to Materials Science I ...... 3
- M.E. 316. Measurements II .............................. 2
- M.E. 372. Systems Analysis II .......................... 3
- M.E. 384. Mechanics IV ................................ 4
- M.E. 441. Introduction to Mechanical Engineering Laboratory ........................... 1
- Social-humanistic elective .......................... 3

### SENIOR YEAR

**Fall Semester**

- M.E. 442. Mechanical Engineering Laboratory ........ 3
- M.E. 414. Mechanical Engineering Design ............. 3
- M.E. 401. Introduction to Materials Science II ...... 3
- Technical elective ................................. 6
- Free elective ........................................ 3

**Spring Semester**

- Social-humanistic elective .......................... 3
- Technical electives .................................. 14

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**College of Engineering and Applied Science/81**

**Spring Semester**

- Social-humanistic elective .......................... 3
- Technical electives .................................. 17

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**Notes for B.S. (Mechanical Engineering)**

1. Or other English options; see the English listings in the College of Liberal Arts and Sciences section of this bulletin.

2. Or C.E. 130 or E.E. 130.

- Engr. 301-3. Thermodynamics. Introduction to energy and its transformations, entropy and information theory, states of matter, and statistical mechanics, with engineering application. Prer., Phys. 213 and junior standing, or consent of instructor.

- M.E. 130-2. Introduction to Mechanical Engineering. Introductory survey of statics, mechanics of materials, thermodynamic processes, machine design; emphasis is on engineering approach to problem solving.

- M.E. 195-1 to 3. Special Topics in Mechanical Engineering and Mechanics. Subject matter to be selected from topics of current technological interest. Credit to be arranged.


- M.E. 295-1 to 3. Special Topics in Mechanical Engineering and Mechanics. Subject matter to be selected from topics of current technological interest. Credit to be arranged.

- M.E. 301-3. Introduction to Materials Science I. The development of the physical principles relating the structural features of materials to their observed properties. Prer., E.Phys. 213.


- M.E. 395-1 to 3. Special Topics in Mechanical Engineering and Mechanics. Subject matter to be selected from topics of current technological interest. Credit to be arranged. Prer., consent of instructor.

- M.E. 400-1 to 6. Independent Study. Subjects arranged in consultation with undergraduate advisor to fit needs of the particular student. Prer., senior standing.

- M.E. 401-3. Introduction to Materials Science II. Application of the physical principles controlling the structure-property relationships in ceramics, metals, polymers, and composite materials. Specific properties considered to include mechanical, electrical, and magnetic behavior. Prer., M.E. 301.


- M.E. 416-3. Mechanical Engineering Design II. Individual device development and product development cycles. Topics are presented so that the creative, the quantitative, or a blend may be achieved. The supporting disciplines of analysis, organization, computation, and communication are brought out as they become relevant. The difficulty of
initial creation, organization, decision, and compromise is not minimized. The subject material is organized chronologically so that a project can be started immediately. Prer., M.E. 414.

M.E. 421-3. Air Conditioning. Physical and thermodynamic laws of water vapor and air mixtures; basic principles of heating and ventilating; determination of heating and cooling loads; examination of heating and cooling systems. Prer., M.E. 362.


M.E. 441-1. Introduction to Mechanical Engineering Laboratory. Project selection for M.E. 442, Mechanical Engineering Laboratory. Study of relevant work reported in the literature and the work of previous students, formulation of objective, preparation of oral and written proposal. Prer., M.E. 314 and 316.

M.E. 442-3. Mechanical Engineering Laboratory. Three lab. periods per wk. Approximately 20 percent of semester spent on experience project assignments on conventional equipment; remaining 80 percent on an individual, live, on-going project on which a design or instrumentation change is made. The student carries out all the planning, testing, and reporting necessary to evaluate the change. Prer., M.E. 312 and 316.


M.E. 457-4. Combustion Phenomena. The multiphase fluid equations of motion and actual thermodynamics are used to study a variety of combustion problems. These include droplet and particle combustion, boundary layer combustion, detonation and deflagration wave theory, topics related to internal combustion engines, liquid and solid rockets. Prer., M.E. 312 and 384.

M.E. 461-4. Analytical Methods of Engineering I. Solutions of linear algebraic equations and applications to theory. Topics include matrix analysis, eigenvalue problems, bilinear and quadratic forms, boundary and initial value problems of physics, solution of wave equations by the method of characteristics and applications to elastic wave propagation and supersonic flows. Prer., A.Math. 232, 236, or Math. 319 and 443, or consent of instructor.

M.E. 462-4. Analytical Methods of Engineering II. Boundary and initial value problems of physics. Topics include solution of partial differential equations of physics by the methods of separation of variables; Sturm-Liouville theory; variational principles and applications; Green's functions and applications. Prer., A.Math. 232 or 236 or consent of instructor.

M.E. 471-4. Fluid Mechanics. Viscous incompressible and compressible fluid flows. Topics include derivation of equation governing viscous compressible fluid motion; specialized to simple flows; boundary-layer theory; nozzles and diffusers; transition. Prer., M.E. 384 or consent of instructor.


M.E. 487-4. Rigid-Body Dynamics. Kinematics of a rigid body, principal axes, and moments of inertia, angular momentum of a rigid body, Euler equations. Applications include topics such as motion of a rigid body with a fixed point under no forces, the spinning top, stability of a sleeping top, the gyroscope, motion of a billiard ball, rotating machinery, etc. Prer., M.E. 282 or equivalent.

M.E. 490-1. Senior Seminar. Presentation of broad range of professional opportunities available to graduating seniors. The manner of instruction is by discussions with practicing engineers. Prer., senior standing.


M.E. 495-1 to 3. Special Topics in Mechanical Engineering and Mechanics. Subject matter to be selected from topics of current technological interest. Credit to be arranged.
through applied technical activity to full creative development. He should have a background of secondary education that includes courses in mathematics and physics. Some experience in creative activity may aid him in predetermining his personal satisfaction from the creative process.

UCD Program

The College of Environmental Design at UCD offers three graduate programs: the Master of Architecture, the Master of Architecture in Urban Design, and the Master of Urban and Regional Planning-Community Development. Other undergraduate programs are available only on the Boulder Campus of the University, and students should see the College of Environmental Design Bulletin.

Note: Courses in landscape architecture were offered during 1974-75 and 1975-76. It is anticipated that expansion of this program will begin in fall 1976 and a full program leading to a master’s degree in landscape architecture will be developed during the following years at UCD.

For information about this program write to the Coordinator, Master of Landscape Architecture Program, College of Environmental Design, University of Colorado at Denver, 1100 14th Street, Denver, Colorado 80202.

Financial Aid

Graduate scholarships, fellowships, loans, and teaching assistantships are available to qualified students who demonstrate need. Teaching assistantships are awarded on the basis of the general application materials (application, transcripts, recommendations, and portfolio) and anticipated teaching needs.

A limited number of assistance scholarships of under $1,000 is available. For additional information about scholarships, assistantships, and application forms write the director of the appropriate graduate design program (architecture, urban design, urban and regional planning, landscape architecture), College of Environmental Design, University of Colorado at Denver, 1100 14th Street, Denver, Colorado 80202.

MASTER OF ARCHITECTURE

There are three programs leading to the degree Master of Architecture. The one-year program is open to students with a Bachelor of Architecture degree; the two-year program is available to the student with a Bachelor of Environmental Design or Architectural Studies; and the three-year program is open to students who have a Bachelor of Science or Bachelor of Arts degree in any field.

The Master of Architecture is a professional program based upon a sequential progression of design courses which begin with a small social unit (i.e., family, small group) and progresses to a large-scale design problem that requires major planning considerations (i.e., a college campus, a new ski village, urban redevelopment). Two other major areas are the technological course sequence in structures and environmental systems and the professional courses in office practice, working documents, and internship. Additional courses in planning, landscape architecture, and research methods also are required.

The program has a close alliance with the profession, and every effort is made to involve the student with actual architecture projects and problems through professionals, the Community Design Center, and public or nonprofit organizations. The internship program has been developed to expose students to the range of activities of a professional and to ease the transition from the academic to the professional environment.

One-Year Program

The one-year program is available only to students with a Bachelor of Architecture degree. The Master of Architecture degree is awarded upon satisfactory completion of 32 semester hours and special projects previously agreed upon for the particular candidate’s program. The candidate and his adviser mutually develop his course of study through selection of offerings in the College of Environmental Design and other divisions of the University.

Course Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch. 710-711: Research/Design</td>
<td>14</td>
</tr>
<tr>
<td>Cognate courses</td>
<td>12</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>Total semester hours required</td>
<td>32</td>
</tr>
</tbody>
</table>

Arch. 710 and 711 are course designations for the area of concentration as selected by the student. Options are:

1. Facility Design. Research and design work in design programming, the design process, and the products of architectural design (i.e., housing, educational facilities, and recreational facilities).

2. Man and Environment. The interactions between people and the man-made and natural environment. Man’s physiological, sociological, and psychological relationships to the design environment will be studied.

3. Architectural Technology. Building technology and its interrelationship to architectural design. Structural and environmental control and construction systems and materials may be studied.

4. Design Methods. Systematic methods for decision making in architectural design, such as simulation, gaming, decision theory, computer-aided design, and information systems.

5. History and Preservation. Architectural history and its social relevance as it pertains to renewal, restoration, and the preservation of significant examples of architecture.

Order of Studies (One-Year Program)

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch. 680: Research Methods in Architecture</td>
<td>3</td>
</tr>
<tr>
<td>Arch. 710: Research/Design</td>
<td>7</td>
</tr>
<tr>
<td>Cognate courses</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Semester</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch. 711: Research/Design</td>
<td>7</td>
</tr>
<tr>
<td>Cognate courses</td>
<td>6</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
</tr>
<tr>
<td>Total semester hours required</td>
<td>32</td>
</tr>
</tbody>
</table>

The Option and Research/Design project must be approved by the graduate faculty committee before the student enters the program. The student is asked to submit a statement describing the proposed project with his application. This project may be individual or collaborative, theoretical or real.

Cognate courses are selected with the guidance of the faculty adviser from course offerings in the College of Environmental Design and other departments of the University.

Two-Year Program

For the student with a Bachelor of Environmental Design or Architectural Studies degree who desires a professional degree in architecture, a two-year, 64-semester-hour
program leading to a Master of Architecture degree is offered. Prerequisites for the two-year program are two semesters of architectural history and two semesters of basic structures (statics, strength of materials). These courses may be taken at the University of Colorado after admission to the program if not taken previously.

**Course Requirements**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural design</td>
<td>24</td>
</tr>
<tr>
<td>Environmental systems</td>
<td>10</td>
</tr>
<tr>
<td>Structures</td>
<td>6</td>
</tr>
<tr>
<td>Professional practice, construction drawings, and internship</td>
<td>10</td>
</tr>
<tr>
<td>Allied professions (planning and landscape architecture)</td>
<td>6</td>
</tr>
<tr>
<td>Research methods in architecture</td>
<td>5</td>
</tr>
<tr>
<td>Electives</td>
<td>5</td>
</tr>
</tbody>
</table>

**Order of Studies (Two-Year Program)**

**FIRST YEAR**

**Fall Semester**

- Arch. 600: Design .................................. 5
- Arch. 620: Planning ................................ 3
- Arch. 650: Mechanical Systems .................. 3
- Arch. 651: Steel Structures ...................... 2
- Arch. 630: Landscape Architecture ............. 3

**Spring Semester**

- Arch. 601: Design .................................. 5
- Arch. 651: Illumination and Electrical Systems .. 3
- Arch. 652: Timber Structures .................... 2
- Arch. 655: Acoustics ................................ 1
- Arch. 660: Professional Practice ................. 2
- Arch. 661: Construction Documents ............... 2

**SECOND YEAR**

**Fall Semester**

- Arch. 700: Design .................................. 7
- Arch. 654: Concrete Structures .................. 2
- Arch. 680: Research Methods in Architecture ..... 3
- *Arch. 662: Internship ......................... 3
- Elective ........................................ 2

**Spring Semester**

- Arch. 701: Research/Design ......................... 7
- Arch. 750: Environmental Systems Synthesis .... 3
- *Arch. 662: Internship ......................... 3
- Elective ........................................ 3

**THIRD YEAR**

**Fall Semester**

- Arch. 700: Design .................................. 7
- Arch. 654: Concrete Structures .................. 2
- Arch. 680: Research Methods in Architecture ..... 3
- *Arch. 684: Internship ......................... 3
- Elective ........................................ 2

**Spring Semester**

- Arch. 701: Research/Design ......................... 7
- Arch. 750: Environmental Systems Synthesis .... 3
- *Arch. 685: Internship ......................... 3
- Elective ........................................ 3

**Admission**

In order for a student to be considered for admission into the graduate program, he must submit application forms, transcripts, three recommendations, statement of purpose, and a portfolio of academic and professional work by March 15 preceding the fall semester that he wishes to enter. Application forms and information may be obtained by writing to:

Director of Master of Architecture Program
College of Environmental Design
University of Colorado at Denver
1100 14th Street
Denver, Colorado 80202

**MASTER OF ARCHITECTURE IN URBAN DESIGN**

This curriculum focuses upon the complex problems that are generated by change and growth in a vigorous urban and regional laboratory. Emphasis is given to (a) participatory community and (b) public-funded design, (c) research, and (d) technology. Special efforts are made to

*Optional courses.*
utilize the vast resources of information that are available from federal, state, and local agencies and institutions which are concentrated in the immediate community. Specific courses and projects attempt to incorporate these allied academic, civic, and citizen resources.

The sequential format, content, and progression of the urban design program is purposely parallel to the graduate architectural program with the major exception of the final two semesters. Secondary exceptions in the first part of the three- and two-year sequences are in emphasis and faculty backgrounds. Direct daily contact with students and instructors in the planning and architectural divisions is very important and beneficial.

A specific effort is made in professional practice, internship, and directed elective courses to expose urban design students to broader group-oriented factors in the problem-solving process. Placement of students in combination architecture, urban design, and planning firms is a major consideration in the internship requirements.

In all three sequences, the final year is a synthesis of the special civic scale factors influencing urban design within the four options previously listed. In this phase, the student is carefully advised throughout the course of his independent research and design studies. Opportunities to work in association with the Center for New Towns and Community Design and the Bureau of Community Services (adjuncts of the College of Environmental Design) are available. Many other real problems and/or case studies from the community which require anticipatory and feasibility design and development are also available. Whenever possible, team projects in cooperation with allied disciplines and institutions are encouraged.

One-Year Program

A one-year program leading to the degree Master of Architecture in Urban Design is available to students holding a Bachelor of Architecture degree. The degree is awarded upon satisfactory completion of 32 semester hours.

The program is designed for students who wish to pursue advanced study in architecture with options in the following areas: anticipatory design, technology and research methods, community action design, urban and regional design and development, and health and recreational facilities design.

Course Requirements  

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban design studio</td>
<td>10</td>
</tr>
<tr>
<td>Urban design seminar</td>
<td>4</td>
</tr>
<tr>
<td>Research factors/methods</td>
<td>3</td>
</tr>
<tr>
<td>Planning</td>
<td>6</td>
</tr>
<tr>
<td>Electives (professional)</td>
<td>6</td>
</tr>
<tr>
<td>Independent study</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32</td>
</tr>
</tbody>
</table>

The design studio is the focal point for the area of specialization that is selected by the student, and each project is developed on an independent study basis with meetings, seminars, and evaluations scheduled by the faculty adviser and student. Cognate courses are selected with the guidance of the faculty adviser from related courses offered by the College of Environmental Design or other colleges within the University.

Two-Year Program

A two-year program leading to the degree Master of Architecture in Urban Design is available to students holding a Bachelor of Environmental Design or Bachelor of Architectural Studies degree. The degree is awarded upon satisfactory completion of 64 semester hours. Prerequisites for the two-year program are two semesters of architectural history and two semesters of basic structures (statics, strength of materials, structural analysis). These courses may be taken at UCD after admission to the program if not taken before.

Course Requirements  

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban design studio</td>
<td>20</td>
</tr>
<tr>
<td>Urban design seminar</td>
<td>15</td>
</tr>
<tr>
<td>Technologies</td>
<td>3</td>
</tr>
<tr>
<td>History/philosophy</td>
<td>3</td>
</tr>
<tr>
<td>Research factors/methods</td>
<td>3</td>
</tr>
<tr>
<td>Professional administration and internship</td>
<td>10</td>
</tr>
<tr>
<td>Planning</td>
<td>6</td>
</tr>
<tr>
<td>Electives (professional)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>64</td>
</tr>
</tbody>
</table>

Three-Year Program

A three-year program leading to the degree Master of Architecture in Urban Design is available to students who hold a B.S. or B.A. degree in any field. The degree is awarded upon satisfactory completion of 96 semester credit hours. Additional prerequisites or prerequisites are one year of college or high school physics and college math through beginning calculus. Also required is a brief portfolio showing creative work—designs, inventions, drawings, paintings, sculpture, photographs, and writings.

Course Requirements  

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban design studio</td>
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</tr>
<tr>
<td>Urban design seminar</td>
<td>4</td>
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<tr>
<td>Technologies</td>
<td>25</td>
</tr>
<tr>
<td>History/philosophy</td>
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<tr>
<td>Graphics</td>
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<td>Research factors/methods</td>
<td>3</td>
</tr>
<tr>
<td>Professional administration and internship</td>
<td>20</td>
</tr>
<tr>
<td>Planning</td>
<td>6</td>
</tr>
<tr>
<td>Electives (professional)</td>
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</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>96</td>
</tr>
</tbody>
</table>

Admission

In order for a student to be considered for admission into the graduate program, he must submit application forms, college transcripts, three recommendations, statement of purpose, and a portfolio of academic and professional work by April 15 preceding the fall semester that he wishes to enter. Application form and information may be obtained by writing to:

Director of Master of Architecture in Urban Design Program
College of Environmental Design
University of Colorado at Denver
1100 14th Street
Denver, Colorado 80202

MASTER OF URBAN AND REGIONAL PLANNING-COMMUNITY DEVELOPMENT

The MURP-CD program prepares planners to research, design, and evaluate the ends and means of social and environmental action. Careers in planning usually center in such growing fields as environmental design, community development, social services, natural resources, ecology, planning consultation, environmental assessment, urban renewal, and regional planning. Because Denver is the Rocky Mountain region's central location for managing these fields of action, UCD planning students are able to combine easily the general principles of academic learning with practical experience in nearby operating agencies and organizations.

Curriculum

The curriculum requires 48 semester hours as a minimum for graduation. Thirty of these semester hours
are required "core" courses aimed at training the student in basic planning principles, content, research methods, and plan/policy making skills. Of these 30 required credits, 6 are spent in "experiential learning" and internships with public agencies and other organizations.

Another 15 credit hours of the curriculum are elective. They are chosen in consultation with the student's faculty adviser to form a consistent pattern of planning expertise along the lines of the individual's major interests. The courses may be chosen from the MURP-CD's own "core electives," from other programs in the College of Environmental Design or from other graduate colleges at UCD. Typical areas of specialization have been ecology, transportation, planning administration, community development, urban design, and health planning.

The final curriculum requirement is the satisfactory completion, in the student's last semester, of an in-depth planning study or project. The aim is to illustrate the individual's ability to integrate and apply the knowledge and experience gained in the program. It may take the form of a traditional master's degree thesis, an extended policy research paper, or a major planning laboratory project.

Admission

In order for a student to be considered for admission into the program, application forms must be submitted by April 15 for the fall semester. Entry into the program at other times is not normally permitted. Applications for admission are reviewed by a faculty-student committee. Criteria for admission consist of academic performance, experience, interest, and motivation for study.

Candidates for admission should note that there are three prerequisite courses which must have been taken prior to entry, or made up as nondegree credit courses during the time at UCD. These are local and state government, basic statistics, and a course in mapping and graphics. Application forms and information may be obtained by writing to:

Director of Urban and Regional Planning-Community Development Program
University of Colorado at Denver
1100 14th Street
Denver, Colorado 80202

Course Descriptions

ARCHITECTURE

Design-Architecture

Arch. 500-5. Architectural Design. One lect. and three studio periods per wk. Scope of study expands in scale from a small social unit to a subcommunity. User needs and activities, climate, structural systems and materials, human and vehicular circulation, legal requirements (zoning, building codes, etc.), change, site planning and development, public health and safety, utilities and services, and costs. Includes problem definition, analysis, synthesis, and evaluations.

Arch. 600-5, 601-5. Architectural Design. Three studio-seminar periods per wk. The investigation and design of a building complex and the integration of the environmental and structural systems in the design of a building. The building complex design deals with site planning and development to accommodate the building considering the constraints of site surroundings, climate, codes and ordinances, utilities, on- and off-site human and vehicular circulation; threedimensional integration of the building and spaces; development of a single building of the complex in detail. The integration of environmental and structural systems utilizes a medium- to high-rise building as a design vehicle. Involves space planning for various heating, ventilating and air-conditioning systems, vertical transportation, plumbing and water supply, and electrical service systems as well as site development, economic considerations, and building form.

Arch. 700-7, 701-7. Architectural Research/Design. Five studio-seminar periods per wk. The first course deals with a large-scale design problem that requires major planning considerations and attempts to integrate the previous courses in design and content study into the design process. Design problems used are usually actual or proposed and have real sites requiring the student to develop thorough research techniques. During the second semester the student pursues a design study of his or her choice. Options are facility design, design methods, architectural technology, architectural history and preservation, and man and environment.

Arch. 710-7, 711-7. Research/Design. Advanced study and research in an area of major professional interest to the student. Areas of emphasis are (1) facility design—research and design work in design programming, the design process, and the products of architectural design (i.e., housing, educational facilities, recreational facilities); (2) design methods—systematic methods of decision making in architectural design such as computer-aided design, simulation, gaming, decision theory, and information systems; (3) architectural technology—exploration of building technology and its relationship to architectural design; (4) architectural history and preservation—history and its social relevance as it pertains to renewal, restoration, and the preservation of significant examples of architecture; (5) man and environment—investigation of interaction between people and the man-made and natural environment. Man's physiological, sociological, and psychological relationships to the design environment are studied.

Graphics

Arch. 410-3, 411-3. Architectural Graphics I and II. Two studio periods per wk. Visual communication techniques using various black and white and color media for architectural design and presentation. Perspective drawing, free-hand sketching, two-dimensional plan and section drawing, and model construction are covered.

Technologies

Arch. 450-3. Environmental Systems. Two lect. and one lab. per wk. Fundamental systems consideration of water supply, management and treatment; waste water, treatment and reuse; power supply and consumption, transportation, and land use planning.

Arch. 551-3. Materials and Methods of Construction. Two lect. and one field trip or lab. per wk. Study of materials and components for construction. Construction methods and techniques for residential and commercial buildings.

Arch. 552-2, 553-2. Structures I and II. Two lect. per wk. Analysis of basic structural systems (statics and strength of materials).

Arch. 650-3. Mechanical Systems. Three lect. per wk. Specific building systems study, including water supply systems; sanitation systems; principles and applied design of heating, ventilating, and air conditioning.

Arch. 651-3. Illumination and Electrical Systems. Two lect. per wk. Specific building systems study, including basic principles of electricity, quantity and quality of illumination, light sources and characteristics, lighting and design and application, and electrical wiring design.


Arch. 653-2. Steel Structures. Two lect. per wk. Design of structural steel for buildings: beams, columns, trusses, rigid frames, and connections.


Arch. 750-3. Systems Synthesis. A synthesis of the preceding systems and structure courses. The student will perform the structural frame design and select and detail the mechanical and electrical systems of a specific building.


Professional Practice

Arch. 660-2. Professional Practice. Two lect. per wk. Ethics, management, documents, organization, and production procedures of a professional practice.

Arch. 661-2. Construction Documents. One lect. and two studio periods per wk. Preparation of working drawings and specifications for a small building.
Arch. 663-3, 664-3. Internship. Eight hours per wk. Work in a practicing professional’s office during the regular semester. The student is placed in an office by the college and receives academic credit instead of pay.

Planning

Arch. 620-3. Planning. Two lect. per wk. The integration of architecture and city and regional planning. Basic influences in the development of cities. Accepted practice in zoning, transportation, housing, land use, economics, social, and aesthetic factors leading to urbanization.

Landscape Architecture

Arch. 630-3. Landscape Architecture. Two lect. and one studio period per wk. Plant materials and basic principles of landscape design related to site planning and development.

History/Philosophy

Arch. 470-3, 471-3. History/Philosophy I and II. See Urban Design 470, 471.
Arch. 572-3. Designer Philosophy Seminar. An examination of the philosophies of a selected group of designers and the contributions generated by those philosophies.

Additional Courses and Special Problems

Arch. 590-1 to 3, 591-1 to 3. Special Problems. Studies initiated by students or faculty and sponsored by a faculty member to investigate a special topic or problem related to architecture. Arch. 680-3. Research Methods in Architecture. Developing research and design methods appropriate to architecture, including computer-aided design, gaming, simulation, decision theory, and information systems.

URBAN DESIGN

U.D. 450-3, 451-3. Urban Design Systems I and II. First of a series planned to acquaint students of architecture, urban design, and planning with the man-made systems which alter or supplement the natural environment. The year sequence includes water supply, waste water, power, transportation, land use planning. Scale is regional.
U.D. 470-3, 471-3. Urban Design History/Philosophy I and II. Three lect. hours per wk. Research and discussion of historical (U.D. 470, before 1600; U.D. 471, after 1600) and contemporary architecture, urban design, and planning. Particular attention is directed toward individual and communal sociological and economic philosophies and their role in the design of man-made urban and regional environments.
U.D. 540-3. Basic Ecology of Environmental Impact Statements. (Same as U.P.C.D. 540.) Individual case studies that determine site environmental resources. An inventory and analysis of spatial, physical, biological, and sociocultural assets and liabilities for particular urban and regional locations and activities.
U.D. 600-5, 601-5. Urban Design Studio. See Arch. 600, 601.
U.D. 663-2, 664-2. Internship. See Arch. 663, 664.
U.D. 700-5, 701-5. Urban Design Studio. A study of advanced architectural, urban design, and planning problems which integrate large-scale organization and communication concepts of society. The program includes design studio and/or community action center study options and choice of problems. A series of studies of particular aspects of urban design, with emphasis on economic, social, and political determinants. Topics include the design, implementation, and evaluation of urban residential sectors, urban cores, institutional areas, and circulation systems. U.D. 701 is a continuation of U.D. 700 with emphasis upon implementation techniques, use of research methods within the design process, and evaluation techniques.
U.D. 720-2, 721-2. Urban Design Seminar. An outline of the history and theories of urban design, including case studies in urban design, urban planning, new towns, and urban renewal projects. Special emphasis will be the CBD and its adjacent areas, Denver and Colorado (720). The inner city outside Colorado: past, present and future (721).

URBAN AND REGIONAL PLANNING—COMMUNITY DEVELOPMENT

U.P.C.D. 500-3. Introduction to Planning and Community Development. A basic review of the history of planning and urban areas. Theories of community and regional planning, basic techniques, changing philosophies of planning in modern society, and the process of community development.
U.P.C.D. 506-3. Community Development Methodology. Provides the student with exposure to methods of achieving planned change in both neighborhoods and communities through classroom work and field and laboratory exercises.
U.P.C.D. 510-3. Planning Graphics. An introduction to mapping, aerial interpretation, and graphics for the student who is deficient in these basic background areas.
U.P.C.D. 512-3. The Modern Metropolis. Provides a basic background in the structure and dynamics of the modern metropolis. Includes a review of the historical background of the metropolis; and analysis of its economic, social and political components; and a consideration of various interpretations of its role in modern society.
U.P.C.D. 546-3. Regional Analysis Methodology. Acquaints the student with the concept of the planning region as well as with techniques for analyzing the region. Demographic, economic, social and historical methods are used.
U.P.C.D. 547-3. Regional Planning. Discusses the unique aspects of planning at regional levels. Reviews the various types of regional planning activities that have taken place in the United States and other parts of the world.
U.P.C.D. 550-3. Physical Systems of Urbanization. Provides basic knowledge of the physical systems that exist within an urban environment. Topics covered include water supply, waste disposal, transportation, and energy systems.
U.P.C.D. 560-3. Theory and Philosophy of Planned Change. Describes and critically evaluates contemporary theories and ideologies of the planning process and planned change. Aids the student to develop his own powers of critical theoretical analysis and his own positions on what planning is and ought to be.
U.P.C.D. 570-3. Basic Planning Analyses. Teaches the basic analyses that are used in the comprehensive planning process. General theoretical understandings, specific analytical methods and techniques, and available data sources are discussed in regard to economics, demography, urban activities, physical structures, and land and natural features.
U.P.C.D. 571-3. Advanced Planning Analyses. Covers the more advanced methods and techniques which have been considered for and/or applied to the planning process. Included is a review of urban development models, cost-benefit analysis, general systems analysis, decision-making techniques, linear programming, and advanced statistical methods.
U.P.C.D. 615-3. Development of Environmental Form. Describes and evaluates the history and present developments of the man-made environment. Western culture's town-planning traditions, American planning history, and selected schools of modern environmental design thought. Special attention is given to linking major traditions and trends with environmental design in the development of the Denver metropolitan area.
U.P.C.D. 641-3. Social Policy Analysis and Application. A critical review of the evaluation of national, state, and local social policies with an emphasis on current social issues and programs. Special attention is given
to the application of techniques and procedures of policy analysis to community and regional systems.

**U.P.C.D. 680-variable credit. Experiential Learning.** Laboratory and internship. A series of designed and programmed experiences dealing with the particular aspects of urban planning and community development with emphasis on the interpersonal, group process, and organizational dimensions, together with real life experiences in the professional arena.

**U.P.C.D. 692-variable credit. Independent Study.** Permits the student to pursue independent research in a subject area of special interest. Advance approval by faculty adviser is required.

**U.P.C.D. 700-3. Master’s Thesis.**

**U.P.C.D. 710-3. Urban Problems and Issues.** A seminar which enables the student to engage in advanced study and original research with regard to selected urban problems and issues.

**U.P.C.D. 711-3. Politics and Planning.** A seminar designed to expose the student to the realistic political facts ever present in the planning process and to prepare the individual to deal effectively with governmental operation at all levels of his professional career.

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**College of Music**

ROY PRITTS, Acting Assistant Dean

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**INFORMATION ABOUT THE COLLEGE**

The music program at UCD is growing rapidly. Emphasis is on preparing students for professional careers in music relating to the recording, broadcasting, film, and entertainment industries. The College of Music is approved by the National Association of Schools of Music to offer a variety of baccalaureate and postbaccalaureate degrees. While most of this work is now offered only on the Boulder Campus, the University of Colorado has recently approved a new degree, Bachelor of Science in Music and Media, for which all work can be completed at UCD.

**REQUIREMENTS FOR ADMISSION**

In addition to the entrance requirements of the University outlined in the General Information section of this bulletin, the entering student must meet the following requirements of the College of Music:

**Required High School Units**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
</tr>
<tr>
<td>Foreign language</td>
<td>8</td>
</tr>
<tr>
<td>Social science</td>
<td></td>
</tr>
<tr>
<td>Physical science</td>
<td></td>
</tr>
<tr>
<td>Theoretical music</td>
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<tr>
<td>Additional high school units</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
</tr>
</tbody>
</table>

It is expected that all students will have had previous experience as performers. Two years of piano study are recommended.

The College of Music requires an audition of all entering freshmen and undergraduate transfer students. In lieu of the personal audition, applicants may substitute tape recordings (about five minutes in length at 7½ ips) or a statement of excellence from a qualified teacher. Interested students should write to the College of Music, UCD, for audition or interview applications.

**ENSEMBLES**

Music and nonmusic majors are invited to audition for any of the UCD music ensembles. Each carries 1 semester hour credit. Some of these groups have more than one section, depending upon skill level: Electronic Music Ensemble, Jazz Ensemble, The New Singers, Wind Ensemble, String Ensemble, Chamber Music (various), Percussion Ensemble, American Media Orchestra, and Jazz-Rock groups.

**American Media Orchestra**

This ensemble utilizes the resources of UCD’s visiting faculty program to showcase compositions, soloists, and experimental media by noted active professionals. Artistic director of the orchestra is Mr. Pat Williams.

**APPLIED MUSIC POLICY**

All performance standards, requirements, and credits specified for a particular music degree in the college do not necessarily transfer and become acceptable for any other music degree within the college. Additional information on this policy is available from the Office of the Assistant Dean, UCD College of Music.

**GRADUATE STUDY**

For information on graduate studies in music see the Graduate School section of this bulletin.

**BACHELOR OF SCIENCE IN MUSIC AND MEDIA**

This degree is unique in Colorado and is intended for students seeking preparation for professional careers in music related to the recording, broadcasting, film, and entertainment industries.

**Core Curriculum**

This work is to be started in the student’s freshman year and a large portion of it can be completed by the end of the sophomore year.

**Required Courses in Music**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hours</th>
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</thead>
<tbody>
<tr>
<td>Music 100.</td>
<td>Theory and Musicianship I</td>
<td>3</td>
</tr>
<tr>
<td>Music 101.</td>
<td>Theory and Musicianship II</td>
<td>4</td>
</tr>
<tr>
<td>Music 200.</td>
<td>Theory/Musicianship II</td>
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</tr>
<tr>
<td>Music 207.</td>
<td>Instrumentation I</td>
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<tr>
<td>Music 180,</td>
<td>181, Introduction to Music</td>
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<tr>
<td>Music 380,</td>
<td>381, History and Literature of Music</td>
<td>6</td>
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<tr>
<td>Music 354.</td>
<td>Sound Reinforcement and Recording I</td>
<td>3</td>
</tr>
<tr>
<td>Music 456.</td>
<td>Electronic Music I</td>
<td>3</td>
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<tr>
<td>Applied Music</td>
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<tr>
<td>Ensembles</td>
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<tr>
<td>Functional piano</td>
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<td>Total</td>
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</tr>
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</table>
Areas of Concentration

When students are approaching completion of studies in the core curriculum, they are to select an area of concentration, in consultation with an adviser and with the approval of the assistant dean. A minimum of 18 credit hours in one area of concentration is to be selected from the following:

**Scoring and Arranging**
- Music 406 or 407. Analysis I or II .............................................. 2
- Music 401 or 402. Counterpoint .................................................. 2
- Music 403 or 405. Instrumentation II or Scoring and Arranging .......... 2
- Music 305 and 420. Composition .................................................. 4
- Music electives ................................................................................ 8

**Sound Synthesis and Recording**
- Music 355. Sound Reinforcement and Recording II .......................... 3
- Music 457. Electronic Music II ....................................................... 3
- Music 433. Computer Music .......................................................... 3
- Sound Measurement and Noise Control recommended .................... 3-7
- Applied study and field work ......................................................... 6-8

**Communication and Theatre**
- C.T. 273. Stage Movement ............................................................ 2
- C.T. 276. Stagecraft ......................................................................... 3
- C.T. 460. Radio-TV Station Organization and Operation .............. 3
- C.T. 362. Television Production ..................................................... 3
- Electives and/or field work in communication or theatre ............... 7

**Business and Administration**
- Econ. 201, 202. Principles of Economics ......................................... 6
- Mk. 300. Principles of Marketing ...................................................... 3
- Org. B. 300. Introduction to Management and Organization ............ 3
- Electives and/or field work in business ........................................... 4-6

**Applied Music (Concentration)**
- Applied study (three semesters) .................................................... 6
- Repertoire project ............................................................................ 2
- Music 328. Contemporary Improvisation .................................... 2
- Ensembles ......................................................................................... 2
- Recital ............................................................................................... 0
- Electives in music (other than applied or ensemble) ......................... 6
- Also required: 12 credits in electives (from any area).

**Performance Requirement**

Students are required to include applied music study of their principal performing medium (instrument or voice) from the outset of their studies at UCD, continuing throughout their residency. Prior to graduation, students are required to pass an examination of their performance proficiency.

**Ensemble Requirement**

Students are expected to participate in ensembles throughout their residency. They should acquire experience in both large and small ensembles, vocal and instrumental, in accordance with capabilities in their primary and secondary performance media.

**Description of Courses**

**Music 100-4, 101-4. Theory and Musicianship. Fall and Spring.** A study of harmonic styles from early periods to the present day, with emphasis on contemporary practices. Prereq., placement test.

**Music 106-2. Music Fundamentals.** An introduction to the rudiments of music notation, basic ear training, reading of music. Intended for the student with little or no musical background. No credit for music majors.

**Music 111-2. Fundamentals of Conducting.**

**Music 140-1. Voice Class.** Prereq., consent of instructor.


**Music 182-2. Music for Listeners.** For nonmusic majors who want to learn how to listen to music with greater understanding and pleasure. No credit for music majors.


**Music 315-2. Beginning Guitar Pedagogy.** Contemporary teaching methods for group guitar instruction in the school or studio.

**Music 328-2. Contemporary Improvisation.** An introduction through performance to the art of improvisation as practiced in contemporary Western culture. Prereq., Music 200.

**Music 354-3, 355-3. Sound Reinforcement and Recording.** Operating principles and performance characteristics of microphones, amplifiers, speaker systems, equalizers, mixers, and multitrack recorders. Three class hours plus two lab. hours per week. Facilities fee: $18. Prereq., consent of instructor.


**Music 403-2. Scoring and Arranging.** Writing for instruments and voices in various combinations with emphasis on contemporary styles. Prereq., Music 207.

**Music 405-2. Instrumentation II.** Continuation of Music 403.

**Music 406-2. Analysis I.** Selected works through the 18th century. Prereq., Music 380 or equivalent.

**Music 407-2. Analysis II.** Selected works of the 19th and 20th centuries. Prereq., Music 380 or equivalent.

**Music 411-2. Electronic Media for Music Educators.**

**Music 420-2. Composition.** Creative work in small to large forms. May be repeated for credit. Prereq., Music 305 and consent of instructor.

**Music 422-2 to 4, 423-2 to 4. Writers Workshop.** Scoring for instruments and voices with an emphasis on contemporary practices. Prereq., consent of instructor.

**Music 454-3, 455-3. Sound Reinforcement and Recording.** Similar to Music 354, 355, but involves more theoretical study and laboratory work. Prereq., consent of instructor. Facilities fee: $18.


**Music 464-3. Development of Jazz.** A study of the origins, historical development, and contemporary trends in the blues, jazz, and soul.

**Music 466-3. Chamber Music Literature: Winds and Percussion.** Stylistic-historical survey in various genres from the Baroque era to the present. Prereq., Music 381.

**Music 480-1 to 3. Special Studies.** Advanced undergraduate studies or special projects in selected areas. May be repeated for additional credit.


**Music 484-3. Music Aesthetics.** Various philosophies of music as they have developed during the past 100 years in writings of philosophers, psychologists, sociologists, composers, critics, and historians.


**Music 487-3. Chamber Music Literature: Strings.** Stylistic-historical survey in various genres from the Baroque era to the present. Prereq., Music 381.

**Music 488-3. Late Eighteenth- and 19th-Century Music.** Prereq., Music 381.

Music 490-3, 491-3. Music and Media. A survey of the music industry as it relates to media, performing rights societies, merchandising, and legal and business aspects. Prer., Music 381 or consent of instructor.


Music 518-2. Selected Studies in Music Education. May be repeated for additional credit. Prer., Consent of instructor and appropriate chairman of graduate studies.


Graduate School

ROBERT N. ROGERS, Associate Dean

INFORMATION ABOUT THE SCHOOL

The Graduate School of the University of Colorado offers programs on four campuses. Work leading to advanced degrees can be completed at UCD. In addition, graduate-level course work can be taken at UCD and used for credit toward an advanced degree.

Anyone wishing further information not given in this bulletin should contact:

Associate Dean of the Graduate School
University of Colorado at Denver
1100 14th Street
Denver, Colorado 80202

The Graduate School office at UCD is open at 8:30 a.m. to 5:30 p.m. Monday through Friday, and 8:30 a.m. to 7 p.m. on Wednesday.

Degrees Offered

The following graduate programs are authorized for completion through the Graduate School on the Denver Campus. In some cases, a specific required course may only be offered on the Boulder Campus in a given year.

The Master of Arts (M.A.) in:

Anthropology  Geography
Biology  History
Communication and theatre  Humanities
Communication disorders and  Mathematics
speech science  Political science
Economics  Psychology
English  Sociology

The Master of Education (M.Ed) and the Master of Arts in Education (M.A.) in:

Counseling and guidance  Library media
Early childhood  Reading
Educational psychology  Secondary education
Elementary education  Social foundations

The Master of Science (M.S.) in:

Accounting  Environmental science
Applied mathematics  Finance
Chemistry  Management and organization
Civil and environmental engineering  Marketing

The Master of Basic Science (M.B.S.)

The Ph.D. degree is awarded only by the graduate faculty of the University of Colorado. A major portion of the course work required in partially fulfilling the requirements of that degree may be taken in the following specializations at UCD:

Civil and environmental engineering  Electrical engineering
Communication disorders and  English
speech science
Education (social foundations)

In addition, significant course work at the graduate level may be taken in the following programs:

Computer science  Music
Fine arts  Philosophy
German  Physics
Mechanical engineering  Spanish

The Master of Engineering

Facilities for Graduate Study and Research on the Denver Campus

Facilities for research in many fields are available at UCD as well as specialized institutes, seminars, and meetings of national standing.

Institute for Advanced Urban Studies

Since UCD is an urban university situated in a major metropolitan area, the primary thrust of its organized research activity is directed toward problem-related research with an urban focus. The major focus for these activities is the Institute for Advanced Urban Studies.

The Institute for Advanced Urban Studies was established in 1975 to foster research and public service activities related to urban problems and policy issues. Groups of faculty, student, and community participants address problem areas, such as land use, urban growth, municipal finance management, regional housing, transportation, and community recreation.

UCD's previous centers have been incorporated into the institute structure as constituent parts. They include the Center for New Towns and Community Design, the Center
for Urban Transportation Studies, the Center for Public and Urban Affairs, and the Applied Sociological Research Unit, with an informal working arrangement with the Bureau of Community Services.

Through its various research components, the institute provides research assistance to state and local government agencies. Additionally, the institute makes available a variety of topical seminars, conferences, and in-service training programs.

The Graduate Student at UCD

Approximately 1,300 students are enrolled in graduate programs at UCD and an additional 1,300 special students take graduate courses. Of these, approximately 45 percent are part-time students.

Faculty

The faculty operating in these programs is mainly housed at UCD, although resources of other campuses at the University of Colorado are used. A full list of the graduate faculty of the University is given in the Graduate School Bulletin.

FINANCIAL AID FOR GRADUATE STUDY

Scholarships and Fellowships

The University of Colorado administers various forms of financial aid for graduate students: fellowships, scholarships, and a number of awards from outside agencies. The Graduate School each year awards to qualified regular degree graduate students approximately 60 tuition scholarships, and approximately 60 fellowships paying up to $2,500 plus tuition.

Special fellowships and scholarships are also available for study in certain departments.

Applications for fellowships and scholarships are due in the department before the announced department deadline. Awards are announced about March 15.

Graduate Student Teaching Appointments

Many departments employ graduate students as part-time F-89 instructors or F-99 teaching assistants. The F-89 instructorship is reserved for those advanced graduate students already possessing an appropriate M.A. degree who may be independently responsible for the conduct of a section or course. Payment for these teaching appointments will be: one-half time F-89 instructor, $4,950 for the academic year; one-half time F-99 teaching assistant, $3,960 for the academic year.

A half-time appointment for an F-89 instructor is considered to be equal to 6 class contact hours; a half-time teaching assistant is appointed for 20 hours per week. Students appointed for at least one-half time qualify for resident tuition rates regardless of their actual Colorado residency status. Teaching assistants and F-89 instructors must be enrolled students for the full period of their appointment.

Research Assistantships

Research activities provide opportunities for graduate students to obtain part-time work as research assistants in many departments. Holders of these positions pay resident tuition. Assistants must be enrolled students.

Loan Funds

Graduate students wishing to apply for long-term loans through the National Direct Student Loan Program and for part-time jobs through the college work-study program should submit an Application for Financial Aid to the Office of Financial Aid by March 1. This office also provides short-term loan assistance to students who have completed one or more semesters in residence. Short-term loans are designed to supplement inadequate personal funds and to provide for emergencies. Applicants should go directly to the Office of Financial Aid.

Employment Opportunities

The University maintains an employment service in the Office of Financial Aid to help students obtain part-time work either through conventional employment or through the college work-study program.

Students employed by the University are hired solely on the basis of merit and fitness, a policy which avoids favor or discrimination because of race, color, creed, sex, age, handicap, or national origin. Students are also referred to prospective employers in accordance with this policy.

International Education

The Office of International Education expedites the exchange of students and faculty, entertains foreign visitors, promotes special relationships with foreign universities, and acts as adviser for Fulbright and other scholarships.

The office also arranges study abroad programs. Students remain enrolled at the University of Colorado while taking regular courses in the foreign universities. A B average with the equivalent of two years of college-level work in the appropriate language is required. There are also occasional summer programs offering academic credit.

Peace Corps information may be obtained from the Office of International Education.

For additional information contact Professor James Wolf, History Department, UCD.

REQUIREMENTS FOR ADMISSION

General Requirements

Students may be admitted to the Graduate School in either of the two categories described below.

Admission to the Graduate School is not admission to candidacy for an advanced degree. A student who wishes to become a candidate for a degree must make special application at the time and in the manner prescribed by the requirements for the degree sought.

A student who is granted admission must reflect in a moral and ethical sense a personal background acceptable to the University. The University reserves the right to deny admission to applicants whose total credentials reflect an inability to assume those obligations of performance and behavior deemed essential by the University and relevant to any of its lawful missions, processes, and functions as an educational institution.

Regular Degree Students

Qualified students are admitted to regular degree status by the appropriate department. In addition to departmental approval, an applicant for admission as a regular degree student must:

1. Hold a baccalaureate degree from a college or university of recognized standing, or have done work equivalent to that required for such a degree and equivalent to the degree given at this University.

2. Show promise of ability to pursue advanced study and research, as judged by his previous scholastic record.

3. Have had adequate preparation to enter upon
graduate study in the field chosen.
4. Have at least a 2.75 undergraduate grade-point average.
5. Meet additional requirements for admission as established by major departments.

Regular degree students must maintain at least a 3.0 grade-point average each semester or summer term on all work taken, whether it is to be applied toward the advanced degree intended or not. If the student fails to maintain this standard of performance, he will be subject to suspension from the Graduate School.

Pass/Fail Grades. In order to permit a meaningful evaluation of an applicant's scholastic record, not more than 10 percent of those credit hours that are relevant to his intended field of graduate study shall have been earned with pass/fail grades, nor more than 20 percent overall. Applicants whose academic record contains a larger percentage of pass/fail credits must submit suitable additional evidence that they possess the required scholastic ability. If the applicant does not submit satisfactory additional evidence, he can be admitted only as a provisional student.

Provisional Degree Students
Applicants who do not meet the requirements for admission as regular degree students may be admitted as provisional degree students upon the recommendation of the major department. With the concurrence of the dean of the Graduate School a department may admit provisional students for a probationary term, which may not normally exceed one academic year. At the end of the probationary period, provisional degree students must either be admitted to regular degree status or be dropped from the graduate program.

Credit earned by persons in provisional degree status may count toward a degree at this University.
Provisional degree students are required to maintain a 3.0 grade-point average or higher, as may be required by the terms of their provisional admission, each semester or summer term on all work taken, whether or not it is to be applied toward the advanced degree sought. If the student fails to maintain such a standard of performance, he will be subject to suspension from the Graduate School.

APPLICATION PROCEDURES
Graduate students who expect to study at UCD should contact the Office of the Graduate School on the Denver Campus concerning procedures for forwarding completed applications.

An applicant for admission from another institution must present a completed Application Form (Parts I and II), which may be obtained from the UCD Graduate School office and two official transcripts of all academic work completed to date. The application must be accompanied by a nonrefundable application processing fee of $20 (check or money order) when the application is submitted. No application will be processed unless this fee is paid. Many departments require scores from the Graduate Record Examination and most departments require three or four letters of recommendation.

When a prospective degree student applies for admission, the chairman of each department or a committee named for the purpose shall decide whether an applicant shall be admitted and shall make that decision known to the Office of Admissions and Records, which will inform the student. Persons not wishing to work toward an advanced degree are referred to as special students (below).

A completed application must be in the office of the major department at least 60 days prior to the term for which admission is sought or earlier as may be required by the major department.

Completed applications for foreign students must be on file in the Office of Admissions and Records prior to May 1 for the fall semester and by October 1 for the spring semester.

Students who wish to apply for a graduate student award for the academic year 1976-77, e.g., fellowship, scholarship, assistantship, etc., must file a completed application with the department before the announced departmental deadline (see previous section on financial aid).

All credentials presented for admission to the University of Colorado become the property of the University.

Seniors in the University of Colorado
A senior in this University who has satisfied the undergraduate residence requirements and who needs not more than 6 semester hours of advanced subjects and 12 credit points to meet his requirements for a bachelor's degree, may be admitted to the Graduate School by special permission of the dean.

Graduate Record Examinations
At the option of any department, the Graduate Record Examination may be required of applicants for assistantships, or of any student before his status is determined.

Students who are applying for the fall of 1976 should take the GRE no later than the December testing date so that their scores will be available to the graduate awards selection committee. Four to six weeks should be allowed for GRE scores to be received by an institution.

Information regarding these examinations may be obtained from the Graduate School office or the Student Relations office at UCD, or from the Educational Testing Service, Box 1502, Berkeley, California 94701, or Box 955, Princeton, New Jersey 08540.

Special Students
A student not wishing to earn an advanced degree from the University of Colorado should apply to the Office of Admissions and Records, UCD, 1100 Fourteenth Street, Denver, Colorado 80202 or to the Office of the Associate Dean of the Graduate School. Special students will be allowed to register only on the campus to which they have been admitted.

Special students desiring to pursue a graduate degree program at this University are encouraged to submit the complete graduate application and supporting credentials as soon as possible. A department may recommend to the graduate dean the acceptance of as much as 8 hours of credit toward the requirements of a master's degree for courses taken either as a student at another recognized graduate school, as a special student at the University, or any combination thereof. In addition, the department may recommend to the graduate dean the acceptance of credit for courses taken as a special student for the semester, quarter, or summer term for which the student has applied for admission to the Graduate School, provided that the student's application was on file with the department before the beginning of the semester, quarter, or term in question.

REGISTRATION
Course Work and Examinations
On the regular registration days of each semester, students who have been admitted to the Graduate School and who expect to study in the Graduate School are required to
complete appropriate registration procedures.

Students should register for classes the semester they are accepted into Graduate School. If unable to attend that semester they must notify the department which has accepted them and submit the necessary forms to the Office of Admissions and Records at UCD in order to attend the following semester.

Master's Thesis or Report

Every graduate student working toward a master's degree, if he expects to present a thesis or M.Ed. report in partial fulfillment of the requirements for the degree, must register for thesis for a minimum of 4 semester hours or a maximum of 6 semester hours, or for M.Ed. report for 2 semester hours. The student may register for any specific number of hours in any semester of residence, but the total number of hours for all semesters must equal the number of credits he expects to receive for his thesis or report. The final grade will be withheld until the thesis or report is completed. If the thesis or report is not completed at the end of the term in which the student is so registered, an in progress (IP) will be reported. (The student may not register again for any portion of thesis credit on which an IP grade has been submitted.)

Limitation of Registration

Full Load

A graduate student will be considered to be carrying a full load during a regular semester for purposes of determining residence credit if he is registered for not fewer than 3 semester hours in work numbered 500 or above, or at least 8 semester hours of other graduate work, or thesis.

A full load for purposes of determining residence credit during the summer term is 3 semester hours of work in courses numbered 500 or above, or 6 semester hours of other graduate work, or thesis.

For the purpose of determining a student's status with respect to eligibility for the G.I. Bill, full-time graduate study is defined as registration for at least 8 hours of graduate work during a regular semester, or full-time research and writing.

Maximum Load

No graduate student may receive graduate credit toward a degree for more that 15 hours in a regular semester.

The maximum number of graduate credits that may be applied toward a degree during a summer term at UCD is 10 hours per 8-week summer term.

TUITION AND FEES

The schedule of tuition and fees is given in the General Information section of this bulletin.

REQUIREMENTS FOR ADVANCED DEGREES

Quality of Graduate Work

Although the work for advanced degrees is specified partly in terms of credit hours, an advanced degree will not be conferred merely for the completion of a specified period of residence and the passing of a given number of courses. A student should not expect to get from formal courses all the training, knowledge, and grasp of ideas necessary to meet the requirements for an advanced degree. He should work on his own initiative, reading widely and thoughtfully, reaching his own conclusions, and acquiring a sense of values, perspective, and proportion.

All studies offered for credit toward an advanced degree (except those in deficiencies) must be of graduate status. For all advanced degrees except the Ph.D. degree, the quality of the student's work must attain an average of B in all work offered for the degree.

For the Ph.D., a course mark below B is unsatisfactory and will not be counted toward fulfilling the minimum requirements for the degree.

A student is expected to maintain at least a B average in all work attempted in Graduate School.

A student who fails to do satisfactory work will be subject to suspension from the Graduate School by the dean with the approval of the major department.

Appeal may be made to the Executive Committee of the Graduate School, whose decision shall be final. A suspended student is eligible to apply for readmission after one year. Approval or rejection of this application rests jointly with the student's major department and the dean.

In case of lack of agreement between the department and the dean or in case of appeal by the student, the final decision will be made by the Executive Committee.

Grading System

The standing of a student in work intended for an advanced degree is to be indicated by the marks A, B, and C.

A—Superior, 4 credit points for each credit hour.
B—Good, 3 credit points for each credit hour.
C—Fair, 2 credit points for each credit hour.

Work receiving the lowest passing grade, D, may not be counted toward a degree, nor may it be accepted for the removal of deficiencies. Marks below B are not accepted for the doctoral degree.

An in progress grade shall be a valid grade only until the end of the semester following that in which the grade is given. By the end of this interval, the instructor concerned shall have turned in a final grade of A, B, C, D, F, W (withdrawal). If no reports are received from the instructor within the allotted time, the dean shall be authorized to report a final grade of W (withdrawal).

Should a student later wish to receive credit for the course for which a W has been recorded, he will have to reregister for it.

The only exceptions to the foregoing rules are these:

1. Should a student enter the armed forces before he has completed a course and an in progress is reported, this in progress may be carried on the records for the duration of his service provided arrangements have been made with the dean of the Graduate School.

2. An in progress given for thesis or M.Ed. report will be valid until the thesis or report has been completed.

A graduate student may repeat once a course for which he obtained a grade of C or D, upon written recommendation to the dean by the chairman of his advisory committee and the chairman of his department, provided the course has not previously applied toward a degree. Courses in which the grade F is received may not be repeated.

Use of English

A student who is noticeably deficient in the use and spelling of the English language may not obtain an advanced degree from the University of Colorado. The satisfaction of this requirement depends not so much upon the ability to pass formal tests, although these may be demanded, as it does upon the habitual use of good English in all oral and written work. Ability to use the language with precision and distinction should be cultivated as an attainment of major importance.

Each department will judge the qualifications of its
advanced students in the use of English. Reports, examinations, and speech will be considered in estimating the candidate’s proficiency.

MASTER OF ARTS AND MASTER OF SCIENCE
A student regularly admitted to the Graduate School and later accepted as a candidate for the degree Master of Arts or Master of Science will be recommended for the degree only after the following requirements have been met.

In general, only graduates of an approved institution who have a thorough preparation for their proposed field of study and who do graduate work of high quality are able to attain the degree with the minimum amount of work specified below. All studies offered toward the minimum requirement for the degree must be of graduate rank. Necessary additional work required to make up deficiencies or prerequisites may be partly or entirely undergraduate courses.

The requirements stated below are minimum requirements; additional conditions set by the department will be found in the announcements of separate departments. Any department may make further regulations not inconsistent with the general rules.

Minimum Requirement
The minimum requirement of graduate work for the degree Master of Arts or Master of Science may be fulfilled by following either Plan I or Plan II below.

Plan I: By presenting 24 semester hours of graduate work, including a thesis. At least 12 semester hours of this work must be at the 500 level or above.

Plan II: By presenting 30 semester hours of graduate work, without a thesis. At least 16 semester hours of this work must be at the 500 level or above.

Plan II does not represent a free option for the student. A candidate for the master’s degree may be allowed to select Plan II only on the recommendation of the department concerned.

Field of Study
Studies leading to a master’s degree may be divided between major and minor subjects at the discretion of the faculty of the degree-granting program.

Status
After a student has made a satisfactory record in this University for at least one semester or summer term and after he has removed any deficiencies that were determined at the time of admission or by qualifying examinations, or otherwise, he should confer with his major department and request that a decision be made on his status. This definite status must be set by his major department before a student may make application for admission to candidacy for an advanced degree.

Students who are inadequately prepared must make up without credit toward a graduate degree all prerequisites required by the department concerned.

Language Requirements
Candidates must have such knowledge of ancient and modern languages as each department requires. See special departmental requirements.

Credit by Transfer
Resident graduate work of high quality done in a recognized graduate school elsewhere and coming within the time limit may be accepted up to a limited amount, provided it is recommended by the department concerned and approved by the dean of the Graduate School.

All work accepted by transfer must come within the five-year time limit or be validated by special examination.

The maximum amount of work that may be transferred to this University, dependent upon the master’s degree sought, is noted below:

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<tr>
<th>Semester Hours</th>
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<tbody>
<tr>
<td>M.A. or M.S.</td>
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<tr>
<td>M.Bus.Ed.</td>
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<tr>
<td>M.Ed.</td>
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<tr>
<td>M.Mus.</td>
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<tr>
<td>M.Mus. Ed.</td>
</tr>
<tr>
<td>M.F.A. (painting)</td>
</tr>
<tr>
<td>M.F.A. (education)</td>
</tr>
</tbody>
</table>

Credit will not be transferred until the student has established in the Graduate School of this University a satisfactory record of at least one semester in residence; such transfer will not reduce the residence requirement at this University, but it may reduce the amount of work to be done in formal courses. Requests for transfer of credit to be applied toward an advanced degree must be made on the form specified for this purpose and submitted to the Graduate School by the beginning of the semester prior to that in which the student will be graduated.

Work already applied toward a master’s degree received from another institution cannot be accepted for transfer toward the master’s degree at the University of Colorado; extension work completed at another institution cannot be transferred; and correspondence work, except to make up deficiencies, is not recognized.

Excess undergraduate credits from another institution may not be transferred to the Graduate School. Seniors in this University may, however, transfer a limited amount of advanced resident work (up to 8 semester hours) provided such work:
1. Is completed with distinction in the senior year at this University.
2. Comes within the five-year time limit.
3. Has not been applied toward another degree.
4. Is recommended for transfer by the department concerned and is approved by the dean of the Graduate School.

Requests for transfer of credit to be applied toward an advanced degree must be made on the form specified for this purpose and submitted to the Graduate School by the beginning of the semester prior to that in which the student will be graduated. For more information contact the Graduate School office.

Residence
In general, the residence requirements can be met only by residence at this University for at least two semesters or at least three summer terms. For full residence a student must be registered within the time designated at the beginning of a semester and must carry the equivalent of not fewer than 5 semester hours of work in courses numbered 500 or above, or at least 8 semester hours of other graduate work. See Limitation of Registration, Full Load, for requirements for full residence credit during the summer. A student who is noticeably deficient in his general training, or in the specific preparation indicated by each department as prerequisite to graduate work, cannot expect to obtain a degree in the minimum time specified.

Assistants and other employees of the University may fulfill the residence requirements of one year in two semesters, provided their duties do not require more than half time. Full-time employees may not satisfy the residence requirements of one year in fewer than four semesters.
Admission to Candidacy
A student who wishes to become a candidate for a master's degree must file application in the dean's office not later than 10 weeks prior to the completion of the comprehensive-final examination. The number of hours to be presented for the degree must be determined before this application may be filed. See previous section on Status.
This application must be made on forms obtainable at the dean's office and in various departments and must be signed by a representative of both the major and minor, if any, fields of study, certifying that the student's work is satisfactory and that his program outlined in the application meets the requirements set in his particular case.

Thesis Requirements
A thesis, which may be of a research, expository, critical, or creative type, is required of every master's degree candidate under Plan I. Every thesis presented in partial fulfillment of the requirements for an advanced degree must:
1. Deal with a definite topic related to the major field.
2. Be based upon independent study and investigation.
3. Represent the equivalent of from 4 to 6 semester hours of work.
4. Receive the approval of the major department not later than 30 days (in some departments, 90 days) before the commencement at which the degree is to be conferred.
5. Be essentially complete at the time the comprehensive-final examination is given.
6. Comply in mechanical features with specifications obtainable from the Graduate School.

Two weeks prior to the date on which the degree is to be conferred, two formally approved, printed or typewritten copies of the thesis must be filed in the Graduate School. The thesis must be complete with abstract.
All theses must be signed by the thesis adviser and the second reader. All approved theses are kept on file in the library. The thesis binding fee must be paid at the Business Office when the thesis is deposited in the Graduate School.
Credit hours earned for the thesis will not be accepted toward the requirements for a degree unless such credit has previously been registered. A student working toward a master's degree must register for thesis for a specific number of hours. The registered credit for thesis must total a minimum of 4 or a maximum of 6 semester hours, the total number of hours depending upon how much credit is to be given for the thesis.

Comprehensive-Final Examinations
Each candidate for a master's degree is required to take a comprehensive-final examination after the other requirements for the degree have been completed. This examination may be given near the end of the candidate's last semester of residence while he is still taking required courses for the degree, provided he is making satisfactory progress in those courses.
The following rules applying to the comprehensive final examination must be observed:
1. A student must be registered when he takes his examination.
2. Notice of the examination must be filed by the major department in the dean's office at least three days in advance of the examination.
3. The examination is to be given by a committee of three graduate faculty members appointed by the department concerned in consultation with the dean.
4. The examination, which may be oral or written, or both, must cover the thesis, which should be essentially complete at the time, as well as other work done in the University in formal courses and seminars in the major field.
5. An examination in the minor work taken at this University is optional with the major and minor departments.
6. The examination must include all work presented for the degree not done in residence at the University of Colorado, whether in the major or minor field. The examination on transferred work will be given by representatives of the corresponding fields of study in this University.
7. If a candidate fails the comprehensive-final examination, three months must lapse before he may again attempt it.

Supplemental Examinations
Supplemental examinations should be simply an extension of the original examination and given immediately. If the student fails the supplemental examination, three months must lapse before he may again attempt it.

Course Examinations
The regular written examinations of each semester except the last must be taken. Course examinations of the last semester, which come after the comprehensive-final examination has been passed, may be omitted with the permission of the instructor.

Time Limit
All work, including the comprehensive-final examination, should be completed within five years or six successive summers. Work done earlier will not be accepted for the degree unless validated by a special examination. A candidate for the master's degree is expected to complete his work with reasonable continuity.

Deadlines for Master's Degree Candidates Expecting to Graduate During 1976-77
Deadline dates for the following can be obtained by calling the Graduate School office on the Boulder Campus, 492-7401:
1. Last day for requesting transfer of credit.
2. Applications for admission to candidacy. Applications must be submitted at least 10 weeks before the student expects to take the comprehensive-final examination. Students are urged to submit this form by the beginning of the semester prior to that in which they expect to receive degree. (The form may be picked up in the department or in the Graduate School office.)
3. Last day for thesis to be approved by department.
4. Last day for scheduling of comprehensive-final examination with the Graduate School.
5. Last day for taking comprehensive-final examination.
6. Last day for filing thesis in the Graduate School. At the time of filing, the thesis must be complete in all respects and must meet thesis specifications in order to be accepted by the Graduate School. Candidates whose theses are received after 5 p.m. on the indicated date will be graduated at the commencement following that for which the deadline is indicated.

Description of Courses and Programs
Graduate credit is given for courses which are listed in the Graduate School section of this bulletin or which have otherwise been approved by the dean of the Graduate
School. No assurance can be given that work taken by a student will count toward a higher degree unless he has the approval of the department.

Not all courses listed are available at any one time; some of them are given in alternate years.

Courses taken during the fall semester 1975 and thereafter will have graduate rank if they are taught by members of the Graduate School faculty and are in one of the following two categories:

1. Courses within the major department at the 500 level or above.
2. Courses outside the major department at any level, provided they are approved for graduate rank for a specific degree plan by the faculty of the degree-granting program.

This does not change the minimum number of courses that must be taken at the 500 level or above. However, as a result, most students who include 400-level courses of other departments in their program will not exceed those minimum requirements for graduation.

**ANTHROPOLOGY**

Admission to the master’s program in anthropology is open to any holder of the baccalaureate degree, not necessarily in anthropology, provided he meets the following requirements: (1) the undergraduate record, especially that of the last two years of training, must be of good quality—a B or better grade-point average in anthropology is recommended; (2) some acquaintance with anthropology should have been acquired through formal study. Applicants will be expected to have had at least an introductory (general) course and first-level specialized courses in ethnology, archaeology, linguistics, and physical anthropology. An applicant deficient in background may be admitted as a provisional candidate but will be required to make up his deficiencies without graduate credit during his first year of graduate study or the applicant can be admitted to the University for a one-year trial period as a special student.

Besides undergraduate transcripts, applicants also must submit Graduate Record Examination scores for verbal and quantitative aptitude and at least two letters of recommendation. Evidence of previous nonacademic, anthropology-oriented work or experience will be carefully considered, as will that of special skills relevant to anthropological research.

The master’s program welcomes the application of individuals whose current careers could be furthered substantially by graduate training in anthropology—nurses, other health professionals, social studies teachers, public affairs, management, and community planning specialists, etc.

**Residence**

A minimum of two full semesters devoted to advanced study is required by the Graduate School. Students working toward the master’s degree in anthropology will be strongly encouraged to attain that degree within two years following their enrollment in the program.

**Degree Requirements**

The minimum requirement for the M.A. degree may be fulfilled by following either Plan I or Plan II below.

**Plan I.** By presenting 24 semester hours of graduate work including a thesis. At least 12 semester hours of this work must be at the 500 level or above.

**Plan II.** By presenting 30 semester hours of graduate work without a thesis. At least 16 semester hours of this work must be at the 500 level or above.

The 24 hours of work under Plan I are to be distributed as follows:

<table>
<thead>
<tr>
<th>Hours</th>
<th>Archaeology</th>
<th>Ethnology</th>
<th>Linguistics*</th>
<th>Physical anthropology</th>
<th>Electives</th>
<th>Thesis</th>
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<td>3</td>
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<td>6</td>
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The 30 hours of work under Plan II are to be distributed as follows:

<table>
<thead>
<tr>
<th>Hours</th>
<th>Archaeology</th>
<th>Ethnology</th>
<th>Linguistics*</th>
<th>Physical anthropology</th>
<th>Minor or collateral field</th>
<th>Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
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<td>3</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

**Examination**

Each student must pass a comprehensive M.A. examination demonstrating his mastery of the fundamental principles of anthropology. This examination will ordinarily be taken before the conclusion of the fourth semester after enrollment in the program.

**Thesis or Research Project**

Each student will submit the results of research on a project agreed upon by the student and his advisers. The report of that research must be acceptable for publication, as judged by the advisory committee, either as a formal M.A. thesis (in the case of students following Plan I) or in some other form.

**Statistics, Field Work, Language, or Library Research**

Formal training in statistics is strongly recommended for all candidates, regardless of the candidate’s subdisciplinary interests. Experience with field work is likewise strongly recommended. The nature of the field work will vary according to interest and opportunity, and need not necessarily be directed toward the research project or thesis. There is no language requirement for the M.A. program. Students who expect to continue working toward a Ph.D., however, are urged to begin work on at least one language early in their graduate careers.

**Minor or Collateral Field**

A minor collateral field of study is required only for students following Plan II. All students, however, are urged to take courses relevant to their interests in related divisional fields and in other divisions, colleges, or schools.

**Graduate Courses**

The following graduate-level courses are offered at UCD. Although many of the courses listed below also appear as 400-level courses in the undergraduate section of this bulletin, anthropology graduate students should register at the 500 level unless otherwise advised. Registration at the 500 and 600 level is also open to qualified undergraduates (see instructor). Graduate-level work will be expected of all who do register for 500 and 600 credit.

*Courses in specific research techniques or data analysis may be substituted upon recommendation by the student’s major adviser.*
For Advanced Undergraduates

Consent of the instructor is required of all upper division students, who wish 500-level credit for those courses which are also listed at the 400-level in the undergraduate section of this bulletin. No 500-level course is open to students who have previously taken the course at the 400 level.


Anthro. 512-3. Advanced Physical Anthropology. Introduction to population genetics, and its application to understanding problems and processes in human evolution and the formation of races in man. Not open to students who have had Anthro. 412.

Anthro. 514-3. Primatology. Survey of the Primate Order in evolution. Morphology and behavior from a comparative point of view, with emphasis on the origin of the human and the origin of the most closely related species of man. Not open to students who have had Anthro. 414.

Anthro. 515-3. Human Ecology. A study of demographic and ecological variables as they relate to man. Aspects of natural selection, overpopulation, and environmental deterioration will be considered.

Anthro. 516-3. Ecology, Adaptation, and Culture. Culture, culture change, and evolution from the perspective of the behavioral adaptations to environmental variables. A general systems, multifactorial (sociocultural and biophysical) approach to cause and effect. Not open to students who have had Anthro. 416.


Anthro. 518-3. Group Processes—Sociobiology. Human and other animal behavior in groups. Social biological processes, structures, and systemic functions of groups in cross-species evolutionary comparison. Not open to students who have had Anthro. 418.

Anthro. 521-3. Archaeology of the American Southwest. Prehistoric cultures of the southwestern U.S. and adjacent Mexico, their origins, characteristics, and interrelationships. Not open to students who have had Anthro. 421.

Anthro. 522-3. Archaeology of Mesoamerica. Prehistoric and protohistoric cultures of Mexico and northern Central America, including the Aztecs and the Maya. Not open to students who have had Anthro. 422.

Anthro. 530-3. Cultural Evolution. Review of various theories explaining the evolution of culture with particular attention to the Neolithic and Urban Revolutions.

Anthro. 536-2 to 6. Anthropological Field Work. Summer. Boulder Campus only. Students will assist in the supervision of archaeological field research and conduct laboratory analysis of archaeological materials and data. Open only to University of Colorado advanced anthropology students enrolled in a regular degree program.

Anthro. 539-3. Research Methods in Anthropology. Methods and theory of research in anthropology, especially the design and application of materials and data and process in human evolution and the formation of races in man. Not open to students who have had Anthro. 439.

Anthro. 543-3. Economic Anthropology. Cross-cultural survey and comparison of economic systems and their functional relationships with other social institutions in a range of societies from simple to complex. Not open to students who have had Anthro. 443.

Anthro. 544-3. Urban Anthropology. An anthropological approach to the comparative study of factors influencing urbanization in different parts of the world along with the implications of economies, society, values, and psychology of urban living in general. Cross-cultural, but with emphasis on the modern western world. Not open to students who have had Anthro. 444.

Anthro. 547-3. Ethnography. The use of documents and other external sources in the reconstruction of culture history. Not open to students who have had Anthro. 447.

Anthro. 548-3. Anthropology and Education. An anthropological focus on contemporary educational systems. Review of recent research in the anthropology of education as well as an introduction to teaching anthropology in the schools. Primarily for social studies teachers, educators, and anthropology students. Not open to students who have had Anthro. 448. Prereq., consent of instructor.

Anthro. 550-3. Family Dynamics. The course examines processes of change in values, roles, and relations involved in marriage and family structure, using contemporary cross-cultural materials leading to understanding of such problems as generation gap and family change. Special attention is given to changing structure of authority, economics, and the emotional components associated with marriage and family life of today's America. Not open to students who have had Anthro. 450.

Anthro. 551-3. Applied Cultural Anthropology. Concepts, methods, and problems in the application of anthropology to community and institution organization, development and administration; exemplified through analysis and discussion of U.S. and cross-cultural case materials. Urban and medical problems as well as ethical issues to be included. Not open to students who have had Anthro. 451.

Anthro. 552-3. Seminar: Recent Cultural Anthropology. Current directions in sociocultural theory, method and technique as exemplified in the reported research and theoretical works of major anthropologists from mid-20th century to the present. Not open to students who have had Anthro. 452. Prereq., anthropology major or consent of instructor.

Anthro. 553-3. History of Anthropology. Foundations and development of major concepts and approaches (theory and method) in the study of man and culture. Discussion of principal contributors and their works to mid-20th century. Not open to students who have had Anthro. 453. Prereq., anthropology major or consent of instructor.

Anthro. 554-3. Psychological Anthropology. A comparative study of the relationship between culture and social character and between culture and individual personality. Anthropological perspectives on the effects of various sociocultural contexts on the individual experience. The relationships of sociocultural situations, to motives, values, cognition, personal adjustment, stress, and qualities of personal experience are emphasized. Not open to students who have had Anthro. 454.

Anthro. 555-3. Culture Dynamics. Theories and perspectives in the study of culture process. Analysis and discussion of case materials dealing with persistence, innovation, situations of culture contact and acculturation, direction and change and resistance, and long-term sociocultural development. Not open to students who have had Anthro. 455.

Anthro. 556-3. Contemporary American Indian Cultures. Beginning with the historical background on American Indian acculturation and persistence, but emphasizing the present-day relations between Indian communities and the dominant society, stressing conditions and events in Denver and the Southwest generally. Not open to students who have had Anthro. 456.

Anthro. 558-3. Political Anthropology. Analysis of institutions of political control both comparatively and from an evolutionary perspective; the interconnections between political and other aspects of human cultural systems.

Anthro. 559-3. Comparative Social Organization. Principles in the comparative study of human social systems, types of social structure, social control, sociocultural integration, and processes of social change and societal development. Focus on the analysis of ethnographies. Not open to students who have had Anthro. 459. Prereq., Anthro. 240 or 452/552 or 453/553 or consent of instructor.

World Ethnography (Anthro. 562-576)

Each course listed below will cover the major aspects of cultural and social anthropological interest relating to the peoples and cultural systems within the areas indicated. Following a survey of the geographical affiliations of the inhabitants, the culture-history of the area will be reviewed. The ways of life of the indigenous populations, their relations with each other and to other peoples, and the effects of culture change will be discussed. Not open to students who have had Anthro. 462, 463, 470, 474, 476.


Anthro. 563-3. Ethnography of Mexico and Central America.


Anthro. 574-3. Ethnography of India, Pakistan, and Ceylon.


Anthro. 581-3. Language and Culture. The course explores the relationships between culture and language in the following contexts: language acquisition, language and individual, social dialects, language and education, language and world view, the role of language in cultural
interaction and social structure, planned language change including lan-
guage problems in new nations and at the international level. Not open to
students who have had Anthro. 481.
Anthro. 599-variable credit. Guided Study. Directed individual study
based in a specific subfield of anthropology. Consent of instructor
required.
current cross-cultural research on the structure and function of social
units, overall societal integration, and processes of change in social
organization. The emphasis will be on contemporary complex societies,
urban, industrial, and alternative systems. Pr., Anthro. 416/516 or
459/559, or consent of instructor.
years. Consideration of the archaeology of a specific area, either geo-
ographical or topical. Areas to be selected in terms of current research
interests.
Alternate years. A detailed consideration of the morphological and
genetic range of variability of major continental divisions of mankind.
Anthro. 650-3. Seminar: Contemporary Culture Theory. The role and
application of theory in cultural and social anthropology. An in-depth
inquiry into important theories and their operational methods. Practice in
model building, research designing, appropriate measures, and other
methodology. Exercises in inductive and deductive generation of theory.
Pr., consent of instructor, upper division or graduate standing.
Anthro. 651-3. Research Techniques in Cultural Anthropology. An
introduction to the methods and techniques used in cultural anthropologi-
cal field work along with the logic, assumptions, implication of theory-
building and hypothesis-testing in comparative research in cultural an-
thropology. Special attention is given to a field work project as a practical
training experience and as an application of the established anthropologi-
cal methods. Close guidance by the instructor and exchange of ideas
among the students are intended to offer useful feedback and criticism
throughout the process of the research project. Pr., consent of instruc-
tor, upper division or graduate standing.
Anthro. 652-3. Research Methods in Physical Anthropology. Alter-
nate years. A survey of methods and procedures for obtaining and
interpreting data in physical anthropology, with practice in selected
techniques. Pr., consent of instructor, upper division or graduate
standing.
Anthro. 699-variable credit. Guided Research. Directed individual
research, field or library, employing specific anthropological theories,
methods, and techniques, any subfield. Consent of instructor is required.

APPLIED MATHEMATICS
See Mathematics Program.

MASTER OF BASIC SCIENCE
COLLIN HIGHTOWER, Coordinator for UCD

The program leading to the Master of Basic Science degree is interdiscipli-
ary. It provides an opportunity for present and prospective high school and junior high school
teachers to continue subject matter training in mathematics
and the sciences at advanced undergraduate and graduate
levels. The student may elect either the mathematics, science, or museology option as described below. Wide
latitude is possible in the details of a degree plan so that
each student may follow a course of study most pertinent
to his interests. The degree plan will be designed in
conjunction with the student's adviser and must be ap-
proved by the director.

All courses credited toward the degree must be taken at
the University of Colorado, on the Boulder, Colorado
Springs, or Denver campuses, over a period of five years
or six successive summers.

The Master of Basic Science degree is supervised by an
advisory committee appointed by the dean of the Graduate
School, and application should be made to the Master of
Basic Science office, Ketchum 306, University of Colo-
rado, Boulder, regardless of the campus which the stu-
dent plans to attend.

Requirements for Admission
1. General regulations for admission to the Graduate School apply (see Requirements for Admission).
2. A student is expected to have had at least 40 semester hours in the natural sciences and mathematics, includ-
ing one year of calculus, upon admission. Students may be
admitted to the program with a deficiency in calculus, but
must remedy the deficiency within two years after admi-
sion by completing Math. 140-241 with a grade of C or
better (or other courses in mathematical subjects on ap-
proval by the advisory committee with a grade of C or
better).

Requirements for the
Master of Basic Science Degree
1. General regulations of the Graduate School governing
the award of the master's degree apply (see Master of
Arts and Master of Science) except as modified below.
2. Graduate Record Examination. Each student is re-
quired to take the GRE aptitude test within a semester after
admission to the program as an aid in the planning of his
degree program.
3. Thirty semester hours of courses at the 300 level and
above in two or more of the following departments: biol-
ogy; chemistry; geology; mathematics; molecular, cellular,
and developmental biology; physics; and computer sci-
ence. See mathematics and science options. At least 12
hours of these must be numbered 500 or higher.
4. Paper/Project. Completion of a paper or project on a
scientific or pedagogical topic selected in consultation with
the student's adviser and to be approved by the advisory
committee. (This is in lieu of the comprehensive examina-
tion.)
5. Minimum Grade-Point Average. Courses on the 300
and 400 level will be accepted toward the degree only with
grades of A or B; 500- and 600-level courses will be
accepted toward the degree with grades of A, B, or C.
The student must have a B average in all courses taken sub-
sequent to his admission to the program, including courses
not actually offered for the degree.

Mathematics Option
1. A reasonable degree of competence is required in the
fields of analysis, algebra, and geometry. A minimum of
15 semester hours or upper division courses (300 level or
above) in mathematics must be offered for the degree,
including at least 3 hours of analysis, 6 hours of algebra,
and 3 hours of geometry.
2. One upper division sequence of at least 6 semester
hours in any of the sciences enumerated above. With
permission, two independent one-semester courses in
the same area may be substituted for the one-year sequence.
3. Upper division electives in science and/or mathemat-
ics, including computer science, to complete an approved
30-semester-hour degree plan. Twelve of the 30 hours
must represent courses numbered 500 or higher. The 30
hours may also include 3 semester hours of courses or
seminars in secondary school mathematics teaching, his-
tory of mathematics or science, or philosophy of
mathematics or science.

Science Option
1. An upper division sequence (300 level or above) of
at least 6 semester hours in each of two of the sciences
named above. With permission, two independent one-
semester courses in the same area may be substituted for
one of the one-year sequences.
2. Upper division electives in science and/or mathemat-
ics, including computer science, to complete an approved 30-semester-hour degree plan. Twelve of the 30 hours must represent courses numbered 500 or higher. The 30 hours may also include 3 semester hours of upper division courses or seminars in secondary school science teaching, history of science, or philosophy of science.

Museology Option (Boulder Campus Only)

1. At least 8 but not more than 12 semester hours of courses offered by the museum. Alternatives are the sequence Musm. 401-402-403 or Musm. 401 and a selection of additional courses in museum. Three to 6 semester hours of courses in the College of Business and Administration are recommended. The total museum-business semester hours may not exceed 15.

2. An upper-division sequence (300 level or above) of at least 6 semester hours in one of the departments (other than museum) represented in the program.

3. Upper division electives in science, mathematics, or computer science, to complete an approved 30-semester-hour degree plan.

BIOLOGY

Students wishing to pursue graduate work in biology should be familiar with the University of Colorado Requirements for Advanced Degrees. There are no special discipline requirements, although the prospective student must consult with a faculty adviser prior to making application. The general portion of the GRE is required, and the specialty area is recommended. Applications are submitted directly to the biology graduate coordinator at UCD.

The discipline offers either Plan I (with thesis) or Plan II (without thesis) Master of Arts degrees in environmental, organismic, and population biology and Plan II M.A. degree in biology with education. Upon admission to the program, the student in consultation with his adviser will design a study program suited to the student's specific needs. There is no core of required courses structured into the master's degree program. Courses acceptable toward the master's degree in biology include, in addition to biology courses and subject to the approval of the adviser, any appropriate 400-, 500-, and 600-level courses offered in other disciplines or divisions of the University.

It should be noted that the student may have to complete some courses at the Boulder or Medical Center campuses.

In conjunction with the College of Engineering and Applied Science an interdisciplinary program is being developed with a major in environmental science. The program will offer several subject concentrations within both basic and applied environmental science. Included within the basic approach will be concentrations in ecology, earth science, population studies, and physical chemistry. Included within the applied approach will be concentrations in conservation of natural resources, systems analysis, and environmental quality control.

Students interested in this program will be advised of core course requirements, program advisers, and other specific details through the Graduate School office as this information becomes available.

Graduate Courses

The following graduate-level courses are offered at UCD. Courses at the 500 level are open to qualified seniors.

Biol. 505-variable credit. Advanced Biology. This course is reserved to offer formal courses for which seniors as well as graduate students can enroll without resorting to Independent Study.


Biol. 528-4. Environmental Physiology. Adaptations of plants and animals to such parameters as temperature, light, and water. Not open to students who have had Biol. 427. Pre., a year of chemistry and a course in physiology.


Biol. 469-variable credit. Independent Study in Biology. Pre., written consent of instructor.

Biol. 570-4. Biometry. An intensive course in intermediate statistics with emphasis on experimental design and analysis. Includes statistical design of repeated measures, analysis of variance, correlation, regression and nonparametric tests. Use of computer processing is introduced. Not open to students who have had Biol. 470. Pre., general biology, statistics, and two other biology courses.


CHEMISTRY

The M.S. or M.A. degree is offered at UCD in any one of the following basic fields: analytical, bio-, inorganic, organic, or physical chemistry.

The master's degree is the highest that can be earned in chemistry at UCD. The emphasis in the program is toward the specialized needs of both full- and part-time students. The department at UCD is small and strives to give students excellent supervision of work and advising toward the graduate degree. Students enrolled in the program may be employed as part-time teaching assistants. In addition, research activities in the department provide opportunities for graduate students to obtain part-time work as research assistants.

Degree Requirements

Two types of degrees are offered: Plan I requires 24 credit hours including 15 to 20 credit hours of formal course work, 4 to 9 credit hours in research courses, the completion of a research investigation, and the presentation of a thesis.
Plan II requires 24 hours of formal course work and 6 credit hours of research without a thesis.

Prerequisite. An undergraduate major in chemistry is desirable since all students are required to pass examinations covering the major fields of chemistry. The GRE Chemistry Graduate Record Examination (GRE) scores are required. Advanced chemistry GREs are recommended.

Students who plan to enroll in the graduate program must take a qualifying examination to determine their background and qualifications for advanced study in the field of chemistry.

Graduate Courses

The following graduate-level courses are offered at UCD. Courses at the 500 level are open to qualified seniors.

Chem. 501-3. Advanced Inorganic Chemistry I. Lect. Introduction to bonding in transition metal complexes, and study of selected transition metal and main group elements. Not open to students who have had Chem. 401. Prer., Chem. 452 and graduate standing.


Chem. 512-3. Selected Topics in Analytical Chemistry. Lect. Newer methods of chemical analysis. Topics covered vary from year to year with emphasis on small digital computers, separation techniques, automation, and other recent analytical developments.


Chem. 558-3. Introductory Quantum Chemistry. Lect. Basic principles and techniques of quantum mechanics; includes the Schrödinger equation, formulation of quantum mechanics, the variation method, and basic theories of chemical valence. Molecular orbital theory of conjugated systems, examples of calculation of energies, charge densities, bond orders, and indole factors, and reactivity. Prer., Chem. 452.


Chem. 581-3. General Biochemistry. Lect. Topics include structure, conformation, and properties of proteins; enzymes; mechanisms and kinetics; intermediary metabolism; carbohydrates, lipids, energetics and metabolic control; and an introduction to electron transport and photosynthesis. Prer., Chem. 342 and graduate standing.

Chem. 582-3. General Biochemistry. Continuation of Chem. 581. Topics include macromolecules; metabolism of nucleic acids and nitrogen-containing compounds; biosynthesis and function of macromolecules including DNA, RNA, and proteins; biochemistry of subcellular systems; and special topics. Prer., Chem. 581 and graduate standing.

CIVIL AND ENVIRONMENTAL ENGINEERING

Students wishing to pursue graduate work in civil and environmental engineering leading to candidacy for the Master of Science or Doctor of Philosophy degree should read carefully Requirements for Advanced Degrees in this bulletin. All requirements for the M.S. and a large part of those for the Ph.D. may be completed at UCD.

A pamphlet elaborating on the rules as they apply to civil and environmental engineering is available from the departmental office at UCD.

No qualifying examination is required by the department for the Master of Science degree; however, in competition for all University fellowships, the Graduate Record Examination (GRE) scores are required. The advanced test in engineering, is used in the evaluation of candidates. Therefore, students are advised to take this examination prior to their arrival on campus.

Programs are available in the fields of transportation, water resources, hydraulics, soil mechanics, structural mechanics, and structural design.

In each program courses are selected by the student (under supervision of his faculty adviser) in such a way as to meet his interests and the requirements of the Graduate School.

See also Master of Engineering degree.

Center for Urban Transportation Studies

The Center for Urban Transportation Studies (CUTS) was established in the Department of Civil and Environmental Engineering to: (1) assume a leading role in the Rocky Mountain region in developing research, research facilities and interdisciplinary graduate programs in urban transportation and (2) provide a central resource for information concerning urban transportation problems in the Rocky Mountain region, making available to outside organizations the expertise within the University.

Through CUTS, the Department of Civil and Environmental Engineering offers interdisciplinary graduate programs and research opportunities designed to develop professionals who will be capable of dealing with the complex problems of urban transportation in a competent and meaningful manner. Students in these programs are expected to reach significant levels of competence not only in urban transportation courses but also in at least two relevant minor areas, such as architecture, environmental design, urban planning, business management, geography, political science, public administration, sociology, computing science, and systems analysis.

The Center for Urban Transportation Studies operates within the framework of the Institute for Advanced Urban Studies at UCD.

Availability of Courses

All courses are not necessarily offered every year. They are available only if there is sufficient demand. According to University rules, a graduate course, even though offered, will be canceled if the enrollment is fewer than five students. Some courses are offered in alternate years on the Boulder Campus and the Denver Campus, others usually at Boulder only, and some only at UCD. If a course is not available at either Boulder or Denver, a student showing urgent need for the material may apply for equivalent studies under the course titles of Independent Study or Selected Topics. Graduate courses related to transportation usually are offered at UCD only.

The Department of Civil and Environmental Engineering has no Ph.D. tool foreign language requirement, other than those communication requirements established by the Graduate School.

Graduate Courses

The following graduate-level courses are offered at UCD. Courses at the 400 level may not be used for graduate credit in the major area, but may carry credit toward a minor area, subject to approval of the major department. A listing of 400-level courses is given in the College of Engineering and Applied Science section of this
C.E. 500-1 to 6. Independent Study. Available only through approval of graduate adviser. Subjects arranged to fit needs of the particular student.

C.E. 511-3. Introduction to Structural Dynamics. Introduction to the dynamic response of structural systems, both linear and non-linear. Prer., C.E. 350, Math. 443 or consent of instructor.


* C.E. 543-3. Advanced Waste Water Treatment.

* C.E. 544-3. Advanced Sanitary Engineering Laboratory.

C.E. 545-3. Administration of Public Works. A descriptive course covering with illustrative cases the planning and administration aspects of public works and with listing and comparing modern methodologies. Prer., graduate standing in civil engineering, public administration, or consent of instructor.


C.E. 558-3. Advanced Topics in Reinforced Concrete. Advanced topics relating to design and analysis of reinforced concrete structures. Includes review of the current ACI design code, slabs, prestressed concrete, seismic design, finite plates and shells, finite element analysis and other topics determined by class interest. Prer., C.E. 458 or equivalent.


C.E. 562-3. Urban Transportation Planning. Definition of the urban transportation problem, sociology of urban populations, history of urban growth, models of urban growth, population forecasts, land use surveys and planning, trip generation, characteristics, distribution and assignment, modal split, system evaluation, CBD transportation planning. Prer., C.E. 360 or consent of instructor.

C.E. 564-3. Urban Traffic—Characteristics. Human and vehicular characteristics, speed and volume studies, origin and destination studies, traffic flow theory, stream characteristics, intersection characteristics, signalized intersections, adjacent characteristics, parking characteristics, highway lighting, and miscellaneous topics. Prer., C.E. 360 or consent of instructor.


C.E. 568-3. Pavement Design. Design of flexible and rigid pavements for highways and airports; stress analysis in flexible and rigid pavements; design of joints and reinforcing steel for rigid pavements; principles of subgrade stabilization. Prer., C.E. 360 and 481.


C.E. 595-599-0 to 3. Selected Topics. Credit and subject matter to be arranged.

Primarily for Graduates

C.E. 600-3. Master's Thesis. Available only through approval of the graduate adviser. Subjects arranged to fit needs of the particular student.


C.E. 617-3. Elastic Shell Theory. Mathematical theories and applications of thin and thick shell structures, with emphasis on analytical and numerical analysis by finite element methods. Prer., C.E. 615.


C.E. 651-3. Advanced Theory of Structures. Generalized approaches to the analysis of civil engineering and continuous elastic structures (such as plates and plane stress bodies) by force and displacement methods. Emphasis is on formulation by finite elements and solution by matrix methods. Prer., C.E. 551 and basic knowledge of computer programming.


C.E. 695-699-0 to 3. Selected Topics. Credit and subject matter to be arranged. Prer., consent of instructor.


C.E. 800-variable credit. Doctor's Thesis.

COMMUNICATION AND THEATRE

Prerequisites. Applicants are admitted to the graduate program in communication and theatre on the basis of their academic records and on recommendations. While there are no specific prerequisites beyond those required by the Graduate School, students admitted who are unable to

*Course usually offered at Boulder only.
offer a substantial number of semester hours of work in the area of their intended specialization or allied fields must expect that a significant number of additional courses and semester hours will be required of them in order to make up deficiencies.

Qualifying Examination. Every student must take a diagnostic examination before he has completed 9 semester hours.

Adviser and Graduate Committee. For every student who declares his intention to qualify for an advanced degree, an adviser and committee will be selected not later than the beginning of the student’s second semester (or second summer term) in residence. It is the duty of this adviser and committee to assume the responsibility for (1) approving the student’s graduate program; and (2) evaluating the student’s qualifying examination, thesis, and comprehensive-final examination.

Each candidate for a degree has the responsibility of making certain that the appropriate persons or committees have been appointed to supervise the various steps in his graduate program. To assist him, detailed instructions sheets are available from the department.

Master's Degree

Course Requirements

All master’s degree candidates are required to complete C.T. 601 or its equivalent. At least two courses (4 to 8 hours) must be taken outside the department or outside the departmental area(s) of concentration.

Plan I, With Thesis. After any undergraduate deficiency has been removed, students under Plan I must normally earn 27 semester hours, of which a minimum of 16 must be earned in one major area. Four to 6 thesis credit hours may be counted toward the 27-hour requirement.

The Plan II Option without thesis is available at UCD only upon application.

Graduate Courses

Courses at the 500 level or above may be applied toward the graduate degree by graduate students in communication and theatre. Graduate students in other disciplines may apply 400-level courses if approved by their disciplines. Some courses are available only on the Boulder Campus; inquiry should be made.

C.T. 511/411-3. Theories of Leadership. A course examining the thought, research, and applications related to the major theories of leadership. Emphasizes a critical reading of research confirming or denying various theories, and stresses the historical development of mid-range theories of leadership behavior and characteristics. Prer., C.T. 202 or 315, or consent of instructor.

C.T. 519-variable credit. Problems in Communication. Opportunity for students to explore upon consultation with the instructor areas in communication which the normal sequence of offerings will not allow. Prer., consent of instructor.


C.T. 524-3. Seminar: Organizational Communication. Relationships between such communication as flows, media, density, channel-saturation, information-delivery and organization functioning, morale, and productivity. Lecture, theory, case observation, and analysis. Prer., consent of instructor.

C.T. 526-3. Communication and Conflict: Interpersonal and Intergroup. A study of the influence of communication on intrapersonal, interpersonal, intragroup, and intergroup conflict situations. Advanced level registration. Involves examination of selected research studies and a major project. Not open to students who have had C.T. 426.

C.T. 527-3. Intercultural Communication. An examination of the philosophy, process, problems, and potentials unique to communication across cultural boundaries. Implications for personal and social innovation. Comparative study of communication customs in selected cultures. Not open to students who have had C.T. 427.

C.T. 528-3. Communication of Directed Change. Examination of the communication process underlying the diffusion of innovations. The course provides a bridge between theory and application in the study of directed change. Not open to students who have had C.T. 428.

C.T. 530-2. Perspectives in Communication Education. A study of the history and philosophy of communication and theatre education with an emphasis on contemporary trends.

C.T. 539-variable credit. Problems in Communication Education. Opportunity for students to explore upon consultation with the instructor areas in communication and theatre education. Prer., consent of instructor.

C.T. 540-3. Structure of Today's English Linguistic View. An exploration of the workings of the English language with attention to current linguistic tendency to provide a comprehensive analysis and description. Not open to students who have had C.T. 440.

C.T. 541-3. Teaching Standard English to Speakers of Other Languages or Dialects II. An in-depth consideration of the teaching of reading and writing in English as a second language or dialect. Concern will be given to the development of "coordinate" bilingualism as a desirable goal in second-language acquisition. Prer., C.T. 441 or consent of instructor.

C.T. 546-3. Languages in Contrast. A general examination of the theories and theorists concerned with universal in human language leading to a detailed inquiry into certain phonological and morphosyntactic differences among language varieties.


C.T. 549-variable credit. Problems in English as a Second Language.


C.T. 563-3 to 4. Television in Education. Utilization of television at all levels of education. Theory and practice in defining needs, identifying alternative solutions, producing materials, and evaluating results. Fourth credit hour requires comprehensive project design. Prer., C.T. 360 or consent of instructor.

C.T. 569-variable credit. Problems in Radio-Television and Film. Opportunity for students to explore upon consultation with the instructor areas in radio-TV and film which the normal sequence of offerings will not allow. Prer., consent of instructor.


C.T. 578-3. Drama Theory. Examination of critical and theoretical ideas from Aristotle to the present day.

C.T. 599-1 or 2. Independent Study.

C.T. 601-3. Introduction to Graduate Work in Communication. Intended to familiarize students with the philosophical, ideological, and methodological bases of study in communication. Required of all departmental graduate students.

C.T. 604-3. Departmental Research Seminar. Devoted to the study, analysis, and actual instrumentation and experimentation in contemporary, ongoing research projects undertaken by various faculty members. Students will actually participate in hypothesis formation, testing, and interpretation.

C.T. 606-3. Management Communication Systems. (P.Ad. 606.) The responsibilities of complex public agencies in maintaining effective communication systems, internal and external; the nature of the systems and problem areas.

C.T. 609-1 to 4. Field Problems in Communication. Analysis, observation, and field experience involving communication problems in organizations such as service, labor, industry, military, and the like. Prer., consent of instructor.

C.T. 615-3. Seminar: Group Methods. Critical examination of contemporary theory and research in small group behavior. Selected topics may include structure, leadership, power, conflict, decision making, and various applications. Prer., C.T. 315 or equivalent or consent of instructor.

C.T. 619-variable credit. Problems in Communication. Opportunity
COMMUNICATION DISORDERS

The graduate curriculum in communication disorders and speech science is accredited by ASHA. At present, students must take courses on both the Denver and Boulder campuses.

A student who does not have an undergraduate degree in the specialty will not be able to complete the undergraduate requirements at UCD. Undergraduate programs in this field are offered at UCD and at Metropolitan State College.

Students should read Requirements for Advanced Degrees in this bulletin. Following are special departmental requirements.

Master's Degree

The minimum requirements of graduate work for the Master of Arts degree in the Department of Communication Disorders and Speech Science may be fulfilled by following the Graduate School Plan I or Plan II.

1. At least 30 semester hours (Plan I), or 36 semester hours (Plan II) of graduate work, assuming all other requirements (discussed below) have been met prior to acceptance for candidacy.

2. Thirty of the above hours must be at the 500 level or above, distributed as indicated below.

Plan I

<table>
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<th>Plan II</th>
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<tr>
<td>b. Minor areas of emphasis (excluding clinical practice). The student must take at least 2 hours in each of two minor areas of emphasis: speech pathology and audiology or phonetics.</td>
</tr>
<tr>
<td>c. Clinical practice. A minimum of 4 semester hours of credit will be required in clinical practice in the major areas of emphasis. At least 1 semester hour of credit will be required in each of the two minor areas of emphasis. The hours will be distributed to meet ASHA requirements for CCC. A student may be required to obtain additional clinical experience in any or all of the above areas as determined by his degree of clinical competence and/or his individual program.</td>
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<tr>
<td>d. Introduction to Graduate Study</td>
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<tr>
<td>e. Thesis (Plan I only)</td>
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<tr>
<td>f. Research experience (Plan II only)</td>
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Additional requirements may have been completed prior to admission to the departmental M.A. program. If they have not been completed previously, they will be considered deficiencies and will add to the minimum number of hours for the M.A. degree.

1. Cognitive psychology (Psych. 414 or equivalent).
2. Developmental psychology (Psych. 468 or equivalent).
3. Physiological psychology (Psych. 405 or equivalent).
4. Introduction to research and statistics (Psych. 210 or R.E.M. 501 or equivalent).
5. Basic communication processes area: 12 semester hours of credit, to include the following:
   a. Anatomic and physiological bases for the normal development and use of speech, language and hearing (C.D.S.S. 305, 306 or equivalent).
   b. Physical bases and processes of the production and perception of speech and hearing (C.D.S.S. 307, 308 or equivalent).
   c. Psychological, social, and cultural variables related to normal development and use of speech, language, and hearing, to include the following: (1) linguistics (Ling. 400 or equivalent),
and (2) speech and language development (C.D.S.S. 301/401 or equivalent).

Students must present a minimum of 2 hours in area (a), 2 hours in area (b), and 4 hours in area (c).

6. Speech Pathology: a minimum of 6 semester hours of credit distributed among the understanding, evaluation, and management of speech and language disorders (C.D.S.S. 450, 451, or equivalent).

7. Audiology: a minimum of 6 semester hours of credit distributed among the identification, evaluation, and habilitation of auditory pathology (C.D.S.S. 470, 471, or equivalent).

Doctor's Degree

The Ph.D. degree plan is developed with the student's advisory committee to meet the individual interests and needs of each student. In addition to the major sequence of courses offered in language and learning disabilities, the student must select two or three minor areas of emphasis from this or other departments. A sequence of courses in statistics also is required.

All students must meet requirements of the Graduate School for the doctoral degree as well as the following departmental requirements:

C.D.S.S. 798-2. Practicum V: Classroom Instruction
C.D.S.S. 797-2. Practicum IV: Research Coordination
C.D.S.S. 795-2. Practicum III: Clinical Supervision
C.D.S.S. 636-1. Practicum I: Language and Learning Disabilities Appraisal and Remediation
C.D.S.S. 573-2. Medical Backgrounds for Clinical Audiology
C.D.S.S. 599-1 to 4. Independent Study
C.D.S.S. 601-2. Introduction to Graduate Study in Communication Disorders and Speech Science
C.D.S.S. 609-1 to 4. Problems in Communication Disorders and Speech Science
C.D.S.S. 638-1. Practicum I: Language and Learning DisabilitiesRemediation
C.D.S.S. 637-2. Medical Backgrounds for Clinical Audiology
C.D.S.S. 698-1 to 4. Departmental Research Seminar
C.D.S.S. 699-1 to 4. Independent Study
C.D.S.S. 700-4. Master's Thesis
C.D.S.S. 795-2. Practicum III: Clinical Supervision
C.D.S.S. 798-2. Practicum V: Classroom Instruction
C.D.S.S. 800-16 to 24. Doctor's Thesis

COMPUTER SCIENCE

ROLAND SWEET and BURTON SMITH, Advisers

Course work at the graduate level can be taken at UCD in this discipline, but degree programs must be completed on the Boulder Campus. Courses at the 500 level are open to qualified seniors.

C.S. 453-3. Assembly Language Programming. (E.E. 453.) A laborato-
ory course in programming at the machine code level. Lectures deal with
the organization of the machine, its effect on the order code, and
the organization of the machine, its effect on the order code, and
techniques for programming in Assembly Language. Primary emphasis is
on preparing and running programs. Prer. C.S. 201.
C.S. 459-3. Computer Organization. (E.E. 459.) This course is con-
cerned with computer arithmetic units, memory systems, control systems,
and input-output systems. The emphasis is completely on logical structure
(E.E. 553.) A study of the concepts which underlie the design of a
programming language. Basic operators, operand modes, and formation
rules. Examples are drawn from contemporary language such as FOR-
TRAN, COBOL, ALGOL, LISP, SNOBOL, and PASCAL. The relation-
ship among languages, hardware, and applications is studied in the light of
the underlying concepts. Prer. C.S. 201 and 453.
554.) Survey of topics in the borderline area between numerical analysis
and computer systems programming and design. A knowledge of assem-
bly language and some familiarity with computer architecture is necessary
for the course. Some topics covered are computer round-off error,
floating point arithmetic, the generation of random numbers, and parallel-
ism in numerical calculations. Prer. C.S. 453 or 401 and numerical analysis.
555.) A study of the methods used in implementing processors for
non-numerical problems; dynamic storage allocation, list processing,
recursive programming and string manipulation. Several special purpose
languages and their implementations will be studied in detail. Prer. C.S.
453 and 401 or equivalent.
*C.S. 556-3. Translation of Programming Languages. (E.E. 556.)
A study of practical techniques for translating text generated by humans into
programs understood by machines: lexical, syntactic and semantic
analysis, code generation, assembly and optimization, error reporting and
recovery. Students write and run their own compilers. Prer. C.S. 453,
which programming systems are integrated into the overall operation of a
computing facility. Program segmentation and loading, filing systems,
*C.S. 558-3. Artificial Intelligence. (E.E. 558.) The design of machines
and systems that have been created to perform tasks that are considered to
C.S. 560-3, 561-3. Numerical Analysis I, II. (Math. 560-561.) Interpo-
lation, solution of equations, numerical analysis of differential equations,
theory of finite differences, linear difference equations, and allied topics.

See the electrical engineering and the mathematics sec-
tions of the Graduate School portion of this bulletin for
other computer-related courses. Refer also to the College
of Business and Administration section.

Additional courses which are not listed here can be
obtained on the Boulder Campus. See the Graduate School
Bulletin.

ECONOMICS

The M.A. degree in economics is offered at both the
Denver and Boulder campuses. The requirements are the
same and the examinations are offered jointly, but the
emphasis and fields offered differ. The Denver program is
oriented toward part-time students concerned with urban
problems or seeking to teach below university level. Per-
sons interested in the program should contact the graduate
adviser, Professor John Morris.

Requirements for Admission
(Students not meeting these requirements may be admitted
 provisionally.)
1. Undergraduate degree with GPA of 2.75.
2. Three letters of recommendation.
3. Sixteen semester hours of economics.
4. Acceptable GRE scores.

Degree Requirements
1. Economic Theory: Econ. 507, 508, and qualifying exam.
2. Quantitative Methods: Econ. 580 (or 380), Econ. 581, and qualifying exam.
3. Two fields of concentration. Each field requires 6 credit hours, but the structure is highly flexible, e.g., one
field can be an internship.
4. Thirty semester hours, of which 16 must be at the
600 level (500 level if taken prior to fall 1975).

Economic Theory and Thought

Econ. 503-3. The Price System. Course in microeconomics designed for
teachers and other nonmajors. Production, price, and distribution theory
in a free-market system. Assumptions and conditions of a free-market
and other market structures. Not open to students who have had Econ. 403.
Econ. 504-3. Income, Employment, and Economic Activity. Course in
macroeconomics designed for teachers and other nonmajors. Theory and
applications of national income determination, the role of money in
the economy, and economic growth. Policy problems in dealing with
unemployment, inflation, growth, and our international balance of
payments. Not open to students who have had Econ. 404.
Econ. 505-3. Introduction to Microeconomic Theory. Production, price,
and distribution theory. Study of value and distribution theories under
conditions of varying market structures, with special reference to the
contribution of modern economic theorists. Not open to students who
have had Econ. 407.
Econ. 508-3. Intermediate Macroeconomic Theory. Macroeconomics
and monetary theory. Not open to students who have had Econ. 408.
Econ. 509-3. History of Economic Thought. Survey of the development
of economic thought from ancient to modern times. Not open to students
who have had Econ. 409.
Econ. 510-3. Radical Political Economy. An introduction to modern
radical economics, emphasizing Marxist critiques of capitalism; Marx's
theory of capitalist development; contemporary analyses and empirical
studies of monopoly capitalism and imperialism; Marxist views of the
future of capitalism; mainstream critiques of radical political economics.
Not open to students who have had Econ. 410.
Econ. 592-variable credit. Special Economic Problems. By consent of
instructor. Designed to give students a chance to evaluate critically some
practical or theoretical problems under supervision, and to present results
of their thinking to fellow students and instructors for critical evaluation.
Econ. 600-3. History of Economic Thought. This course fosters or
advances the student's cultural appreciation of the technical apparatus of
current economic concepts. To gain this insight the student must read in
the original texts of certain great economic writers from the Industrial
Revolution to the 1920s; Secondary sources will be used in some
instances.
Econ. 601-3. Microeconomic Theory I. Recent and contemporary litera-
ture on fundamentals of economic theory. Consideration of value theory
with particular emphasis on methodology, theory of demand, theory of the
firm, and theory of distribution.
Econ. 602-3. Macroeconomic Theory I. Considers general equilibrium
and aggregative analysis in economic theory with particular emphasis given
to theory of employment, consumption, and investment.
Econ. 603-3. Microeconomic Theory II. Continuation of Econ. 602.
Econ. 604-3. Macroeconomic Theory II. Continuation of Econ. 602.
Comprehensive study of classical ideas of economic progress found in
writings of Smith, Ricardo, and J. S. Mill, compared with institutional
theories of economic change of Marx, Veblen, Commons, and Ayers.
Econ. 630-2. Economics as a Social Science. The content and methods
of economics are reviewed and compared with our knowledge of, and
methods of studying the total social system.
Econ. 631-3. Economics and Social Science Curriculum Analysis.
Analysis of the theoretical, institutional, and pedagogical content of
economics with the goal of improving the quality of teaching.
Econ. 690-3. Seminar: Economic Problems. Special problems in
economic theory and in contemporary economic affairs.
Econ. 699-variable credit. Independent Study. To be arranged with
individual faculty members.
Econ. 700-4 to 6. Master's Thesis.

*Not offered every year.
Fiscal and Monetary Theory and Policy; Public Finance

Econ. 521-3. Public Finance I. Taxation, public expenditures, debts, and fiscal policy. Role of public finance in times of peace and war. National, state, and local taxation, with some special attention to the state of Colorado. Not open to students who have had Econ. 421.

Econ. 522-3. Public Finance II. Continuation of Public Finance I. Either course may be taken separately. Not open to students who have had Econ. 422.

Econ. 621-3. Public Finance I. Taxation, public expenditures, debts, and fiscal policy. Role of public finance in terms of peace and war. National, state, and local taxation, with some special attention to the state of Colorado.

Econ. 622-3. Seminar: Fiscal Policy. Continuation of Econ. 621. A critical analysis of fiscal policy with emphasis on economic stability, growth, and employment. Either course may be taken independently for credit.

Econ. 711-3. Advanced Monetary Theory. Major contributions to monetary and banking theory up to the present day and current issues.

Government and Business; Industrial Organization

Econ. 556-3. Economics of Agriculture. Economic analysis of the agricultural sector and of problems and policies related to agriculture and other primary industries. Not open to students who have had Econ. 456.

Econ. 569-3. Government in the Economy. Analysis of the role of government in the economy, neo-classical microeconomic theory as a point of departure for understanding what a free market system can and cannot accomplish. Prereq., Econ. 403 or equivalent. Not open to students who have had Econ. 469.

Econ. 574-3. Industrial Organization. Structure and performance of some important American manufacturing industries. Not open to students who have had Econ. 474.

Econ. 576-3. Government Regulation of Business. Economic characteristics of public utilities and analysis of problems of regulation and control. Not open to students who have had Econ. 476.

Econ. 674-3. Comparative Industrial Organization and Planning. A study of the ways in which common decisions are made and implemented under various patterns of industrial organization, ranging from those relying on the pure market system to those employing a high degree of centralized planning.

Econ. 675-3. Seminar: Industrial Organization and Control. The largest firm in relation to its rivals, suppliers, and customers (theory and industry studies); social control of business through antitrust and other government regulation.

Urban, Regional, and Environmental Economics

Econ. 525-3. Urban Economics. Analysis of the level, distribution, stability, and growth of income and employment in urban regions. Urban poverty, housing, land use, transportation, and local public services, with special reference to economic efficiency and social progress. Not open to students who have had Econ. 425.

Econ. 527-3. Economics of Transportation. Survey of transportation in U.S. First part of course deals with development of inter-city transportation via water, rail, highway, and air. Second part deals with the urban transportation problem, comparing private and public alternatives. Not open to students who have had Econ. 427.

Econ. 553-3. Resource Economics. Application of economic theory to resource-oriented industries. Not open to students who have had Econ. 453.


Econ. 627-3. Seminar: Urban Transportation. Problems and methodology in dealing with urban transportation. Planning models, characteristics of systems, direct and indirect costs and benefits with emphasis on Denver. Required paper on some aspects of transportation in Denver. Prereq., Econ. 427 or equivalent.


Econ. 653-3. Natural Resources Economics. Application of economic theory to physical resources such as land and renewable resources, as well as to exhaustible resources. Prereq., Econ. 407 or 408.

Econ. 654-3. Seminar: Environmental Economics. Effects of economic growth on the environment; application of economic theory of external diseconomies, cost-benefit analysis, program budgeting and welfare economics to problems of the physical environment. Prereq., consent of instructor.

Econ. 670-3. Seminar: Regional Economics. Theories of regional and problems of regional research such as location of industry and regional resources.


Quantitative Methods


Econ. 581-3. Introduction to Econometrics. The application of mathematical and statistical techniques to problems of economic theory. Emphasis is on principles rather than computational methods or mathematical rigor. Major topics include demand, production, and cost analysis. Prereq., two semesters of calculus and one semester of statistics, or consent of instructor. Not open to students who have had Econ. 481.

Econ. 582-3. Introduction to Econometrics II. Continuation of Econ. 581. Prereq., Econ. 581. Not open to students who have had Econ. 482.

Econ. 607-3. Mathematical Structure of Economic Theory. Application of mathematics to economics, including consideration of micro- and macro-economic models, input-output analysis, linear, nonlinear programming, general equilibrium theory.


Econ. 707-3. Seminar: Mathematical Economics. Selected topics on mathematical approaches to demand and production theory, general equilibrium theory, and theory of capital accumulation and economic growth. Emphasis on periodical literature. Prereq., consent of instructor.


International Economics and Economic Development

Econ. 541-3. International Trade and Finance. Theories of interregional and international trade, private and public trade, world population and resources, tariffs, and commercial policy. International economic organization. Not open to students who have had Econ. 441.

Econ. 577-3. Economic Development—Theory and Problems I. Theoretical and empirical analysis of problems of economic development in both underdeveloped and advanced countries. Not open to students who have had Econ. 477.

Econ. 578-3. Economic Development—Theory and Problems II. Current conditions of economic development, with emphasis on accelerating and maintaining growth. Not open to students who have had Econ. 478.

Econ. 587-3. Economic Development of Latin America. Current problems of economic development in Latin America. Not open to students who have had Econ. 487.

Econ. 589-3. The Economics of Africa and the Middle East. Current problems of development faced by African and Middle Eastern economies. Emphasis on case studies, regionalism, planning, and ramification of economic change. Not open to students who have had Econ. 489.


Econ. 677-3. Economic Planning and Development. Deals with role of planning in economic development with particular reference to investigation of planning problems in Southeast Asia and the Middle East.

Econ. 687-3. Seminar: Economics of Latin America I. Research on the economic problems of Latin America. Prereq., Econ. 487 or 587: Spanish 212 or equivalent.

Economic History, Systems, and Institutions

Econ. 551-3. Economic History of Europe. Evolution of industrial society with emphasis upon the growth and development of English industry and commerce. Not open to students who have had Econ. 451.

Econ. 552-3. Economic History of the United States. American economic organization and institutions and their development from colonial times to the present. Not open to students who have had Econ. 452.

Econ. 571-3. Comparative Economic Systems. Critical study of socialism, capitalism, communism, cooperatives, and other proposed
Human Resources Economics and Labor Economics

**Econ. 560-3. Introduction to Human Resources.** Economics of investments in man, including the economics of poverty and the application of cost-benefit analysis to social welfare programs. Not open to students who have had Econ. 460.

**Econ. 561-3. Labor Economics.** Study of problems associated with determination of wages, hours, and working conditions in the American economy. History and analysis of economic effects of trade unionism and other social institutions, including agencies of formal government. Not open to students who have had Econ. 461.

**Econ. 562-3. Economics of Collective Bargaining.** Scientific analysis of processes by which labor and management democratically reach agreements; how differences between labor and management are settled by means of grievance procedure and arbitration; and overall economic effect of collective bargaining on goods produced by the national economy. Demonstrations, workshops, and lectures. Not open to students who have had Econ. 462.

**Econ. 563-3. Income Security.** Development of social insurance in various countries, with emphasis on the United States. Security in old age, unemployment, accident, sickness, and other income-loss situations. Economic analysis of costs and risks of social security; types of carriers, problems of administration. Critical examination of recent American social security legislation. Not open to students who have had Econ. 463.

**Econ. 564-3. Collective Bargaining, Labor Law, and Administration.** Study of social pressures that are shaped into labor policy acceptable to labor, management, and the general public by various means of social control. Evolution of a "common law" of labor relations out of free collective bargaining and arbitration. Not open to students who have had Econ. 464.

**Econ. 661-3. Seminar: Labor Economics.** Advanced study of the history, nature, and function of labor organization; the process of wage determination; and the formation of public policy.

**Econ. 666-3. Seminar: Human Resources.** The economics of investment in human capital including the economics of poverty and the application of cost-benefit analysis to social welfare programs.

**EDUCATION**

**Graduate Program**

Graduate study in education at the University of Colorado is offered on three campuses (Boulder, Denver, and Colorado Springs) and through 14 program areas. The graduate programs are administered through the Office of the Associate Dean for Curriculum and Instruction, and all inquiries regarding programs should be directed to the Associate Dean for Curriculum and Instruction, School of Education, University of Colorado, Boulder, Colorado 80309 or to the Associate Dean of the Graduate School at UCD. A wide range of professional and academic interest is served by these programs. The programs of study can be taken in the following areas:

- Guidance and counseling (elementary, secondary, and agency settings)
- Early childhood education
- Educational psychology
- Elementary education
- Library media
- Reading
- Secondary education
- Social foundations

Doctoral work can be taken in some of the above areas. For specific information consult the adviser. Graduate study in education is offered at three levels: for M.A. (thesis and non-thesis) and M.Ed. degrees, for the Specialist in Education (Ed.S.) degree, and for Doctor of Education and Doctor of Philosophy degrees (Ed.D. and Ph.D.). Each level is discussed in the following pages; more detailed information can be found in the Graduate School Bulletin.

Outlines of each of the graduate programs of study are available upon request from the School of Education office at UCD. Since many graduate degree plans offered by the School of Education are flexible and can be designed around individual student needs, it is highly desirable that the prospective candidate discuss his tentative program of studies with appropriate faculty members prior to submitting an application.

**Application for Admission**

A prospective candidate should request application forms from the Graduate School office. The completed form should be returned to the Associate Dean for Curriculum and Instruction, School of Education, Boulder Campus, together with a $20 application fee. The fee should be in the form of a check or money order made out to the University of Colorado. Two copies of official transcripts of all previous college and university study should be ordered by the applicant to be sent to the associate dean. Four recommendations on the forms provided, or by letter, should be furnished; at least two of these should be from college or university professors who can write with assurance about the applicant's academic and professional achievement and promise. One or two recommendations from supervisors or employers are acceptable with reference to an applicant's ability and contribution to the enterprise with which he was or is associated. Application papers and all supporting documents (including GRE scores, see below) must be in the associate dean's office on March 1 for summer, June 1 for fall and on October 1 for spring semester.

Applicants should request the Educational Testing Service to send their scores on the Aptitude Test (verbal and quantitative) of the Graduate Record Examination (GRE) to the associate dean. If an applicant has not taken the GRE, he should arrange to do so. Applicants are not cleared for admission if GRE scores are lacking or if the faculty finds the scores unsatisfactory. (The GRE is administered at many centers throughout the country. Information about the GRE may be obtained from the Graduate School office or the Student Relations office at UCD, or the Educational Testing Service, 20 Nassau Street, Princeton, New Jersey 08540, or from the graduate office of a university in the applicant's area.)

**Master's Degree**

Two Master of Arts degree plans and a Master of Education plan are available, each comprising one academic year or more of graduate work beyond the bachelor's degree. The minimum residence requirement for any master's degree is one academic year or the equivalent, and it may be satisfied by two semesters in residence, or three full summer sessions, or any combination equal to two semesters. (For part-time credit toward meeting the residence requirement, see the Graduate School Bulletin.)

**Degree Requirements**

1. **M.A.-Plan I (With Thesis).** The program consists of 24 semester hours or more, including 4 semester hours for the master's thesis. While the inclusion of a minor field is not required by the Graduate School, a student and his adviser may agree on a minor, in which 4 to 8 semester hours can be applied toward degree requirements.

The M.A. thesis is written in accordance with specifications set by the Graduate School and under the supervision of
Education as a Minor Field

In M.A. programs providing for majors outside the School of Education, students may include education as a minor if both their major department and the associate dean for curriculum and instruction in the School of Education approve. For master’s degrees, a minor in education consists of at least 6 semester hours of study beyond the master’s degree but who do not plan to study for a doctorate.

Specialist in Education (Ed.S.)

The Ed.S. degree (non-thesis) program affords opportunities for graduate study extending one academic year beyond a master’s degree. The program involves approximately 30 semester hours of course work and is intended to serve the needs and interests of a variety of career people in education who want specialized and up-to-date preparation beyond the master’s degree but who do not plan to study for a doctorate.

Prerequisites for Admission

Applicants for admission are required to have an acceptable master’s degree and an undergraduate record which gives evidence of a good general education. The master’s degree should be in a field which provides an appropriate foundation for the additional year of graduate study to be pursued.

An undergraduate grade-point average of 2.75 or better is required, and/or an average of 3.0 or better for the master’s degree. Scores made on the Aptitude Test of the Graduate Record Examination are required as part of the application.

At least one year or more of teaching or other appropriate experience is required.

Program of Study

When an applicant is admitted, he is notified of the appointment of a faculty adviser. He and his adviser formulate a program of study providing for approximately 30 semester hours of course work.

There is an outline of recommended studies appropriate for individuals pursuing Ed.S. study in most education program areas, and students are expected to follow the recommendations unless they have arranged appropriate substitutions in advance with their advisers. Pamphlets outlining the recommended programs of studies are available from faculty members or the Office of the Associate Dean for Curriculum and Instruction.

When a student and his adviser agree on an appropriate program of studies, the student is required to submit a degree plan signed by him and his adviser. Forms for degree plans are mailed to officially accepted applicants with their notices of acceptance. These forms must be submitted to the associate dean by the end of the student’s first term as an admitted graduate student.

Doctoral Study in Education

Doctoral students in education must apply for admission to the Boulder Campus of the University. A majority of doctoral-level course work must be taken on the Boulder Campus. Special permission is required on a course-by-course basis for study at UCD. Approval for each doctoral level course taken at UCD must be obtained in writing from the dean of the School of Education, Boulder Campus, 60 days before the course begins.

Two types of doctoral degree programs in education are offered under the auspices of the Graduate School and the School of Education. Prospective doctoral students may apply for admission to either program, the choice depending chiefly on their professional or career objectives. The Doctor of Education degree (Ed.D.) is intended primarily to meet the needs of careers in education for advanced study, e.g., teachers in the schools, school or college administrators, guidance counselors and student personnel directors, college or university professors of education. For one who plans to teach in an academic subject matter department and not to be involved in teacher education, a Ph.D. in his major subject field would be preferable, with some work in higher education as electives. The Ph.D. would also be highly appropriate for one who plans a career as a university professor of education or as director of educational research in a state or city school system.

Doctoral programs require a period of study and research of two academic years (four semesters) or more beyond a master’s degree (or in the case of some Ph.D. students three years beyond a bachelor’s degree). At least two semesters of full-time study in residence during one academic year are required, the remainder of the residence requirement may be satisfied by any combination of study in academic years or summer terms, subject to the definition of full load stated previously in this bulletin. For an Ed.D. student whose program calls for certain specialized study at some other university, residence credit for one semester may be earned elsewhere and counted toward meeting the minimum residence requirement, if his adviser and the associate dean approve.

Since the Ed.D. and Ph.D. programs differ only in certain aspects of content and not in procedures, they are discussed together in the following pages. Such differences as currently pertain are clearly pointed out.

For specific information on doctoral study refer to the Graduate School Bulletin.
Admission Requirements

Applicants for admission to doctoral study are expected to have a good liberal arts background, approximately 18 semester hours of undergraduate credit in education or a master's degree in education, and an undergraduate average of 3.0 or better on a 4.0 scale, i.e., B or better. An average of 3.0 or better is expected on all graduate work completed. Ed.D. applicants must have an appropriate master's degree, preferably in the field of their proposed doctoral studies or closely related. Ph.D. applicants are not in all cases required to have a master's degree, although it is deemed generally preferable. At least two years of professional experience relevant to applicants’ proposed advanced studies is required for most programs.

Graduate Record Examination scores (Aptitude Test) are a required part of the application for admission. An interview with a faculty admissions committee may be required.

Students should also refer to the general discussion of the graduate program at the beginning of this section.

An outline of recommended studies appropriate for individuals pursuing study in most education areas is available from faculty members or the School of Education office. Students are expected to follow the recommendations unless they have arranged appropriate substitutions in advance with their advisers.

HOUSING INFORMATION

Information on married student housing may be obtained from the Manager of Family Housing, University of Colorado, 1350 20th Street, Boulder, Colorado 80302. Single students may obtain information from the Student Residence Reservation Center, Hallett Hall, University of Colorado, Boulder, Colorado 80310.

GUIDANCE AND COUNSELING

G.C. 501-3. Foundations of Personnel Services. Introduction to the field of guidance and personnel services. Topics include objectives of guidance and counseling, theoretical bases of counseling, roles and functions of counselors in a variety of settings.

G.C. 502-3. Laboratory in Personal Appraisal. Taken in conjunction with G.C. 501, this course provides the student with experiences designed to stimulate self-appraisal concerning the field of guidance.


G.C. 530-2. Field Work in Agency Counseling. Focuses on directed observational experience in a variety of agency counseling settings. Settings include rehabilitation agencies, employment services, mental health clinics, etc.

G.C. 531-2. Field Experience in Guidance. The primary emphasis is on observational experiences in various counseling and personnel service settings. The experiences will help students familiarize themselves with the counseling techniques used in these settings.

G.C. 533-3. Professional Seminar in Guidance. Provides in-depth attention to a limited number of special interest topics to be determined by the interest of the students and instructor.

G.C. 580-3. Elementary Guidance. Examines the roles and functions of the counselor at the elementary school level. Growth and development stages will be presented as well as appropriate guidance techniques.

G.C. 581-3. Intervention Strategies in Elementary Guidance. Prepares persons to assume the role of a counselor at the elementary level. Consultation, counseling, and coordination strategies will be emphasized as they relate to the elementary school.

G.C. 582-3. Strategies in Agency Settings. Explores the role and function of the counselor in agency settings with emphasis on the underlying historical and theoretical concepts.

G.C. 584-3. Readings in Guidance Development. This workshop focuses on special problems in the development of guidance services. Major activities are directed readings and small group work sessions.


G.C. 586-3. Organization and Administration of Guidance and Personnel Services. Advanced professional course dealing with problems of program organization, development, and management; implementation of guidance strategies; and principles of organizational behavior.

G.C. 640-3. Career Development. Provides students with competencies in career development and career counseling. Topics include theories of career development, information systems, decision making, and awareness of self and the world of work.

G.C. 641-2. Measurement and Appraisal. Helps the student gain competence in the basic fundamentals of tests and measurement. Topics include standardization, correlation, reliability, validity, norms, scoring, standard error of measurement, and restriction of range.


G.C. 678-3. Advanced Practicum in Counseling. Supervised counseling experience, report writing, and case staffing procedures with emphasis on professional staff collaboration.


EARLY CHILDHOOD EDUCATION

E.C.E. 501-3. Context and Curriculum Content of Early Childhood Education. Emphasis on contextual concerns such as procedures for organizing physical space, environments, materials, and methods articulated with the present developmental and learning level of the child. Content areas will include language arts, reading, speech development, arithmetic, creativity, science, and other subjects common to the preschool.

E.C.E. 502-3. Educational Programs for Young Children. Emphasis on program models providing early stimulation for students being developed under Head Start, Follow-Through, experimental programs, etc. Program models will be examined in terms of their relative views of the intellectual, social, and physical development of children and programs' different objectives and procedures.

E.C.E. 513-2. Directing Programs for Young Children. Analysis of organizational factors and instructional events in the classroom. Facilitation of teacher effectiveness through supervisory feedback and in-service development. Special attention is given to supervisor-teacher relationships and processes for feedback.

E.C.E. 514-3. Measurement and Assessment in Early Childhood Education. Includes cognitive, affective, and psychomotor areas, traditional techniques as well as nonobtrusive measures, human- and video-observational schemes, etc.

E.C.E. 530-3. Administrative Seminar: Selected Topics in Early Childhood Education. Emphasis on those topics required of administrators of ECE programs in day-to-day operations (philosophy, finance, programming, management, community/parent relations, etc.). Special attention is given to unique administrative concerns in programs for special categories of children such as toddlers, school disadvantaged children, etc. Preaper., E.C.E. 500, E.C.E. 502.


E.C.E. 569-4. Proseminar: Research in Early Childhood Education. Selected topics with emphasis on research findings in the administration, supervision, learning, and use of evaluation in such programs. Proseminar will concentrate on child development and educational research findings essential to participating in a firm understanding of the child as he evolves from infancy to elementary school age. Students also will be made aware of different philosophies and ways of looking at the child that exist in the field and the educational implications of each. Societal influences on educational development. Related topics include the role of
federal, state, and local government in early education programs, prac-
tice, and research. Prer., R.E.M. 612, R.E.M. 501, E.C.E. 514, any two of

E.C.E. 570-3. Clinical and Educational Practicum in Elementary Child-
hood Education. Includes planned experiences built around the clinic
and ECE classrooms in operation. Students observe special programs
designed for both normal and abnormal preschoolers. Selected settings
include public schools, Head Start, day care, and private preschool
programs. The practicum will require 30 to 40 clock hours of field
placement experience with concurrent classroom meetings. Prer., 15
credits in E.C.E. program.

E.C.E. 579-4. Practicum in Early Childhood Education. Includes
planned experiences in either administration, supervision/teacher training,
or research in area ECE centers and programs. The practicum will require
a minimum of 180 clock hours under supervision. Provides the opportu-
nity to make decisions about young children and to examine simultane-
ously the decision-making process and its results. Whenever feasible,
students will be concentrated in a few shared sites, often where faculty
are also involved. Prer., E.C.E. 570.

E.C.E. 590-1 to 4. Independent Study in Early Childhood Education.
E.C.E. 591-1 to 4. Readings in Early Childhood Education.
R.E.M. 501 plus 20 credits in E.C.E. program.

E.C.E. program.

EDUCATIONAL PSYCHOLOGY

Ed.Psy. 500-3. Advanced Psychological Foundations of Education. A
survey of results of psychological inquiry with emphasis on applications
to educational practices. Major topics are motivation, behavior, learning,
development, and characteristics of teachers and students.

Ed.Psy. 510-3. Advanced Child Growth and Educational Develop-
ment. A review of knowledge of human growth and applications of this
knowledge. Emphasis on key theories of child development.

Ed.Psy. 511-3. Human Learning. A review of research methods and
results of the study of cognition and memory with implications for
instruction and other educational practices.

theory in motivation and learning with emphasis on analysis of classroom
behavior. Instructional modules will be used as well as more traditional

techniques.

Ed.Psy. 513-3. Children's Thinking. A review of the psychology of
thinking with emphasis on developmental changes in modes of thought.
Topics include inference, problem solving, conceptual behavior, and
creativity.

Ed.Psy. 580-1 to 4. Working with School Groups. Techniques of
managing and facilitating classroom and other related groups.

Ed.Psy. 590-1 to 4. Independent Study in Education Psychology.
Ed.Psy. 591-1 to 4. Readings in Educational Psychology.


ELEMENTARY EDUCATION

E.I.Ed. 531-3. Children's Literature. Reading and evaluation of books
for children, information about children's books, children's interest in
reading, important authors and illustrators, and problems in the guidance
of reading.

E.I.Ed. 532-3. Advanced Language Arts in Elementary School. Cur-
rent thought, as determined by research findings, in the various areas of
the language arts: oral and written communication, spelling, handwriting,
usage, grammar, and foreign languages.

E.I.Ed. 533-2 or 3. Current Literature for Children. Current books and
media material in children's literature. This course is for people who have
not had a course in this area within the past five years. Prer., course in
children's literature.

E.I.Ed. 534-3. Language Arts for Urban Schools. Adaptation of intact
sensitiveness for listening, speaking, reading, and writing. Diagnosis for weak-
nesses in listening, speaking, and coordination and application of drama-
tic play, oracy procedures, sensory imagery, and creative expression.
Preparation of cases, records, and application of differential instruction.
(Elective at the undergraduate level.)

experimental programs and implementation of these newer programs.
Supervision and curriculum development considered.

Deals with contemporary mathematical content and teaching techniques.

More emphasis is placed on mathematical background for the teacher and
experimental projects. Prer., Educ. 431 or equivalent, and elementary
teaching experience.

study of curriculum building in mathematics at the elementary school
level (K-8). Particular attention will be given to selection of instructional
materials, establishment of content, and evaluation of programs.

Course examines existing social studies curricula from selected locations
within the United States in light of latest materials and programs. Aims at
students updating their own programs and revising them in accordance
with the latest thought and materials available.

and analysis of current innovations and concept formation in the social
studies. Includes student development and implementation of materials
for trial in classroom instruction.

Characteristics of young children. Daily and weekly program and plan-
ning. Testing and evaluation, and parent-teacher cooperation.

E.I.Ed. 580-2 to 4. Curriculum Workshop for Elementary School
Teachers. Opportunity to work on projects and problems in the school in
which the student is employed; conferences, study groups, discussion,
and work in curriculum construction. Prer., 18 semester hours in educa-
tion and teaching experience or consent of instructor.

E.I.Ed. 581-2. Supervision of Science Curriculum. Workshop for
supervisors of science in city school systems; basic content in science
fields.

E.I.Ed. 590-1 to 4. Independent Study in Elementary Education.
E.I.Ed. 591-1 to 4. Readings in Elementary Education.
E.I.Ed. 610-2. Seminar: Elementary Education. Students work on
individual topics and report orally and in writing. Prer., consent of
instructor.

E.I.Ed. 631-2. Seminar: Children's Literature. In-depth study of topics
such as development of a literature program, banning books, bibli-
otherapy, Appropriateness of Award-winning books, books for minority
groups, and trends in children's literature. Prer., course in children's
literature.

E.I.Ed. 640-2. Seminar: Elementary Mathematics Education. For
advanced students in elementary mathematics education. Content will
relate to recent literature, research and experimental programs in the
teaching of mathematics at the elementary school level (K-8).

E.I.Ed. 591-1 to 4. Readings in Elementary Education.


LIBRARY-MEDIA

L.M. 501-3. Introduction to the Library Media Center. This course is
the first course in the Library Media Program. Its purpose is to give
students knowledge, skills, and motivation to integrate people, materials,
equipment, and facilities into the school curriculum.

L.M. 503-3. Production of Educational Materials. Design and produc-
tion of instructional materials for use by school library media specialists
and teachers in educational situations. Projected and nonprojected mate-
rials produced include graphics, photography, tape recordings, and
head transparencies.

L.M. 505-3. Photography in Education. Photography in education is a
course utilizing the photographic tools of visual literacy in organized
instruction communication. Included are elements of message design,
photographic skills, visual message implementation, and evaluation.
Photographic systems employed are primarily 35mm still photography
and super 8mm motion pictures.

L.M. 507-3. Television in Education. (Same as C.T. 465.) Examines
the application of television to problems and goals in education. Further,
it stresses ways and means by which television can become a significant
part of the educational process at all levels. Finally, it provides students
an opportunity to produce and evaluate instructional TV programs.

L.M. 509-3. Programmed Learning. Designed to develop an under-
standing of the theoretical background of programmed instruction.
Laboratory time for programming, computer-assisted instruction, and
programmed instruction will be included.

L.M. 512-3. Policies and Procedures of Selection/Evaluation of Mate-
rials. Policies, procedures, selection aids, and evaluation criteria needed
to develop and maintain a school library media collection are studied.

L.M. 513-3. Materials and Services for Children and Young Adults.
Extensive and in-depth examination and evaluation of a broad range of
materials and their utilization in instructional development and curriculum design.


L.M. 516-3. Cataloging Library Media. Terminology, philosophy, and practice in the application of cataloging, classification, and filing pertaining to various types of media.

L.M. 518-3. Administration of Library Media Programs. Administrative problems related to all the common educational media programs are studied. Primary emphasis is placed on the organization and administration of the educational media services that support and extend opportunities for teaching and learning in the public schools.

L.M. 520-3. Methodology in Library Media Research. Analysis, evaluation, and interpretation of published library media research with examples of studies using the analytical, historical, descriptive, or experimental method and application of appropriate research methodology to a problem in the library media field.

L.M. 535-3. Information Storage and Retrieval. Examination of the various types of retrieval systems for use in a school media program. Several approaches to information retrieval include: (1) manual information retrieval systems, (2) whole document retrieval systems, and (3) computer-based retrieval systems.

L.M. 540-3. Computer-Assisted Instruction (For Teachers). Examination of and experimentation with various trends in computer-assisted instruction (CAI). Design strategies and intrinsic programming techniques are applied within an existing CAI language.

L.M. 570-1 to 4. Internship in Educational Media. Provides practical experience in the duties, services, and administration of a library media center. The intern will work cooperatively under the direction of the educational media supervisor of the participating library and a faculty adviser.

L.M. 580-3. Educational Media-Theory and Practice for Teachers. The nature and scope of educational media, their nature and use are covered through practical hands-on experiences with audiovisual equipment and materials.

READING

Rdg. 500-3. Improvement of Reading Instruction in the Elementary and Middle School. Comparative analysis of current and emerging philosophies, programs, and instructional practices for teaching reading in the elementary and middle school. Examination and evaluation of basal textbook, individualized, programmed, and hardware reading programs.

Rdg. 501-3. Developing Reading Skills in the Junior and Senior High School. Teaching techniques to improve reading skills and efficiency among junior and senior high school students. Examination and evaluation of survey and diagnostic tests at secondary level.

Rdg. 502-3. Teaching Reading in Content Areas at the Secondary Level. Format variations from content area to content area, materials, equipment, content-response, vocabulary, variations in comprehension, and variations in study procedures.

Rdg. 506-2. Teaching Reading at the College Level. Methods, materials, study skills, and levels of comprehension adapted to the college student requiring reading proficiency for academic success. Prer., consent of instructor.

Rdg. 510-3. Diagnostic and Remedial Techniques of Reading. Causes of low reading ability and techniques employed in teaching the poor reader; diagnosis, motivation, and skills.

Rdg. 532-2. Advanced Language Arts in Elementary School. Current thought, as determined by research findings, in the various areas of the language arts: oral and written communication, spelling, handwriting, usage, grammar, and foreign languages.

Rdg. 533-2 or 3. Current Literature for Children. Current books and media material in children’s literature. This course is for people who have not had a course in this area within the past five years. Prer., course in children’s literature.

Rdg. 535-2. Reading as a Social Force. An overall survey of mass communication fields (print, radio, film) with special emphasis on social responsibility and the role of reading in the classroom of today.

Rdg. 570-4. Reading Clinic Procedures I (Elementary). Supervised diagnosis of reading problems; evaluation instruments; pertinent research; case study approach. Prer., Rdg. 510 or consent of instructor.

Rdg. 571-4. Reading Clinic Procedures II (Secondary). Supervised remediation of reading problems, methods and teaching materials, and use of projectives in reading, construction of teacher-made tests. Prer., Rdg. 570 or consent of instructor.

Rdg. 580-3. Reading Workshop: Individualized Reading. Individualizing instruction with special emphasis on reading and language arts. Classroom programs for individualizing reading instruction will be examined. Models of various programs will be presented. Combined approaches will be discussed. Individual projects and background readings required. Prer., teaching experience or consent of the instructor.

Rdg. 581-3. Reading Workshop: Preparing Teachers and Administrators to Conduct Inservice Training. Designed to help teachers, administrators, and librarians work with recent program models, books, and other materials that will serve as a bridge from textbooks to children’s books to adult books. Contemporary themes integrating multilevel materials and diversified procedures with classroom instruction for elementary, middle school, junior, and senior high schools. Prer., 12 hours in education or consent of instructor.

Rdg. 582-3. Reading Workshop: Reading and Open Education. The relationship of reading instruction to learning in open education. Focuses on a comparative analysis of patterns or organization, philosophy, and psychology of reading instruction; and techniques for instructing students in working with print and other language experiences.

Rdg. 584-4. Reading Workshop: Analysis and Construction of Reading Tests and Diagnostic Instruments. The analysis of reading achievement tests, diagnostic tests, and inventories on the basis of validity and reliability to assist in the construction of varying types of reading and diagnostic instruments.

Rdg. 590-1 to 5. Independent Study: Reading. Intended only for those who wish to study along lines not followed by courses. Prer., written consent of instructor.

Rdg. 591-1 to 3. Selected Readings. Selected readings for advanced study in a specific area of reading instruction or research in reading.

Rdg. 700-0 to 4. Master’s Thesis.


RESEARCH AND EVALUATION METHODOLOGY


R.E.M. 612-3. Educational Evaluation. Study of models and methods for the evaluation of educational programs. Evaluation models proposed by curriculum and instructional researchers are critically examined. Application of methods of measurement and experimentation to evaluation problems is studied. Attention is also given to the empirical evaluation of curricula and instruction. Exemplary evaluation projects are performed and studied in detail. Prer., R.E.M. 502 or consent of instructor.


SECONDARY EDUCATION


Sec.Ed. 511-2. Supervision of Student Teachers. Designed to develop competency in the supervision of student teachers, including attention to various modern and new approaches. For cooperating teachers as well as supervisors.

Sec.Ed. 530-3. Teaching English in High School. Aims and objectives; the language arts skills—reading, writing, speaking, listening; literature for adolescents; English as a second language. For experienced teachers.

Sec.Ed. 535-3. Issues and Problems in Science Education. Recent developments in theory, curriculum, methods, and materials in secondary science examined for their contribution to the objectives of science education. Prer., high school science teaching experience or consent of instructor.

Sec.Ed. 536-3. Supervision of Science Curriculum. Workshop for supervisors of science in city school systems; basic content in science field.

Sec.Ed. 537-4. Basic Aspects of Drug Action. Covers the entire spectrum of drug use from antibiotics to vitamins to marijuana, giving the teacher a better understanding of drug use in society to make him more effective in the school drug education program.


Sec.Ed. 539-3. Teaching Afro-American History and Literature. Purpose of the course is to identify chronologically the materials of two content areas, black history and black literature, and to show various approaches to utilizing these areas to supplement courses that already exist in school curriculums in literature, history, and social science classes. Intended for public school teachers and may be of interest to community and junior college teachers.


Sec.Ed. 541-3. Advanced Methods and Strategies in Secondary Mathematics. In-depth investigation of specific methods and strategies suitable for teaching mathematics from the middle school through senior high school levels. Participants are actively involved in the process of instruction by utilizing methods and strategies being considered.


Sec.Ed. 543-3. Teaching Aids in Mathematics Education. Production and use of manipulative aids, audiovisual aids, and other materials for instruction for teaching mathematics. Open to all persons interested in teaching mathematics at any level.

Sec.Ed. 545-2. Simulation Games in Social Science. Alternate years. An introduction to the use of simulation games as a means to present social processes and information in high school social science courses. This information is available for simulation and attention to various types of game design for particular social studies courses.

Sec.Ed. 546-3. Theory and Practice of Social Science. Designed to meet the needs of experienced teachers and of those who will teach in public schools. Recent developments in theory and materials in the social studies examined and present practices analyzed for their contribution to general goals of social studies education. Appropriate for teachers in grades 7-12, but also profitable for elementary teachers with a specialization in social studies.

Sec.Ed. 559-3. Design and Analysis of Instructional Systems. The course covers the theoretical rationale underlying recent advances in instructional design. The student is also expected to develop and assess materials in his own area of specialization.


Sec.Ed. 561-3. Development of Experiential Education Programs. A seminar focusing on organizational development concepts, planning systems relevant to experiential education, and an analysis of existing programs in experiential education.

Sec.Ed. 562-3. Research and Evaluation of Experiential Education Programs. Covers fundamental statistical, basic research design, standardized instruments, instrument construction, systems analysis, approach to research, and an overview of more advanced techniques such as nonparametric statistics and multivariate analysis appropriate to the evaluation of experiential education programs in schools.

Sec.Ed. 563-3. Seminar: Experiential Education. Students identify, plan, implement, and evaluate an intensive experiential education experience. They serve as assistants to leaders directing experiential education programs and report their experiences orally and in writing.

Sec.Ed. 564-3. Intensive in Experiential Education. Open to practicing teachers, college faculty, counselors, and youth workers who are interested in initiating and being directly involved in the implementation of Outward Bound-type projects.


Sec.Ed. 570-1 to 4. Advanced Practicum in Teaching. This course is not to be used as independent study but is to be used for groups approved in advance by the dean of the School of Education. Prer., consent of instructor.

Sec.Ed. 571-3. Internship in Mathematics Education.

Sec.Ed. 572-1 to 6. Internship in Experiential Education. Spent off campus in a major project which candidates have identified and planned during the academic year, adapting the principles of Outward Bound to a school setting. Candidates will initiate, supervise, evaluate, and document their own project.

SOCIAL FOUNDATIONS

Soc.Fnd. 500-3. Advanced Social Foundations of Education. An evaluation of the social values and forces in American society that shape or influence the aims, philosophies, methods, content, issues, and problems of the American educational enterprise.

Soc.Fnd. 501-3. Education in Other Countries. A comparative evaluation of the political, historical, philosophical, sociological, economic, religious, and other foundational aspects of education in selected countries.

Soc.Fnd. 530-3. Educational Sociology. A sociological appraisal of the school in American society with reference to the status, role, activities, and relationships within the school, and of the school to other social institutions.

Soc.Fnd. 531-3. History and Philosophy of Early Education. Traces the development of educational theory and practice from ancient times to the 16th century.


Soc.Fnd. 533-3. History and Philosophy of Modern Education. Traces the development of educational theory and practice from the 16th century to the present day, including education in the United States.


Soc.Fnd. 600-3. History of Educational Thought. A critical historical analysis of important educational doctrines that have shaped Western education.


Soc.Fnd. 670-3. Teaching Internship in Foundations. A one-semester teaching internship in undergraduate or graduate foundations course. For social foundations doctoral candidates only.


ELECTRICAL ENGINEERING

Graduate programs leading to the Master of Science and Ph.D. degrees are offered at UCD in the areas of communication and information systems, computer hardware and software, control systems, and electro-optics and holography. Courses also are offered in bio-engineering,
circuits and electronics, fields and propagation, and power systems.

A student wishing to pursue graduate work in electrical engineering should read carefully the Requirements for Colorado, Boulder, Colorado. Special students and those intending to pursue a graduate program at UC are urged to consult the departmental representative as part of their application procedure.

Master's degree students are expected to present a thesis unless specifically exempted by the department. The Ph.D. preliminary examination will include the following areas:

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<tr>
<th>Bioengineering</th>
<th>Circuits (active, passive, models)</th>
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<td>Communication theory</td>
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<td>Computers</td>
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<td>Control systems</td>
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<td>Electric and magnetic fields</td>
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<td>Energy conversion</td>
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<td>Mathematics</td>
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<td>Physical and semiconductor electronics</td>
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Each student must complete two sections, mathematics and the area in which he plans to specialize, and must present an acceptable master's thesis or the equivalent as an indication of ability to perform independent research.

The electrical engineering department has no foreign language requirement for the Ph.D. degree.

Graduate Courses

The courses listed below are in general offered once per year with the exception of courses marked with an asterisk, which are offered occasionally or on demand. Also, independent study courses such as E.E. 500, 600, 700, and 800 are offered each semester.

Each year several courses are taught under the Special Topics Classification (course numbers 49X, 59X or 69X). Courses taught during the last several years include:

- Study of some mathematical theories and physical concepts related to energy functions, gauge transformations, radiation of moving charges, and special relativity. Prer., E.E. 314.
- Electromagnetic Field and Waves III. This course is a study of some mathematical theories and physical concepts related to Maxwell's Equations. The particular topics treated include the static field theory, the boundary-value problems, Green's functions and eigenfunction expansions, momentum and energy for plane waves, reflection and refraction, propagation in anisotropic media, concept of potential and energy function, radiation of moving charges, and special relativity. Prer., E.E. 513.
- Electromagnetic Fields and Waves IV. Application of Maxwell's equations to microwave passive network analysis. Topics include transmission lines, general mode theory of waveguides, discontinuities, excitations and bends in waveguides, nonreciprocal, inhomogeneously-filled and surface-wave waveguides; reflection and transmission resonant cavities; excitation and input admittance of a resonant cavity; scattering and impedance matrices of microwave junctions; special topics such as optical resonators and microwave filters. Prer., E.E. 513 or equivalent.

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- E.E. 545-3. Sampled-Data and Digital Control Systems I. A study of the analysis and synthesis of control systems characterized by the transmission of control signals by means of periodic or continuous systems. Transfer function and pulse transfer functions are introduced with applications to digital computers. Prer., E.E. 413.
- E.E. 551-3. Hardware-Software Interface. Computer engineering methods and software design applied to problems drawn from the minicomputer systems field. Hardware and software techniques will be compared and related, and general techniques for the design of a combined hardware-software system will be developed. The type of system to be considered is characterized by an interface between a computer system and an external digital device.
- E.E. 554-3. Semi-Numerical Methods for Digital Computers. (C.S. 554.) Survey of topics in the borderline area between numerical analysis and computer systems programming and design. A knowledge of assembly language and some familiarity with computer architecture is necessary for the course. Some topics covered are computer round-off error, floating point arithmetic, the generation of random numbers, and parallelism in numerical calculations. Prer., E.E. 453 or 401 and numerical analysis.
E.E. 558-3. Artificial Intelligence. (C.S. 558.) The design of machines and systems that have been created to perform tasks that are considered to require intelligence. Prereq. E.E. 201 or consent of instructor.

E.E. 559-3. Advanced Computer Architecture. A broad-scope treatment of the important concepts in the structural design of computer systems. A large number of actual computers will be studied in depth. Prereq. E.E. 459.


E.E. 563-3. Discrete Time Systems With Applications to Digital Filtering. The use of digital and discrete time systems in engineering has been increasing due to the widespread use of digital computers and because of the ease of manufacture of digital components. This course is an introduction into the techniques that are used to analyze such systems. The primary emphasis is on study of linear discrete time systems that are used to perform operations on random sequences for the purposes of signal detection, estimation, and signal improvement. The course will cover such topics as linear difference equations, Z-transforms, characterization of discrete time systems by state variables, random sequences, deconvolution filters, discrete time matched filters and Wiener filters, discrete time time-invariant prediction and filtering of discrete stochastic processes. Prereq. E.E. 381 or Math. 481. E.E. 421.

E.E. 565-3. Detection and Extraction of Signals from Noise. This course is an introduction into detection and extraction methods used in signal processing and includes such subjects as detection theory, detection of known and random signals, optimum designed detection and evaluation, estimation theory, estimation of parameters Wiener filtering. Kalman-Bucy filtering, applications to problems in communication theory. Prereq. E.E. 381 or Math. 481.


E.E. 569-3. Optical and Spatial Information Processing. This course treats the processing of two- and three-dimensional spatial information. The scalar diffraction theory necessary to describe the information-bearing wave-front is developed and wave-front recording, modulations, and reconstruction are described. Topics included are holography, Fourier transform properties of lenses, two-dimensional convolution and correlation, pattern recognition, and optical information processing. Prereq. E.E. 314 and 421 or E.E. 413, or consent of instructor.


E.E. 573-3. Tensor Analysis of Electric Energy Systems. The application of tensor and matrix methods to the analysis of energy systems and sub-systems; eigenvalues and eigenvectors; load predicting and system design; introduction to Kron's method of diakoptics. Prereq. E.E. 416 or equivalent.


E.E. 586-3. Loud Speaker Synthesis. Continuation of E.E. 585. Closed and vented box direct radiator drivers, eigenvalues of loudspeakers; closed box loudspeaker analysis; Thiele alignment of vented box loudspeakers; filter assisted alignments; Small's synthesis of acoustic parameters; Small's synthesis of mechanical parameters; limitations of marketed systems; further handling considerations; crossover network theory. Prereq. E.E. 585.


E.E. 591-599-0 to 3. Special Topics. Intermediate courses of variable title and variable credit, usually offered once by guest lecturers. See current departmental notices for details.

E.E. 593-3. Minicomputer Programming. An introduction to the assembly-language programming of minicomputers. Although most of the material will be directed toward the Nova 1200, other machines will be discussed and their features compared. Students will acquire hands-on experience in the computer laboratory. Prereq. E.E. 201 or equivalent.

E.E. 593 I to 6. Independent Study. Affords an opportunity for students to do independent creative work. Prereq. consent of adviser.


E.E. 641-3. Advanced Theory of Control I. Optimal control theory; Pontryagin's maximum principle; discrete maximum principle; stochastic optimal control; computational methods. Prereq. or coreq. E.E. 544.

E.E. 642-3. Advanced Theory of Control II. Nonlinear adaptive systems subject to deterministic and random inputs and disturbances; phase-locked loop; time-varying systems; identification theory; learning systems. Prereq. E.E. 542 and 544.


E.E. 663-3. Digital Filtering Applications in Communication. This course presents the application of digital filtering theory to problems in communication and signal processing. Topics covered include computer implemention techniques, fast Fourier transforms, quantization effects, array processing, and recursive (adaptive) digital filtering. Prereq. E.E. 563.

E.E. 673-3. Advanced Synchronous Machines. Study of transient characteristics of synchronous machines such as short-circuit currents and

Not offered every year.

Offered primarily in Boulder.

Temporary course number.
torques, out-of-phase synchronizing, and starting torque. Prer., E.E. 416 or equivalent.


E.E. 691 to 699-0 to 3. Selected Topics. Courses of variable title and variable credit, usually offered once by guest lecturers. See current departmental notices for details.


E.E. 800-variable credit. Doctor's Thesis.

**MASTER OF ENGINEERING DEGREE**

The Master of Engineering degree program is administered by the Graduate School through the departments of engineering. The requirements for admission and for quality and quantity of academic work are essentially the same as for the Master of Science degree awarded in the College of Engineering and Applied Science.

The principal difference between the Master of Engineering degree and the Master of Science degree is that the Master of Engineering is intended especially to meet the needs of those practicing engineers who are working full time outside the University and who wish to carry on an integrated program of studies in an exceptionally broad interdisciplinary field in engineering and allied subjects related to the individual student’s professional work. Examples of broad interdisciplinary fields include engineering and the social sciences, engineering and the biological sciences, engineering and the behavioral sciences, engineering and public administration, engineering and law, and engineering and business administration. A successful program to meet these needs requires greater flexibility in operation than is normally possible or intended under the existing Master of Science degree program.

The degree will be especially valuable for continuing education programs for engineers in industry. It will provide a framework for such persons to work toward a significant goal fitted to their particular interests. The program will make effective use of the present TV tape program for offering engineering courses from the University (the ACE program). The ACE program, plus extended use of live TV offerings, will make the program available on a comprehensive basis at various areas throughout the state.

The degree is not intended as a means to permit a random, unguided selection of courses. Each prospective student is required to present a well-defined objective in order to be admitted to the program. An academic program is developed to meet this objective in consultation with the faculty advisers.

The requirements for the degree are 30 credit hours plus a written report on a creative investigation which may be related to the student’s professional work. The report will be of the same general quality as that required for the thesis for the Master of Science degree and must be defended orally, but does not in itself carry credit, nor require registration. It may be based upon work done for credit under independent study. At least 15 credit hours must be in engineering at the 500 level or above. As many as 15 credit hours may be taken outside of engineering. Credit in courses below the 400 level will not apply toward degree requirements.

Requirements relating to the following items are the same as those for the Master of Science degree as awarded in the College of Engineering and Applied Science: admission to Graduate School, application procedures, registration, quality of graduate work, status, credit by transfer, residence, admission to candidacy, and time limit.

The admission of each student to graduate study, the approval of his degree program, admission to candidacy for the degree, and the approval of the awarding of a degree are to originate through a specific department of the College of Engineering and Applied Science in the same manner as for the established Master of Science program. An advisory committee, consisting of not fewer than three faculty members, will be appointed for each student by his department. The membership of each advisory committee shall be chosen from the various interdisciplinary academic areas represented in the student’s program and will be from more than one department. The advisory committee guides the student. It is responsible for approving the individual’s degree program and admission to candidacy; it approves the student’s written report and the awarding of the degree.

**Further Information**

Additional information about the degree may be obtained from the Graduate School Bulletin, the Graduate School on the Boulder Campus, or College of Engineering and Applied Science departmental offices on the Boulder and Denver campuses.

**ENGLISH**

Students admitted to graduate study in English may complete all or substantially all of their course requirements for either the M.A. or Ph.D. at UCD; examinations are administered through the English Department on the Boulder Campus.

Admission requirements for graduate study in English include satisfactory scores on verbal and advanced (literature) parts of the Graduate Record Examination, plus at least 24 semester hours in English (exclusive of composition, creative writing, speech, and literature courses counting as credits in education, but including 6 hours of Survey of English Literature), of which at least 16 semester hours must be in upper division work.

Students wishing to pursue graduate work in English should note Requirements for Advanced Degrees in this bulletin. They also should obtain a copy of the brochure, *Graduate Study in English*, issued by the English discipline and should consult the director of graduate English studies at UCD.

All students planning to take any graduate English examination must state their intentions to the director of graduate English studies at UCD at least three weeks prior to the date of the examination.

**Courses Primarily for Graduate Students**


Engl. 585-3. History of the English Language. Same as Engl. 485. Additional class meetings to be arranged for graduate students.


Engl. 589-3. Semantics. Same as Engl. 489. Additional class meeting to be arranged for graduate students.

*Not offered every year.*
FINE ARTS

Significant course work at the graduate level can be taken at UCD in this discipline, but degree programs must be completed on the Boulder Campus. Courses at the 400 level also may be used for graduate credit as part of the minor; 500-level courses are open to qualified seniors.

Fine Arts 470/570-3. Primitive Art (African and Pacific Areas). Native arts of various African peoples as well as those of the major island groups of the Pacific area.

Fine Arts 471/571-3. Pre-Columbian Art. Architecture, sculpture, and painting of the ancient cultures of Meso-America and the Andean area before the Spanish conquest.


Fine Arts 492/592-3. Modern Art II. A survey of major trends in painting and sculpture from the present (1924-).


Fine Arts 496/596-3. Art Seminar. Creativity and problem solving, exploration of the process of problem solving through the means fundamental to all artistic endeavors, i.e., making and doing.

Fine Arts 500/501-3. Graduate Drawing. A creative approach to problems involving varied subject matter and painting media with an emphasis on individual development.

FRENCH

The following graduate-level courses are offered at UCD.


GEOGRAPHY

An M.A. degree program is offered at UCD emphasizing the spatial analysis of a variety of urban phenomena.

Significant course work at the Ph.D. level can also be completed at UCD. Courses at the 500 level are open to qualified seniors.

Geog. 500-3. Introductory Quantitative Methods in Geography. The application of quantitative techniques to geographic research problems. Not open to students who have had Geog. 400.

Geog. 506-3. Geographical Interpretation of Aerial Photos. Use of aerial photographs for the analysis of vegetation, land-forms, agriculture, and urban-industrial patterns. Prer., Geog. 306 or consent of instructor. Not open to students who have had Geog. 406.

Geog. 531-4. Principles of Geomorphology. (Geol. 463/563.) Systematic study of weathering, mass-wasting, fluvial, wind, and marine processes and the landforms resulting therefrom. Prer., Geol.-Geog. 101 or equivalent and elementary chemistry, or consent of instructor. Not open to students who have had Geog. 431 or Geol. 463.


Geog. 561-3. Urban Geography: Economic. An introduction to the origin, economic growth processes, distribution, and functions of urban areas. Not open to students who have had Geog. 461.

Geog. 562-3. Urban Geography: Social. Analysis of the social, behavioral, and other factors influencing the spatial arrangement of cities. Not open to students who have had Geog. 462.

Geog. 563-3. Transportation Geography. Concepts and theories leading to description and understanding of the relationships between people, products, and transportation systems over space and time. Not open to students who have had Geog. 463.

Geog. 564-3. Problems in Urban Geography: Socioeconomic. A study of contemporary social and economic problems of metropolitan areas and
introduction to applicable research techniques. Prer., Geog. 461/561 or consent of instructor.

Geog. 565-3. Location Analysis of Human Activities. The study of distributions, densities, and migration flows. Not open to students who have had Geog. 465.


Geog. 573-3. Population Geography. Analysis of population dynamics, distributions, densities, and migration flows. Not open to students who have had Geog. 473.

Geog. 599-variable credit. Readings in Geography.


Geog. 660-3. Advanced Quantitative Methods in Geography. Continuation of Geog. 460/560 with emphasis on more advanced mathematical and statistical techniques in geography and related fields. Prer., Geog. 460/560 or consent of instructor.

Geog. 661-3. Seminar: Geographic Problems. Emphasizes research methods and their applications to selected topics. An intensive classroom and field course involving the entire departmental faculty working as individuals with graduate students.


Geog. 699-1 to 3. Independent Study. Independent research for graduate major students. Prer., consent of department.


Geog. 800-1 to 8. Doctor's Thesis.

GEOLOGICAL SCIENCES

Course work at the graduate level can be taken at UCD in this discipline, but degree programs must be completed on the Boulder Campus.

Geol. 563-4. Principles of Geomorphology. (Geog. 431/531.) Systematic study of weathering, mass-wasting, fluvial, wind and marine processes, and the landforms resulting therefrom. Prer., elementary geology or equivalent and elementary chemistry, or consent of instructor. Offered occasionally. Not open to students who have had Geol. 463 or Geog. 431.

HISTORY

Master's Degree

Prerequisites

As general preparation for graduate work in history, it is desirable for a student to have had undergraduate courses in government, geography, and economics as well as a major in history. Candidates for graduate degrees may be required to pursue such fundamental courses in history as the department deems necessary to provide a suitable understanding of the processes of history. The candidate with degree status is required to take the verbal section of the Graduate Record Examination before enrolling in the discipline's graduate program, and demonstrate adequate background for candidacy.

Residence

While it is possible to obtain the M.A. degree in two full semesters of residence, it is frequently advisable and at times necessary that more time be spent in graduate work.

Degree Requirements

A total of 24 semester hours plus a thesis is required for the degree. The required qualifying examination is met by a satisfactory score on the Graduate Record Examination. A comprehensive examination must be passed before the degree is granted.

Graduate Courses

The following graduate-level courses are offered at UCD. Courses at the 500 level are open to qualified undergraduates.

Hist. 505-3. The New South.
Hist. 530-3. History of France Since 1815.
Hist. 559-3. American Southwest.
Hist. 587-3. History of South Africa.
Hist. 644-3. Readings in Modern European International History. Topics will vary.
Hist. 660-3. Readings in the American Southwest.
Hist. 693-2. Readings in Modern Russian History.
M ASTER OF HUMANITIES DEGREE

The Master of Humanities is an interdisciplinary degree offered at UCD. Its purpose is to provide an opportunity for students to broaden their understanding of the relationships among the several areas normally subsumed under the heading of humanities, e.g., communication, philosophy, the arts, literature, and the languages. The M.H. program is especially suitable for the many high school, junior high school, and elementary school teachers who find themselves in the position of having to teach in several different areas of the humanities. However, the M.H. program is by no means restricted to teachers.

All courses required for the M.H. degree are offered at UCD.

Admission

Each student is required to take the Graduate Record Examination aptitude test as an aid in the planning of his studies for the degree. Before entering the M.H. program, a student is expected to have had at least 40 semester hours in the humanities. Humanities, as used here, is broadly conceived to include general studies in communication, theatre, philosophy, literature, the arts, the languages, and other areas as agreed upon by the student and the Graduate School.

General requirements of the Graduate School governing the awarding of the master's degree apply.

Degree Requirements

All courses credited toward the M.H. degree must be taken at the University of Colorado over a period not exceeding five years or six successive summers. The M.H. degree program shall be supervised by an advisory committee appointed by the dean of the Graduate School. The committee shall consist of three members of the graduate faculty, each from a different area of the humanities.

In addition to the 6 hours for Hum. 500 and 501 (described below), candidates for the M.H. degree are expected to complete a minimum of 24 semester hours at the 500 level or higher in four of the following areas (i.e., 6 hours in each of four areas): Mathematics

Communication History
Comparative literature Music
English Philosophy
Fine Arts Spanish language and literature
French language and literature Theatre
German language and literature

(Note: As UCD expands and develops, it is expected that additional humanistic major areas will become available on the Denver Campus.)

Up to 6 hours in areas other than those listed above may be accepted as humanities as agreed upon by the student and his advisory committee.

The requirement of 6 hours in each of four areas is intended to insure that the student achieves a considerable degree of breadth. On the other hand, this requirement should not be construed as precluding the student from doing additional work in one particular field in order to achieve further depth.

Within one calendar year of entering the M.H. program, the student is required to take Hum. 500 and 501. These are 3-credit seminars which deal with the identity of the humanities, their place in the life of man, the various media through which they manifest themselves, and related matters. Hum. 500 and 501 count as part of the 30 hours required for the M.H. degree. Twenty-four of the required hours will be taken in the disciplines listed above, the remainder to be completed through Hum. 500 and 501.

Before completing 15 hours of course work toward the M.H., the student must meet with his advisory committee to plan the directions and emphases for the remainder of his studies for the degree. At this time he must submit to the committee a precis outlining his final paper or project. After completing the 30 hours required for the degree, the student is required to pass a comprehensive examination covering the three areas in which he has concentrated his course work. It should be stressed that this examination is not a combination of three different master degree examinations; rather, it is an opportunity for the student to display, and the faculty to view, the student's expertise in combining significant aspects of three different fields, bringing major trends and ideas of the three fields into meaningful relationships with each other. The examination will be composed and administered by the student's advisory committee.

After satisfactory completion of the comprehensive examination, the student must present a final thesis or project. This is a substantial scholarly and/or creative exercise involving three different humanistic areas. It is supervised by the student's advisory committee and must be performed or presented before an open seminar consisting of the committee and any other faculty members who wish to attend. The approved thesis or report of thesis-performance shall be recorded in the Graduate School.

Throughout this work toward the M.H. degree, the student must uphold the high standards of the Graduate School, maintaining at least a B average in all courses taken subsequent to his admission to the M.H. program.

Required Courses

The only courses specifically required for the M.H. degree are the new Hum. 500 and 501 described above.

The 24 hours (in addition to Hum. 500 and 501) required for the degree will normally be drawn from 500-level courses which already exist at UCD.

The language requirement for the M.H. degree is fourth-semester proficiency in a language relevant to the student's particular course of study. Such relevancy will be decided upon by the student's advisory committee.

For further information about the Master of Humanities degree program students should contact the Division of Arts and Humanities.

MATH E M ATICS

Two graduate degrees may be earned in mathematics: the M.A. in mathematics and the M.S. in applied mathematics. (Also see Master of Basic Science.) It is the
responsibility of each individual student to see that the requirements for these degrees are satisfied at the proper time.

Prerequisites for Graduate Study
To begin graduate work toward one of the above degrees, a student should have at least the following preparation: 30 semester hours in mathematics including, beyond a full course in calculus, a year's course in advanced calculus, 3 semester hours of linear algebra and either a 3-semester-hour course in higher algebra or a 3-semester-hour course in ordinary differential equations.

Students who do not have all the prerequisites for one of the advanced degrees may still be admitted provisionally if, in the faculty's judgment, their record justifies this (but see also the Graduate School admission requirements).

For a mathematics minor for a graduate degree, a full course in calculus is prerequisite.

Requirements for the M.A. and M.S.
The student must present 30 hours of course work, including a 6-hour minor. All mathematics courses submitted must be numbered 500 or higher. If the minor is taken outside of mathematics, the minor courses must be numbered 400 or higher.

These 30 hours must include at least two of the following two-semester sequences. See the Schedule of Courses for courses offered.

Math. 501-502. Topology
Math. 511-512. Theory of Numbers
Math. 513-514. Abstract Algebra
Math. 515-516. Linear Algebra
Math. 521-522. Projective Geometry
Math. 523-524. Differential Geometry
Math. 531-532. Real Analysis
Math. 535-536. Complex Variables
Math. 537-538. Topics in Applied Mathematics
Math. 541-542. Calculus of Variations
Math. 553-554. Mathematical Physics
Math. 560-561. Numerical Analysis
Math. 571-572. Logic
Math. 573-574. Set Theory
Math. 581-583. Statistics and Probability
Math. 581-587. Statistics
Math. 583-585. Probability

A two-hour written examination will be given on the content of the two sequences and two other one-semester courses that the student offers for the degree.

There is no thesis requirement for either degree.

There is no foreign language requirements for either master’s degree. However, students who may want to continue for a Ph.D. should satisfy at least one of the foreign language requirements before obtaining a master’s degree.

Mathematics offers a wide assortment of programs leading to a master’s degree. All programs must be planned in consultation with and approved by a mathematics graduate adviser.

Suggested M.A. in Mathematics

**FIRST YEAR**

| Semester Hours | Math. 505. Topics in Combinatorial Analysis | 3 |
| Math. 507. Advanced Calculus III | 3 |
| Math. 537-538. Topics in Applied Mathematics | 6 |
| Minor | 3 |

**SECOND YEAR**

| Semester Hours | Math. 550-551. Numerical Analysis I, II | 6 |
| Math. 543. Ordinary Differential Equations | 3 |
| Math. 549. Introduction to Partial Differential Equations | 3 |
| Minor | 3 |

Graduate Courses
The following graduate-level courses are offered irregularly at UCD. For courses offered any one semester, please consult the Schedule of Courses. For courses numbered above 600, consult the mathematics department.


Math. 505-3. Topics in Combinatorial Analysis. Topics such as finite combinatorial analysis, combinatorial questions entering in topology, infinite permutations and transformations, graph theory. Pre. consent of instructor.

Math. 507-3. Advanced Calculus III. Vector fields, implicit function theorem, inverse function theorem; Green’s, Stokes’ and divergence theorems; Taylor’s theorem for functions of several variables; calculus on manifolds if time permits. Pre. Math. 432 or consent of instructor, and Math. 315 or 319. Not open to students who have had Math. 433.


Math. 511-3, 512-3. Theory of Numbers I, II. Pre. abstract algebra or consent of instructor.


Math. 533-3, 534-3. Partial Differential Equations I, II. General theory of partial differential equations; first order equations; classification of second order equations; theory and methods of solution of elliptic, parabolic, and hyperbolic types of equations; maximum principles; Green’s functions; potential theory; and miscellaneous special topics. Pre. two semesters of advanced calculus.


Math. 537-3, 538-3. Topics in Applied Mathematics. Selected topics in mathematical problems arising from various applied fields such as mechanics, electromagnetic theory, economics, etc. Pre. consent of instructor.


Math. 541-3, 542-3. Calculus of Variations I, II. Classical necessary and sufficient conditions with emphasis on the simplest problems; the


Math. 585-3, 586-3. Introduction to Stochastic Processes I, II. An intermediate course in random processes with emphasis on basic principles. Topics will include Markov chains, birth and death processes, first-passage time problems, theory of runs, and darn theory. Includes review of probability theory. Applications to behavioral, biological, and physical sciences. Prer., consent of instructor.

Math. 587-3. Statistical Methods in Research. A one-semester course in the design and analysis of experiments, employing various statistical techniques such as t-tests, chi-square tests, analysis of variance and covariance, regression, analysis, distribution-free methods, graphical and other quick and approximate procedures. Emphasis on the application of the above techniques as an aid to research in the behavioral, biological, and physical sciences. Prer., consent of instructor.


Math. 593-3. Linear Programming. The general linear programming problem and commonly used techniques for its solution. Prer., Math. 315 and advanced calculus, or consent of instructor.

Math. 599-1 to 6. Independent Study. Available only through the approval of the graduate adviser. Subjects arranged to fit the needs of the particular student.

MUSIC

Graduate study in music at UCD is presently offered in several cooperative programs with the Boulder Campus. A significant amount of work toward the Master of Music Education and the Master of Music degrees may be taken in Denver. Admission to these programs is achieved by application to the Office of the Associate Dean for Graduate Studies, College of Music, in Boulder.

Postbaccalaureate study in the special areas of concentration unique to UCD include Afro-American music, composition and arranging, sound synthesis and recording, and music and media. Since these are innovative programs, prospective candidates should make personal inquiry at UCD about requirements.

The music educator intending to undertake graduate work will find the UCD programs attractive, particularly if he has special interests in jazz, rock, improvisation, sound synthesis and recording, and the repertory associated with today's youth.

The composer-arranger-performer-producer who seeks graduate training in the fields of recording, film, television, and music for advertising also will find UCD responsive to his needs.


Music 518-2. Selected Studies in Music Education. May be repeated for additional credit. Prer., consent of instructor and appropriate chairman of graduate studies.


Music 521-3 to 4. Film Scoring. A study of descriptive composition and the techniques of scoring to film.


Music 580-1 to 3. Special Studies. May be repeated for additional credit.

Applied Music Policy
All performance standards, requirements, and credits specified for a particular music degree in this college do not necessarily transfer and become acceptable for any other music degree within the college. Additional information on this policy is available from the Office of the Assistant Dean, UCD College of Music.

PHILOSOPHY

Departmental Requirements
Applicants for admission to the Graduate School for work toward a master’s or doctor’s degree with a major in philosophy are expected to have had 18 or more semester hours in undergraduate courses in the subject, including history of philosophy.

Students wishing to pursue graduate work in philosophy should note Requirements for Advanced Degrees in this bulletin and should obtain from the department a copy of the Graduate Program in Philosophy. The Graduate Record Examination is not required.

Certain special programs exist (M.A.’s in comparative East/West philosophy and in history and philosophy of science), details of which may be had on request.

All courses at the 500 level carry the following prerequisites unless otherwise indicated: 12 hours of philosophy or consent of instructor.

Phil. 500-3. Medieval Philosophy.
Phil. 501-3. Renaissance Philosophy.
Phil. 508-3. Ethics. Representative positions in normative ethics and meta-ethics.
Phil. 510-3. Topics in the History of Philosophy.
Phil. 524-3. Philosophy and Contemporary Culture.
Phil. 530-3. Philosophy of Mind.
Phil. 534-3. Epistemology.
Phil. 538-3. Metaphysics.
Phil. 542-3. Philosophy of Science. Topics connected with development and nature of science; structure of scientific theories, testing of hypotheses. Theory of decisions in science and ethics. Basic concepts and models of abstraction in history of science.
Phil. 570-3. Aesthetics. An analysis of the principal topics of aesthetics, including such issues as for formal structure of aesthetics, the nature of critical judgments, and the status of the work of art.
Phil. 575-3. Introduction to Phenomenology. An examination of the contribution of phenomenology to selected topics in the theory of meaning, philosophy of mind, ontology, epistemology through a study of such philosophers as Husserl, Heidegger, Sartre, and Merleau-Ponty.
Phil. 580-3. Philosophy of Plato.
Phil. 581-3. Philosophy of Aristotle.
Phil. 582-3. Philosophy of Hume.
Phil. 583-3. Philosophy of Kant.
Phil. 584-3. Philosophy of Spinoza.
Phil. 585-3. Philosophy of Dewey.
Phil. 586-3. Philosophy of Wittgenstein.
Phil. 587-3. Philosophy of Russell-Moore.
Phil. 588-3. Locke, Berkeley, Hume.
Phil. 589-3. Philosophy of Hegel.
Phil. 590-3. Philosophy of Whitehead.
Phil. 591-3. Philosophy of St. Thomas.
Phil. 592-3. Philosophy of Husserli.

Philo. 594-3. Topics in Recent Philosophy: The Later Heidegger and Poety.
Philo. 597-3. Seminar: Comparative Philosophy. A seminar in the problems and literature of relating non-Western philosophical methods, traditions, and results to Western equivalents or para-equivalents. Required of master’s degree candidates in comparative philosophy.
Philo. 598-3. Special Topics in Philosophy. Seminars not listed as courses in which the instructor meets regularly with three or more students to discuss special topics in philosophy. Philo. 599-variable credit. Independent Study.

For Graduate Students Only
Philo. 646-3. Seminar: Phenomenology. Intensive study of one or more topics or philosophers in the 20th-century phenomenological movement.
Philo. 662-3. Studies in Political Philosophy. A study of selected texts in political philosophy as guides to formulating the principal problems in the area and to establishing the distinctive features of political realities.

PHYSICAL EDUCATION

A variety of graduate-level courses in physical education and recreation can be taken at UCD. At the present time, the degree program must be completed on the Boulder Campus. Courses at the 500 level are available to qualified students. For further information, contact the physical education office.

P.E. 501, 502, 503-1 to 3. Seminar: Physical Education. Presentation of special aspects of current practices, materials, and trends in physical education. The functions of these topics in contemporary physical education are analyzed or experienced.

P.E. 510-2. Movement Education. The teaching of development movement and the learning of motor skills applicable mainly to the elementary school, utilizing a guided discovery-problem solving approach.


P.E. 530-2. Problems in Recreation Administration. Lecture, field work, and lab. experience in recreation administration; problems in management, finance, evaluation, and maintenance of recreation facilities.


P.E. 534-2. Financial Management for Recreation. Specific techniques of management currently being utilized in the profession. Bids, grants, tax expenditure justifications, and specific program accounting will be accredited.

P.E. 538-2. Recreation Leadership at the Administrative Level. Concepts of play and recreation; recreational needs, characteristics of various age groups.


P.E. 599-1 to 3. Independent Study. Consult adviser on topic; subject field arranged to meet needs of individual student.

P.E. 620-3. Administration of Physical Education. This class affords insight into the problems of present-day educational administration in physical education. Learning procedures essential for the effective preparation of teachers, coaches, and administrators are presented by the School of Education.


PHYSICS

While some course work at the graduate level may be taken at UCD in this discipline, all degree programs must be arranged on the Boulder Campus. Physics courses at the 400 level (see listing under College of Liberal Arts and Sciences) may be used for graduate credit for students in nonphysics graduate programs.

Phys. 552-2. Spectroscopy. Survey of atomic spectra is made from the point of view of the vector model. Zeeman and Stark effects are included. Prer., Phys. 213, 215, 331, and some vector analysis.


POLITICAL SCIENCE

Before applying for admission, a prospective student will want to read carefully the brochure which describes in detail the discipline requirements for advanced degrees. Usually, students desiring a graduate major in political science should present either 16 semester hours of undergraduate work in the subject or 12 semester hours in related fields of anthropology, economics, history, psychology, or sociology.

Students wishing to minor in political science must present at least 10 semester hours of undergraduate work in political science. The undergraduate hours presented by students desiring to major or minor in political science must include at least 6 semester hours of advanced work in political science. The departmental committee on graduate studies may make exceptions to the above requirements in unusual cases. The aptitude portion of the GRE is required.

Master of Arts in Political Science

The degree requirement shall consist of at least 24 semester hours of work at the graduate level, including a minimum of 16 hours of 500-level work or above, of which at least 9 hours must be seminar work in political science (Pol. Sci. 699 is not seminar work), and not more than 4 hours for the master’s thesis. The M.A. degree shall be awarded by the discipline to political science upon the recommendation of an M.A. comprehensive-final examination committee of not less than three faculty members who shall examine the candidate orally in three fields of concentration, including political theory, and on his thesis.

Graduate Courses

The following graduate-level courses are offered at UCD. Courses at the 400 level also may be used for graduate credit if the credit is to be used as part of a minor field. A listing of these courses is given in the College of Liberal Arts and Sciences section of this bulletin. Courses at the 500 level are open to qualified seniors.

American Government and Politics

Pol.Sci. 501-3. Seminar: American Politics. Intended primarily for students who have had an undergraduate course in American politics, this course will be devoted to the preparation and criticism of research papers, with some examination of literature in the field. Prer., graduate standing or consent of instructor.


Pol.Sci. 504-3. Seminar: The Presidency. Intensive examination and preparation of research papers on the historical, functional, and constitutional aspects of the presidency. Broad attention will be given to the literature on the presidential system and to analytical comparison with other executive systems.


Comparative Politics

Pol.Sci. 510-3. Seminar: Comparative Political—Western Europe. Examination of and writing of comprehensive research papers on selected topics of western European political institutions. Focus is on recent developments in executive decision making; the bureaucracy and its control; economic planning and welfare state politics.

Pol.Sci. 511-3. Seminar: Political Development. Writing and discussion of comprehensive papers on selected aspects of political development within the non-Western world. Focus on the theory of political development and the impact of the heuristic values of this conceptual framework for the comparative study of non-Western politics. Introduction to research methods and materials in this field.


Pol.Sci. 519-3. Seminar: Comparative Politics—Sub-Saharan Africa. Writing and discussion of comprehensive research papers on political integration and modernization in sub-Saharan Africa. Stress on comparisons among African political systems as well as with other areas of the world and on use of concepts such as elite, culture, role, and function in studying the problems.

Pol.Sci. 539-3: Administrative Problems in Developing Countries. See listing under Public Administration.

Pol.Sci. 560-3. Seminar: Comparative Political Parties and Interest Groups. Critical examination of selected topics relating to social forces, parties, and interest groups. Analysis of concepts, theories, and case studies with particular emphasis on Western political systems. Party systems in comparison; their social bases and ideologies. The role of groups and the determinants of group politics. Research material and reports.

International Relations

Pol.Sci. 521-3. Seminar: International Relations. Primarily devoted to writing and discussion of comprehensive research papers in the field of international power politics and the attempts at controlling conflicts among nations. Introduction to research methods and materials in the field.


Pol.Sci. 574-3. Seminar: Africa in World Affairs. Examination of motives, objectives, nature, and methods of intra-African and international behavior of independent African states, through such issues as national sovereignty and African unity, liberation from foreign/minority domination, and economic development. Experimentation with such methodologies and approaches as values, decision making, systems and "pre-theory."
Political Theory and Public Law

Pol.Sci. 540-3. Seminar: Topics in the History of Political Thought. Selected topics, such as freedom, justice, equality, and revolution, in leading political philosophies from classical and modern political thought.


Pol.Sci. 547-3. Seminar: American Constitutional Law. Intensive analysis of the most recent doctrinal developments in the areas of federal jurisdiction, federalism, separation of powers, commerce, taxing and war powers, civil liberties, civil rights, etc. Designed primarily for graduate students who intend to offer American government as a field for examination for an advanced degree. Prer., Pol.Sci. 447-448, or 446, or consent of instructor.

Pol.Sci. 549-3. Seminar: The Behavioral Study of Public Law. Intensive, critical examination of theoretical and substantive literature dealing with the behavior of the primary actors in the legal system—police, lawyers, judges, and citizens. Emphasis will be on the empirical approach and quantitative methods. Research papers will be required.

Pol.Sci. 590-3. Seminar: Conflict Behavior: The Politics of Violence. Theoretical and empirical analysis of conflict behavior with special emphasis on the explanation of political violence. Revolution, international warfare, and urban unrest are studied as forms of political violence, and the role of systematic empirical research is emphasized in the development of general theories of intergroup conflict.

Pol.Sci. 594-3. Seminar: Political Psychology. Role of personality variables in political attitudes, behavior, and system-maintenance and change; human nature as a parameter; political relevance of psychoanalytic, behaviorist, existential, and social psychology; alienation, ethnocentrism, dogmatism, and aggression as political variables. Prer., consent of instructor.

Pol.Sci. 641-3. Seminar: Political Thought. Intensive research in and presentation of selected topics intended to introduce the mature student to broad context with which political ideas arise. Deals with classical and modern thought. Prer., Pol.Sci. 440, 441, or consent of instructor.


Pol.Sci. 690-3. Seminar: The Formal Study of Power. Approaches to the conceptualization and measurement of power as a social behavior with applications to community, national, and international power systems. Various structures of political authority are studied with regard to the power relations implicit in each. Forms of economic and interpersonal expressions of power relationships also are examined.

General Courses in Political Science


Pol.Sci. 543-3. Problems and Concepts in the Study of Political Science. Discussion of theoretical problems in political science and the use of such concepts as interest, power, decision, law, and role as approaches to the subject matter of the discipline; problems of theory construction; the relationship of culture, groups, and governmental institutions in the resolution of conflict. It is recommended that this course be taken after Pol.Sci. 546.


Pol.Sci. 699-1 to 3. Graduate Research Topics. Independent research in some subject of interest to the graduate student. Subjects are chosen and arrangements are made to suit the needs of each particular student. Prer., consent of instructor.


PSYCHOLOGY

Students wishing to pursue graduate work leading to the Master of Arts degree should read Requirements for Ad-


Psych. 679-2. Introduction to Community Mental Health Practice. A survey of practices in community mental health and of the issues which need to be considered in evaluating these practices.

Psych. 683-2. Practicum in Interview Survey I.

Psych. 684-2. Practicum in Interview Survey II.


Psych. 699-4 to 8. Psychology Internship. Half- or full-time in an agency providing cases requiring screening, diagnosis, educational/therapeutic intervention, and/or research, with supervision by qualified professionals. Prereq., completion of one year in the UCD graduate program in psychology.


SOCIOLGY

The M.A. degree in sociology offered at UCD has an urban focus with an applied emphasis. The urban sociology program is designed to complement professional degree programs in environmental design, medicine, nursing, community health, physical engineering, public and business administration, education, and fine arts by providing advanced seminars, and planning and research opportunities in urban theory and methodology.

Requirements for Admission to the Master’s Program

1. A baccalaureate degree or its equivalent as determined by the department.
2. An overall undergraduate grade-point average of at least 2.75.
3. A combined grade-point average of at least 3.0 for all courses taken in sociology as an undergraduate or graduate prior to admission.
4. Three letters of recommendation.
5. A statement specifying the purpose and goal of advanced study.

Degree Requirements

1. Completion of a minimum of 30 semester hours of approved graduate work.
2. Completion of a project in the format of an article prepared and submitted for publication in a relevant professional journal.
5. Proseminar in Sociology—2 hrs. (Soc. 505 and 506).
6. Area of concentration—10-12 hrs.
7. Field work and project report—4-6 hrs.
8. Passing of comprehensive-final examination.

Graduate Courses

Note that Soc. 505, 506, 507, 508, 515, and 516 are open to M.A. graduate students in sociology only.


Soc. 508-3. Seminar: Research Methods. Practical applications of research design and methods and statistical techniques in a variety of research settings with a focus on student research projects. Restricted to M.A. graduate students in sociology.

Soc. 509-variable credit. Research Practicum. Consent of instructor required.


Soc. 520-3. Seminar: Secondary Analysis. A research-oriented seminar stressing the utilization of social data already collected in the test or generation of sociological theory.

Soc. 519-3. Seminar: Deviant Behavior. Examination of current theory and research on deviant behavior with an emphasis on the relationship between deviance and patterns of social exclusion.


Soc. 540-3. Seminar: Small Group Processes. Empirical and theoretical analysis of basic forms of social interaction, including such processes as attraction, conformity, cooperation, competition, social exchange, etc.


Soc. 571-3. Seminar: Political Sociology. Analysis of theories related to the political order from viewpoints of social structure, cultural values, and group behavior.


Soc. 579-3. Seminar: Bureaucracy. An inquiry into the consequences of bureaucracy based on analysis of diverse theories concerning the functions of large-scale organization.

Soc. 603-variable credit. Guided Research in Sociology. Consent of instructor required.


SPANISH

At present UCD offers no Spanish courses above 599. The courses at the 500 level are applicable to an M.A. degree from the Boulder Campus, depending upon degree plan approval by the graduate adviser in Boulder in each case.

Refer to the College of Liberal Arts and Sciences section of this bulletin for a list of 500-level courses at UCD.
Graduate School of Public Affairs

ROBERT F. WILCOX, Dean, Boulder Campus
ROBERT W. GAGE, Assistant Dean, Denver Campus

INFORMATION ABOUT THE SCHOOL

The Graduate School of Public Affairs was established in 1972 to provide an expanded program of educational preparation for the public service. The school offers two graduate degrees and a nondegree program leading to a certificate, a long-established and nationally recognized Master of Public Administration, a recently authorized Master of Urban Affairs, and a series of courses leading to the Certificate in Public Administration which is administered by the Division of Continuing Education under the guidance of the school.

The M.P.A. degree can be earned on the Boulder, Denver, and Colorado Springs campuses of the University. The M.U.A. is offered at UCD.

The Graduate School of Public Affairs holds membership in the National Association of Schools of Public Affairs and Administration and the Council of University Institutes for Urban Affairs.

Functions of the School

The principal functions of the school are to provide a varied program of professional education and training for the public service and to undertake research on issues of concern to the public sector. Many different kinds of activities are carried out by students and faculty of the school under these two broadly defined missions.

In the field of professional graduate education for the public service, the school provides opportunities to both recent graduates and to those who are well into public service careers. It selects and motivates young men and women for careers in managing the public service, providing knowledge, skills, and an ethic for the profession into which they are entering. It offers an opportunity to the increasing number of young people who are looking to the University to provide an educational program specifically designed to prepare them for careers in planning, directing, and evaluating human services.

The school provides an opportunity for selected working men and women to enhance their capabilities and potential for executive leadership in the public service through graduate education. It offers curricula and courses in a variety of formats, credit and noncredit, for those who are not degree-bound as well as those who are, to people with experience and a commitment to learning.

Instruction is provided by a multidisciplinary faculty, the members of which are experienced administrators and/or specialists in such fields as organization, theory, policy analysis, budgeting, information systems, quantitative analysis, science policy and administration, urban management and research. Applicable graduate courses from other University schools and departments are available to students desiring specialized study in areas of advanced knowledge beyond the scope of the Graduate School of Public Affairs.

Faculty members of the school maintain close associations and working relations with practitioners in all levels of government. Such activities include taking leadership roles in professional associations, arranging intern assignments for graduate students, conducting executive development programs and undertaking significant consulting assignments. Special attention is given to assessing and reviewing, in cooperation with the appropriate officials, the needs of governments for professional education for executive leadership. Continuing cooperative effort with responsible public administrators has resulted in a very high rate of placement of the graduates. More than 450 individuals have earned the M.P.A. Alumni with the master's degree in public administration from the University of Colorado hold responsible positions in more than 40 states and in at least 14 countries throughout the world.

Goals of the School

Some of the goals which guide the development of the school are listed here in order to give the prospective student an idea of the environment in which he will be studying if he enrolls. The school endeavors to:

1. Work for a synthesis in the University's approach to problems of the public sector, emphasizing multidisciplinary approaches to public issues. The Graduate School of Public Affairs resembles other professional schools in its orientation to decision and action rather than to the accumulation and development of theoretical knowledge.

2. Prepare for public service posts recent college graduates having such diverse majors as anthropology, psychology, economics, sociology, biological sciences, business administration, engineering, political science, etc., and also midcareer specialists (including retired military personnel or veterans) desiring executive development or retraining.

3. Afford students the opportunity to study in cross-disciplinary programs designed to link expertise in such areas as engineering, science, and public health with such factors as policy analysis skills, administrative knowledge and skills, and understanding of the phenomena of urbanism.

4. Devote special effort to enrollment of full- and part-time students from the ranks of those now severely underrepresented in responsible policy and management positions in public service: women, blacks, Chicano, and native Americans.

5. Expose students to a faculty drawn from the small and uniquely qualified group of scholars who are involved in the domain of the practitioners and move readily and regularly to and from the practice of public affairs.

6. Maintain close relationships with federal, state, and local governments and associations of governmental executives.

Career Expectations of Graduates

While it would be difficult to predict all of the kinds of careers graduates of this school will pursue, several major categories can be defined. In the past, those who have earned the M.P.A. from this University have filled a variety of administrative positions in federal, state, and
local governments. With the initiation of new programs and the addition of new faculty, some of the principal categories of career opportunities are:

1. Generalist public executives, represented by such positions as city manager, assistant city manager, director of administration, department head, assistant administrator, and administrative assistant.

2. Specialists in such fields as urban affairs, policy analysis, administrative planning, financial management, manpower planning and management, and administrative analysis.

3. Mission-oriented careerists, a category which includes persons who are involved in the management of functional programs in which some basic substantive knowledge is deemed to be necessary or desirable. Examples would include research into, analysis of, planning and direction of such human services as welfare, health, housing, and recreation; those involved in all aspects of the direction of programs in such areas as environmental protection, urban planning, research and development, development and management of natural resources, and utilization of technology; public works administrators; criminal justice planners and administrators; administrators of cultural and artistic programs; and those who administer American foreign policy and foreign aid programs.

DEGREE PROGRAMS

The Master of Public Administration (M.P.A.) degree is offered at the University of Colorado through the Graduate School of Public Affairs on the Boulder, Denver, and Colorado Springs campuses. The Master of Urban Affairs (M.U.A.) is offered at UCD.

Both degree programs are interdisciplinary. They combine some required core courses to provide background and elective courses selected by the student to serve his or her professional interest. An internship is required for students without prior governmental experience.

M.P.A. Areas of Specialization: general public administration, urban administration, environmental management, human resources management, financial administration, and policy analysis.

M.U.A. Options: urban systems, urban planning and community development, human resources and services, organizational analysis, urban transportation, urban environment, and urban housing.

The criminal justice administration option may be taken in either the M.P.A. or M.U.A. degree program.

A student may develop, in consultation with a faculty adviser, an individualized degree plan meeting the basic requirements for core courses of either the M.P.A. or M.U.A. degree.

The objectives of the Graduate School of Public Affairs, which are described above, should be read carefully by all applicants to the school.

MASTER OF PUBLIC ADMINISTRATION

The degree Master of Public Administration (M.P.A.) is offered at the University of Colorado by the Division of Public Administration of the Graduate School of Public Affairs. The program of the Division of Public Administration which leads to the M.P.A. is multi-disciplinary and is designed to provide graduate professional education for men and women who wish to prepare themselves for administrative careers in government service—urban, state, national, and international—or in organizations which are concerned with government affairs. The program also offers to those already in the public service an opportunity to pursue additional education as a means of furthering their careers. In addition to the courses offered by the Divisions of Public Administration and Urban Affairs, cooperating departments and schools of the University offer courses and seminars which may be included in the degree plans of graduate students who major in public administration. More than 250 graduate students are majoring in Public Administration and are working for the professional degree Master of Public Administration. The M.P.A. is conferred on more than 75 men and women each year.

Financial Assistance

Students in the M.P.A. program are eligible for several types of financial assistance. Work-study positions and educational loans require application to the University of Colorado Office of Financial Aid. A number of students secure internships or other part-time positions with local, state and federal agencies in the Denver-Boulder area. Minority students may apply for the Minorities in Urban Administration Program Traineeships (supported by the Denver Regional Council of Governments, U.S. Department of Housing and Urban Development, and the International City Management Association.) Also available to minority students are fellowships offered jointly by the University of Colorado and the National Association of Schools of Public Affairs and Administration, utilizing a Ford Foundation grant. Law Enforcement Assistance Program funds are available for reimbursement of tuition and books for persons employed in the criminal justice field.

The Graduate School of Public Affairs is actively seeking additional funding for student support in the form of fellowships and additional internship positions.

Professional Organizations

Students in public administration are encouraged to become members of the American Society for Public Administration and to utilize the publications and other services of that professional organization. The monthly meetings in Denver of the Colorado Chapter of the American Society for Public Administration provide students with the opportunity of associating regularly with professional administrators from all levels of government. The Public Affairs Council, which is a University of Colorado section of the Colorado Chapter of ASPA, brings government officials and others to the Boulder and Denver campuses as speakers, and otherwise fosters the professional development of students.

Admission Requirements

1. A baccalaureate degree from a college or university of accredited standing, with grades sufficiently high to indicate ability to pursue graduate work. The applicant may have majored in any field for the baccalaureate degree, but he or she will be required to have, or to acquire, an acquaintance with the political environment in which public administrators work. Students who have not had college or university course work which included the basic elements of American government are required to take, before or during their first semester of enrollment, the College Level Examination in American Government. This examination is administered by the Testing Office of the University of Colorado. Courses completed while students are classified as special students may not be applied toward graduate degrees, with the exception that students who are registered as special students during the semester or term in which they are admitted as degree students may request that the work completed be applied toward a degree.
2. Applicants for admission should present evidence that they possess the necessary personal qualifications for administrative or other professional positions in public service. Recommendations by qualified references are to be submitted on forms which the applicant will receive when he requests an application form. (Recommendations may be by professors and/or others who are acquainted with the prospective student's professional work.)

3. A satisfactory score on the Aptitude Test of the Graduate Record Examination (or an equivalent test, e.g., the Admission Test for Graduate Study in Business). Information about the Graduate Record Examination and the registration form for the examination may be obtained from the Testing Center, Willard Administrative Center, University of Colorado, Boulder, Colorado 80309, or from the Educational Testing Service, 1947 Center Street, Berkeley, California 94704. To insure proper reporting of test scores, examinees should specify that their graduate major at the University of Colorado will be Public Administration (Graduate School Department Code No. 94 for Item 10, on application form). Applicants should request that their test scores be sent to the campus to which they are requesting admission, namely the Director, Division of Public Administration, Graduate School of Public Affairs, University of Colorado, Boulder, Colorado 80309; the Assistant Dean, Graduate School of Public Affairs, University of Colorado at Denver, 1100 Fourteenth Street, Denver, Colorado 80202; or the Assistant Dean, Graduate School of Public Affairs, University of Colorado at Colorado Springs, Colorado Springs, Colorado 80907.

4. Completed credentials should be received by June 1 for the fall semester, by November 15 for the spring semester, and by April 1 for the summer term. Because the Boulder Campus is subject to restrictions on enrollment, applicants for fall semester on that campus should apply by April 15, if at all possible.

**Minimum Requirements for the Master of Public Administration Degree**

The minimum requirements for the M.P.A. are changed from time to time. Students may graduate under the requirements which were in effect when they were admitted; however, because students in the program are highly motivated and are eager to obtain the best professional public administration education available to them, when requirements have changed almost all of them have preferred to graduate under the very latest requirements. Present minimum requirements for the M.P.A. are listed below.

1. The completion of a minimum of 36 semester hours of graduate work with a grade average of B or better. At least 30 semester hours of this work must be at the 500 level or above.

2. The completion of the following core courses or acceptable equivalents: P.Ad. 500, Fundamentals of Public Administration (required of students who have not had an introductory course in public administration); P.Ad. 602, Quantitative Analysis; P.Ad. 504, Organization Theory and Administrative Behavior.

3. P.Ad. 600, Field Study in Public Administration. Students who have not had government experience are required to complete P.Ad. 600. Enrollment in the field study may be during the summer months while students have full-time internships or similar positions in government agencies or in government-related agencies, or during the academic year while they have part-time internships in government agencies or in government-related organizations. Interns must meet their on-job requirements and also the requirements of the Graduate School of Public Affairs. A minimum of 240 hours of supervised work-and-study is required to earn 3 hours of credit and at least 480 hours for 6 semester hours. Students with administrative experience are not eligible to take P.Ad. 600.

4. The completion of an option, examples of which are set forth below. Selection of an option should be made in consultation with an adviser during the first semester of full-time enrollment or before completion of 9 semester hours by part-time students.

In addition to the options listed, a student may develop, with the assistance of an adviser, a degree plan which reflects his or her principal focus of interest and professional objectives. Individual degree plans may be developed, for example, with emphasis in areas such as urban planning, transportation, and comparative and developmental administration. In addition to courses offered by the Graduate School of Public Affairs, the student is encouraged to include in his degree plan appropriate specialized courses and seminars offered by other departments and schools of the University. Examples of such courses are listed below. Every course and seminar included in each degree plan is part of the student's major, i.e., public administration. There is no minor. The examples of options follow:

**General Public Administration Option**

- Core courses (P.Ad. 500, 504, 602) ........................................... 9
- Required courses for this option ............................................. 9
- P.Ad. 505-3. Financial Administration and Policy Formulation
- P.Ad. 507-3. Human Resources Management
- P.Ad. 601-3. Administrative Analysis

Elective courses for this option ............................................. 15
- (a) Three courses selected from the following:
  - P.Ad. 510-3. Urban Administration
  - P.Ad. 608-3. Organization Development
  - P.Ad. 653-3. Public Policy Analysis and Evaluation
  - P.Ad. 696-3. Seminar: Ethics and Professionalism in the Public Service
- P.Ad. 606-3. Public Management Communications System

- (b) Additional courses selected under advisement
- Field study ............................................................................. 3-6
- P.Ad. 600. Field Study in Public Administration. (Required only of students who have not had appropriate experience.)

**Urban Administration Option**

- Core courses (P.Ad. 500, 504, 602) ........................................... 9
- Required courses for this option ............................................. 12
- P.Ad. 505-3. Financial Administration and Policy Formulation
- P.Ad. 507-3. Human Resources Management
- P.Ad. 510-3. Urban Administration

Elective courses for this option ............................................. 12
- Additional courses are to be selected under advisement. The student may wish to choose courses which would provide a concentration in such areas as urban management, urban planning, or urban systems. 
- Field study ............................................................................. 3-6
- P.Ad. 600. Field Study in Public Administration. (Required only of students who have not had appropriate experience.)

**Environmental Management Option**

- Core courses (P.Ad. 500, 504, 602) ........................................... 9
- Public administration electives ................................................. 6
- Two courses chosen from the following:
  - P.Ad. 505-3. Financial Administration and Policy Formulation
  - P.Ad. 507-3. Human Resources Management
  - P.Ad. 600-3. Field Study in Public Administration. (Required only of students who have not had appropriate experience.)
- Environmental management core ............................................. 9
- P.Ad. 630-3. Seminar in Environmental Management
- P.Ad. 631-3. Analysis of Environmental Policy
- P.Ad. 545-3. Administration of Public Works

Elective courses for this option ............................................. 12
- In the remaining 12 units of the environmental management option,
  *P.Ad. 651. Policy Analysis and Evaluation may be substituted when P.Ad. 631 is not offered.*
students can follow one of the following two concentrations:

**DISCIPLINARY CONCENTRATION**
Students are allowed to develop a disciplinary expertise directly related to environmental problems. The departments may include economics, civil and environmental engineering, etc. The courses taken by the student would be determined by the cooperating department and his adviser.

**INTERDISCIPLINARY CONCENTRATION**
Students are allowed to develop either multidisciplinary specializations in environmental management or a program in a specialized area of environmental management (air pollution control, wastewater management, water quality monitoring and management).

Suggest courses include:

**Civil and Environmental Engineering**
C.E. 449. Introduction to Environmental Pollution
C.E. 537. Water Law, Policy and Institutions

**Economics**
Econ. 553. Natural Resources Economics
Econ. 554. Seminar in Environmental Economics
Econ. 591. Seminar in Water Resources Development and Management

**Geography**
Geog. 541. Workshop in Conservation Problems
Geog. 543. Land Utilization
Geog. 550. Water Resources and Water Problems of Western U.S.
Geog. 640. Seminar in Comparative Environmental Studies

**Law**
Law. 747. Environmental Control

**Political Science**

**Preventive Medicine**
P.M. 610. Urban Health Ecology
P.M. 612. Concepts of Health

**Public Affairs**
P.Ad. 510. Urban Administration
P.Ad. 696. Seminar in Science Policy and Administration
U.A. 651. Urban Geocoding

**Urban and Regional Planning—Community Development**
UPCD 540. Basic Ecological Planning
UPCD 547. Regional Planning
UPCD 552. Legal Aspects of Planning

**Human Resources Management Option**
Core courses (P.Ad. 500, 602, 604) ........................................... 9
Required courses for this option .............................................. 12
P.Ad. 505-3. Financial Administration and Policy Formulation
P.Ad. 507-3. Human Resources Management
P.Ad. 608-3. Organization Development
P.Ad. 609-3. Group Dynamics
Elective courses selected under advisement .................................. 12
The student may wish to choose courses which would provide a concentration in such areas as human resource management, labor-management relations, or organization development.
Field study ................................................................. 3-6
P.Ad. 600-3. Field Study in Public Administration. (Required only of students who have not had appropriate experience.)

**Policy Analysis Option**
Core courses (P.Ad. 500, 504, 602) ........................................... 9
Required courses for this option .............................................. 12
U.A. 500-3. Research Methods
P.Ad. 505-3. Financial Administration and Policy Formulation
One of the following:
P.Ad. 622-3. Seminar: Public Processes and Priorities
P.Ad. 623-3. Intergovernmental Fiscal Relationships
P.Ad. 631-3. Analysis of Environmental Policy
Field Study ................................................................. 3-6
P.Ad. 600-3. Field Study in Public Administration. (Required only of students who have not had appropriate experience.)
Elective courses for this option .............................................. 12
Additional courses are to be selected under advisement. Examples of such courses are statistics, computer science, mathematics for economists, economic theory, accounting, financial analysis, management science, independent research in the analysis of specific problems, and P.Ad. 603 or 613.

**Financial Administration Option**
Core courses (P.Ad. 500, 504, 602) ........................................... 9
Required courses for this option .............................................. 12
P.Ad. 601-3. Administrative Analysis
P.Ad. 505-3. Financial Administration and Policy Formulation
P.Ad. 653-3. Public Policy Analysis and Evaluation
Two of the following:
P.Ad. 622-3. Seminar in Analysis of Public Processes and Priorities
P.Ad. 623-3. Intergovernmental Fiscal Relationships
P.Ad. 624-3. Governmental Budgeting
Elective courses for this option .............................................. 9-12
Additional courses are to be selected under advisement. Examples of such courses include governmental accounting, public finance, economic theory and management science.
Field study ................................................................. 3-6
P.Ad. 600. Field Study in Public Administration. (Required only of students who have not had appropriate experience.)

**Criminal Justice Administration Option**
Core courses (P.Ad. 500, 504, 602) ........................................... 9
Public administration electives .............................................. 9
Recommended electives:
P.Ad. 505-3. Financial Administration and Policy Formulation
P.Ad. 510-3. Urban Administration
P.Ad. 507-3. Human Resources Management
Required courses for this option .............................................. 9
C.J. 500-3. Law and Social Control
C.J. 610-3. Administration of Criminal Justice
Elective courses for this option .............................................. 9
These 9 semester hours are to be selected under advisement from courses appropriate to either law enforcement or correctional administration, depending on the student’s interests. The student may select courses in sociology, psychology, etc., as well as those in public administration and/or urban affairs. Examples of appropriate courses include Soc. 590 (Seminar in Correctional Institutions) and Soc. 594 (Seminar in Prevention and Control of Delinquency and Crime).

**Field Study Requirement**
As indicated above, students who have not had government experience are required to complete P.Ad. 600 (Field Study in Public Administration). Enrollment in the field study may be during the summer months while students have full-time internships or similar positions in government agencies, or in government-related agencies; or during the academic year while they have part-time internships or similar positions in government agencies or in government-related organizations.

5. Completion of either a thesis or a comprehensive written examination taken during the last semester of enrollment is required. The comprehensive examination includes two parts: (1) general concepts in public administration and (2) the area of specialization. An oral examination based on material covered in the written examination may be required at the option of the student’s examination/thesis committee.

Students admitted under previous requirements stipulating a comprehensive oral examination may remain under that option or may elect these new requirements which became effective for those entering in the fall semester 1974.

**Limitation on Course Load**
The normal course load for a full-time student is 12 semester hours. A student who is employed full time may not carry more than 6 hours unless an excess load has been approved in advance by the director of the Division of Public Administration. A student employed half time is limited to a course load of 9 hours unless special authorization for an overload has been granted.

*Soc. 558 (Sociology of the Future) may be substituted when P.Ad. 622 is not offered.
*P.Ad. 536 (Intergovernmental Relations) should be substituted when P.Ad. 623 is not offered.
Courses in Other Disciplines

Examples of courses offered by other departments and schools which may be included in the M.P.A. degree programs are listed below.

**AEROSPACE ENGINEERING SCIENCES**
- Aero. 551-3. Systems Analysis I
- Aero. 552-3. Systems Analysis II

**BUSINESS**
- Acct. 454-3. Accounting Systems and Data Processing
- Acct. 455-3. Problems in Systems Analysis
- Acct. 480-3. Business and Governmental Budgeting and Control

**BUSINESS ADMINISTRATION**
- B.Ad. 610-3. Business, Government and Society
- B.Ad. 620-3. Administrative Controls

**CIVIL AND ENVIRONMENTAL ENGINEERING**
- C.E. 537-3. Water Law Policy and Institutions
- C.E. 562-3. Urban Transportation Planning
- C.E. 569-3. Urban Traffic Workshop

**COMMUNICATION**
- Comm. 524-3. Seminar in Organizational Communications
- Comm. 606-3. Public Management Communications Systems (P.Ad. 606)

**COMPUTER**
- C.S. 540-3. Computer Decision Modeling (M.Sc. 625)

**ECONOMICS**
- Econ. 544-3. Environmental Economics
- Econ. 601-3. Microeconomic Theory
- Econ. 602-3. Macroeconomic Theory
- Econ. 621-3. Seminar in Public Finance
- Econ. 622-3. Seminar in Fiscal Policy
- Econ. 625-3. Urban and Regional Economics: Theory and Methods
- Econ. 642-3. Seminar in International Finance
- Econ. 653-3. Natural Resource Economics
- Econ. 691-3. Seminar: Water Resources Development Management (Same as C.E. 539)

**ENVIRONMENTAL DESIGN**
- U.P.-CD 506-3. Planning Methodology
- U.P.-CD 510-3. Integrated Urban Systems
- U.P.-CD 520-3. Municipal Information and Design Systems
- U.P.-CD 540-3. Basic Ecological Planning and Impact
- U.P.-CD 547-3. Regional Planning
- U.P.-CD 550-3. Legal Aspects of Planning
- U.P.-CD 630-3. Social Factors in Urban Design

**GEOGRAPHY**
- Geog. 541-3. Workshop in Conservation Problems
- Geog. 543-3. Land Utilization
- Geog. 550-3. Water Resources and Water Problems of Western United States
- Geog. 565-3. Location Analysis of Human Activities
- Geog. 640-3. Seminar: Comparative Environmental Studies

**LABOR RELATIONS**
- L.Re. 566-3. Public Collective Bargaining (P.Ad. 566)

**LAW**
- Law 631-3. Water Resources
- Law 632-3. Law and Mineral Resources
- Law 650-3. Labor Law
- Law 747-3. Environmental Control
- Law 785-2. Social Legislation
- Law 782-2. Labor Arbitration

**MANAGEMENT SCIENCE**
- M.Sc. 635-3. Mathematical Programming

**POLITICAL SCIENCE**
- Pol.Sci. 539-3. Administrative Problems in Developing Countries
- Pol.Sci. 583-3. Seminar: Comparative Administration
- Pol.Sci. 600-3. Analysis of a Public Institution

**PSYCHOLOGY**
- Psych. 440-3. Social Psychology

**REAL ESTATE**
- R.Es. 401-3. Urban Land Economics

**SOCIOLGY**
- Soc. 426-3. Urban Sociology
- Soc. 533-3. Seminar: Communities
- Soc. 558-3. Sociology of the Future

**TRANSPORTATION MANAGEMENT**
- Tr.Mg. 650-3. Seminar in Transportation Management

**Master of Urban Affairs**

The professional degree Master of Urban Affairs (M.U.A.) is offered at UCD by the Division of Urban Affairs of the Graduate School of Public Affairs. The Master of Urban Affairs degree program enables students to become broadly knowledgeable about urban society and at the same time equips them with the specialized skills necessary for public, quasi-public, and private agency positions devoted to human services in the urban setting. The urban occupations for which this degree provides educational preparation are found primarily but not exclusively in the public service, meeting a variety of needs of diverse segments of the urban population. A candidate for this degree will become an urban generalist while concurrently acquiring specialized knowledge and skills in areas such as housing, urban analysis, transportation, delivery of human services, and environmental protection. The M.U.A. degree is not only professional, but the program by its very nature is deeply involved in and concerned with the urban community. It is designed to increase the analytical and problem-solving capabilities of those already working in a variety of urban-oriented positions, and to prepare young men and women for jobs in a number of public as well as quasi-public, private, and volunteer agencies.

The program leading to the Master of Urban Affairs degree is interdisciplinary, with core courses offered under the auspices of the Graduate School of Public Affairs (most of them listed as urban affairs courses) and electives offered in the Division of Public Administration; the Division of Health Administration of the School of Medicine; the disciplines of economics, geography, history, political science, and sociology in the Division of Social Sciences; the School of Law; the College of Environmental Design; the College of Engineering and Applied Science; and the Graduate School of Business Administration. The student is offered course work in urban theory, quantitative skills and research methodology, urban policy issues, and urban administration, as well as in an area of specialization.

Initiated at UCD in September 1973, the M.U.A. emphasizes flexibility and development of degree plans appropriate to individual needs and interest.

**Affiliation**

The University is an active member of the Council of University Institutes for Urban Affairs and sponsored a regional conference of the Council in Denver in April 1975.

**Financial Assistance**

Students in the Master of Urban Affairs degree program are eligible for financial assistance from several sources. Work-study positions and educational loans require application to the University of Colorado Office of Financial Aid. A number of students secure internships or other part-time positions with local, state and federal agencies in
the Denver-Boulder area. Minority students may apply for
ships (supported by the Denver Regional Council of Gov-
ernments, U. S. Department of Housing and Urban De-
velopment, and the International City Management
Association). Also available to minority students are fellow-
ships offered jointly by the University of Colorado and the
National Association of Schools of Public Affairs and
Administration, utilizing a Ford Foundation grant. Law
Enforcement Assistance Program funds are available for
reimbursement of tuition and books for persons employed
in the criminal justice field. The Graduate School of Public
Affairs is actively seeking additional funding for student
support in the form of fellowships and additional internship
positions.

Admission Requirements

In considering applicants for admission to the graduate
program in urban affairs, the Graduate School of Public
Affairs is guided by the following criteria:

1. Baccalaureate or advanced degree from an accredited
institution of higher education.

2. Letters of recommendation submitted from former
teachers and employers.

3. Applicant’s undergraduate academic record.

4. Record of any post-baccalaureate academic work
which the applicant might have.

5. Appropriate work experience in the urban field.

6. Test scores on the Aptitude Test of the Graduate
Record Examination (GRE) or equivalent test.

7. Evidence of the applicant’s commitment to the study
of urban affairs.

In general, a well-balanced undergraduate program with
background in the social sciences is recommended. This
would include courses in public and business administra-
tion, political science, economics, sociology, anthropol-
ogy, history, and psychology. Deficiencies, as determined
by the faculty, must be made up in addition to regular
degree requirements. However, these recommendations do
not preclude admission based on specialized undergraduate
or graduate degree programs since the Master of Urban
Affairs curriculum recognizes the probable diversity in
student backgrounds and career goals and will seek to
reconcile these differences with common core courses and
electives.

Under special circumstances, a student may be admitted
on a provisional status for a specified probationary period.
At the end of this period, the student’s faculty adviser, in
consultation with other faculty members, will review the
student’s performance and recommend to the Graduate
School of Public Affairs whether the student should be
admitted to regular degree status or dropped from the
program.

A number of students in the urban affairs program come
from midcareer posts in government and public service
agencies. In some cases, these applicants enter the school
some years after completion of their undergraduate studies.
In determining an applicant’s potential for success in the
M.U.A. program, the Graduate School of Public Affairs
will take into consideration such factors as work experi-
ence, letters of reference, and evidence of a commitment
to urban affairs. The program seeks candidates who are
deeply interested in and committed to urban public service,
not just those who qualify intellectually.

Application materials for the Master of Urban Affairs
program may be obtained from: Division of Urban Affairs,
Graduate School of Public Affairs, University of Colorado
at Denver, 1100 14th Street, Denver, Colorado 80202.

Completed credentials should be received in the Office of
the Director of the Division of Urban Affairs by June 1 for
the fall semester, by November 15 for the spring semester,
and by April 1 for the summer term.

Requirements for the Master of
Urban Affairs Degree

1. The basic minimum requirement for the M.U.A.
degree is the successful completion of 36 semester hours of
graduate work with not less than a B average. Prior
approval by an adviser should be obtained for any course
at the 400 level to be credited toward the degree. Normally
not more than two such courses may be counted. Each
student develops a proposed degree plan with assistance
from his/her assigned adviser; the plan must be approved
before the end of the first semester (for full-time students)
or before completion of 12 semester hours (for part-time
students).

2. There are two main sequences or general foci
of study in urban-oriented courses leading to the M.U.A.
degree:

a. The analytic sequence (Track A) emphasizing quantitative capability
which prepares candidates for careers in urban research, program
analysis and evaluation, information systems, planning, and other
quantitatively oriented, policy-related positions.

b. A general urban sequence (Track B) permitting flexible choice of
specialization selected by the student and designed to accommodate
his or her particular career goals.

In addition, degrees may be pursued simultaneously in
urban affairs and health administration, urban and regional
planning, urban sociology, engineering or other fields by
developing courses of study in consultation with appropi-
ate advisers.

3. In each of the two sequences mentioned above,
certain core courses plus other required courses are to be
taken from offerings of the Graduate School of Public
Affairs and various cooperating units of the University. A
wide range of electives also is available.

4. Students electing either Track A or B must dem-
onstrate competence in integrating knowledge from the
various courses. This is be accomplished as follows:

a. Track A-Specialization in Urban Analysis
Students electing this track are to follow the curriculum outlined
below for Track A. They are also required to (1) complete U.A. 657,
(Applied Urban Research Seminar); and (2a) produce an acceptable
Project Report/Thesis by registering for U.A. 700 (Urban Research
Project/Thesis), or (2b) successfully complete the comprehensive
written examination described in 5 below.

b. Track B-General Urban Affairs
Students electing this track are to follow the curriculum outlined
below for Track B. They are also required to meet a two-fold
completion requirement of (1) completing of U.A. 690 (Seminar in
Urban Philosophy); and (2a) producing an acceptable Project Report/
Thesis by registering for U.A. 700 (Urban Research Project/Thesis),
or (2b) successfully completing the comprehensive written examina-
tion described in 5 below.

5. A comprehensive written examination may be ap-
proved in exceptional cases in lieu of the project or thesis.
The examination will cover two areas: (1) general, concep-
tual knowledge covered in the core courses and (2) the
more specialized concepts and skills covered in the stu-
dent’s elective area. The Graduate School of Public Affairs
provides general administration of the examination.

6. Service in an internship providing actual working
experience in an agency setting relating to some aspect of
urban affairs is required as a further condition for the
M.U.A. degree for those candidates who do not have prior
qualifying job experience. Such students must register for
U.A. 656 (Urban Internship) for 3 semester hours of
credit. The internship normally will consist of at least 240
clock hours of work in a situation in which the student has
an opportunity to do responsible work and also to observe
and/or participate in broader policy-making operations of an organization.

**Track A: Specialization in Urban Analysis**

1. **General Courses.** (U.A. 501 and one other course required.)
   - U.A. 501-3. Introduction to Urban Affairs (required; may be waived if equivalent completed)
   - U.A. 510-3. Urban Administration (same as P.Ad. 510)  
   - U.A. 543-3. Intergovernmental Relations (same as P.Ad. 556; prer., U.A. 505)  
   - P.Ad. 504-3. Organizational Theory and Behavior

2. **Analytic methods.** (Choose two courses from one group and three from the other.)

**B. Elective Options (6 hours).** Students are required to take a minimum of 6 hours within the category of general electives or within one of the specialized options shown below. Additional electives may be selected from any of the elective categories or from the list of core courses.

**C. U.A. 656-3. Urban Internship.** For students who have not had agency experience; if internship is waived, the student must take an elective course.


**E. U.A. 700-3. Urban Research Project or Thesis.**

**Track B: General Urban Affairs**

1. **General Courses.** (U.A. 501, U.A. 502 and two other courses required.)
   - *U.A. 501-3. Introduction to Urban Affairs
   - *U.A. 502-3. Quantitative Analysis
   - U.A. 510-3. Urban Administration (same as P.Ad. 510)  
   - U.A. 536-3. Intergovernmental Relations (same as P.Ad. 536)  
   - P.Ad. 504-3. Organizational Theory and Behavior

2. **Area of concentration.** (Two courses from any of the following groups; other groupings may be selected with the approval of the student’s adviser.)

**Group 1.** (Emphasis in Financial Analysis and Administration)

- U.A. 622-3. Analysis of Public Processes and Priorities
- U.A. 623-3. Intergovernmental Fiscal Relationships (same as P.Ad. 623)
- U.A. 624-3. Governmental Budgeting (same as P.Ad. 624)

**Group 2.** (Emphasis on Research Methods and Program Evaluation)

- U.A. 500-3. Urban Research Methods (required)
- P.Ad. 502-3. Quantitative Analysis
- U.A. 570-3. Introduction to Systems
- P.Ad. 602-3. Quantitative Analysis II (required; prereq., P.Ad. 502 or equivalent)
- P.Ad. 603-3. Research and Statistical Analysis (prereq., P.Ad. 602)
- P.Ad. 653-3. Public Policy Analysis and Evaluations (same as P.Ad. 653; prereq., P.Ad. 502 and U.A. 505)

**Group 1.** Organizational Behavior

- P.Ad. 507-3. Human Resources Management
- P.Ad. 608-3. Organizational Development (prereq., P.Ad. 604)
- P.Ad. 609-3. Group Dynamics

**Group 2.** Public Relations and Communication

- U.A. 615-3. Public Relations and the Urban Administrator
- Comm. 524-3. Seminar: Organizational Communications

**Group 3.** Economic Perspectives

- U.A. 525-3. Urban Economics (Econ. 525)
- Econ. 579-3. Economic Planning

**Group 4.** Quantitative Methods and Analysis

- U.A. 500-3. Urban Research Methods
- U.A. 570-3. Introduction to Systems (same as P.Ad. 570)
- P.Ad. 602-3. Quantitative Analysis II (prereq., P.Ad. 502)
- P.Ad. 603-3. Research and Statistical Analysis (prereq., P.Ad. 602)
- P.Ad. 613-3. Operations Research for Public Programs (prereq., P.Ad. 602)

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**B. Elective Options (9 hours).** Students are required to take a minimum of 6 semester hours within the category of general electives or in one of the specialized options given below. The remaining 3 hours may be selected from any of the elective categories or from the list of core courses.

**C. U.A. 656-3. Urban Internship.** For students who have not had agency experience; if internship is waived, the student must take an elective course.


**E. U.A. 700-3. Urban Research Project or Thesis.**

**Specialized Options**

**A. Option in Urban Housing**

- Res. 401. Urban Land Economics
- Econ. 528. Seminar: Housing
- UPCD 610. Seminar: Housing
- UPCD 620. Seminar: Urban Design I
- UPCD 621. Seminar: Urban Design II

**B. Option in Urban Transportation**

- Econ. 527. Seminar: Transportation
- C.E. 561. Quantitative Techniques in Urban Transportation Engineering
- C.E. 562. Urban Transportation Planning
- C.E. 564. Urban Traffic—Characteristics
- C.E. 565. Urban Traffic—Operations
- C.E. 569. Urban Traffic—Workshop
- C.E. 596. Seminar: Urban Transportation
- Tr.Mg. 560. Seminar: Transportation

**C. Option in Urban Environment**

(Courses may also be selected from “urban planning and community development” group.)

- C.E. 545. Administration of Public Works
- Geog. 503. Rural-Urban Land Use Models
- Geog. 509. Problems in Urban Geography
- Pol. Sci. 535. Seminar: Natural Resources Policy and Administration
- Soc. 621. Seminar: Demography and Ecology
- P.Ad. 630. Seminar: Environmental Management
- P.Ad. 631. Analysis of Environmental Policy
- UPCD 615. Development of Environmental Form

**D. Option in Urban Planning and Community Development**

(Courses may also be selected from “urban environment” group.)

- UPCD 500. Introduction to Planning and Community Development
- UPCD 506. Community Development Methodology
- UPCD 547. Regional Planning
- UPCD 552. Legal Aspects of Planning
- UPCD 555. Economic Aspects of Planning and Community Development
- UPCD 570. Basic Planning Analyses
- UPCD 571. Advanced Planning Analyses
- UPCD 615. Development of Environmental Form
- UPCD 630. Social Factors in Urban Design
- UPCD 641. Social Policy Analysis and Application
- UPCD 711. Politics and Planning
- UPCD 713. The Community and the Federal System

**E. Option in Urban Systems**

- U.A. 570. Introduction to Systems (P.Ad. 570)
- U.A. 640. Urban Systems I
- U.A. 641. Urban Systems II
- U.A. 645. Urban Geocoding
- U.A. 650. Urban Information Systems I
- U.A. 651. Urban Information Systems II

**F. Option in Human Resources and Services**

(Courses in health administration, education, recreation, or other such fields may be included in this option.)

- P.Ad. 507. Human Resources Management
- P.Ad. 566. Collective Negotiations in Public Employment
- P.Ad. 608. Organizational Development
- P.Ad. 614. Manpower Planning
- U.A. 660. Administration of Human Service Agencies (P.Ad. 660)
- U.A. 661. Evaluation of Human Services Programs (P.Ad. 661)
- Econ. 463. Social Security
- Econ. 566. Seminar: Human Resources

*Required, may be waived if equivalent completed.
** soc. 558 (sociology of the future) may be substituted when P.Ad. 622 is not offered.
*P.Ad. 536 (Intergovernmental Relations) should be substituted when P.Ad. 623 is not offered.
*Required, may be waived if equivalent completed. Not for credit toward degree for students in Track A.
CERTIFICATE IN PUBLIC ADMINISTRATION

General Information
A program of study leading to the award of the Certificate in Public Administration is offered to those who seek a higher level of expertise, a new area of specialization or preparation for greater administrative responsibilities, or a combination of these objectives as they relate to the public service. As citizens' demands for more effective performance in the public service increase, men and women who avail themselves of professional education will be in a position to make major contributions to advancing the competence of government. This certificate program is designed to make available professional training with academic credit.

The Public Administration Certificate program, developed by the Graduate School of Public Affairs, consists of a sequence of courses for persons who desire to increase their knowledge of and skills in a number of managerial and/or specialized aspects of public employment. Initially, course work for the certificate will be grouped under one of the options listed below.

**General Course**
U.A. 501. Introduction to Urban Affairs

**Analytic Methods**
U.A. 500. Urban Research Methods
P.Ad. 502. Quantitative Analysis

**Administration of Urban Systems** (Choose minimum of one course)
U.A. 510. Urban Administration
U.A. 521. The Politics of Urban Management
U.A. 570. Introduction to Systems (P.Ad. 570)
U.A. 650. Urban Information Systems I

**Elective Options in Urban Affairs** (Two courses). Students in urban affairs pursuing the option in criminal justice are required to select a minimum of two courses from the specialized elective options or the list of general electives. These courses are to be selected in consultation with the student's advisor as an approved part of the overall degree plan.

**Criminal Justice Administration Core Courses**

**Required Courses for This Option**
C.J. 500. Law and Social Control
C.J. 610. Administration of Criminal Justice

**Elective Courses for This Option**
Nine semester hours are to be selected under advisement from courses appropriate to either law enforcement or correctional administration, depending on the student's interest. The student may select courses in sociology, psychology, etc., as well as those in urban affairs and/or public administration.

**General Electives**
Econ. 521. Seminar: Public Finance
Econ. 522. Seminar: Fiscal Policy
Educ. 408. Seminar: Urban Education
Educ. 415. Problems and Trends in Education
Educ. 516. Advanced Social Foundations of Education
Educ. 520. Educational Sociology
Educ. 526. Economics of Education
Educ. 583. School and Community Relations
Educ. 591. Evaluation of School Systems and Programs
Educ. 680. School Finance
Hist. 670. Seminar: History of Urban America
P.Ad. 504. Organizational Theory and Administrative Behavior
P.Ad. 505. Financial Administration and Policy Formulation
P.Ad. 606. Public Management Communications Systems
P.Ad. 696. Seminar: Public Administration
Pol.Sci. 408. Municipal Government and Administration
Pol.Sci. 455. Mexican American in Politics
Pol.Sci. 536. Intergovernmental Relations
Pol.Sci. 553. Problems in Public Policy Analysis
Pol.Sci. 580. The Political System and Telecommunications
Soc. 460. The Chicano Community and Community Organization
Soc. 550. Seminar: Poverty
Soc. 621. Seminar: Demography and Ecology
Soc. 642. The New Chicano Movement
U.A. 509. Seminar: Metropolitan Areas (Pol.Sci. 509)
U.A. 526. Seminar: Urban Sociology (Soc. 526)
U.A. 530. Urban Social Systems
U.A. 533. Seminar: Communities (Soc. 533)
U.A. 540. Minority Groups in Urban Society
UPCD 500. Introduction to Planning and Community Development
UPCD 570. Basic Planning Analyses
UPCD 630. Social Factors in Urban Design

**Foundation Requirements**
P.Ad. 400-3. The Practice of Public Management
P.Ad. 401-3. Administrative Leadership
P.Ad. 402-3. Administration of Financial Resources
P.Ad. 403-3. Administration of Human Resources

**Areas of Specialization**
Students are to select one area in which to specialize. An additional four courses are required in the specialized area for completion of the certificate.
Human Resource Management Option
Choose any four of the following:
P.Ad. 430-3. Labor Management Relations in the Public Sector I
P.Ad. 431-3. Labor Management Relations in the Public Sector II
P.Ad. 432-3. Current Issues in Public Personnel Management
P.Ad. 434-3. Training of Trainers

Financial Administration and Program Management Option
P.Ad. 440-3. Fundamentals of Quantitative Methods
P.Ad. 441-3. Elements of Governmental Accounting
P.Ad. 442-3. Budgeting and Financial Administration
P.Ad. 443-3. Program Management Techniques

Public Management Option
P.Ad. 410-3. Decision Making in Public Organizations
P.Ad. 411-3. Public Information and the Public Administrator
P.Ad. 412-3. Administrative Analysis
P.Ad. 414-3. Organization Development

Urban Affairs Option
P.Ad. 420-3. Fundamentals of Local Government Administration
P.Ad. 421-3. Contemporary Urban Problems
P.Ad. 422-3. Urban Political Economy
P.Ad. 423-3. Modernization of Urban Government

Criminal Justice Administration Option
P.Ad. 450-3. Executive Development for the Criminal Justice System
P.Ad. 451-3. Criminal Justice Policy: Assessment and Evaluation
P.Ad. 452-3. Criminal Justice Information Systems
P.Ad. 453-3. Contemporary Legal Aspects of Criminal Justice Administra-
tion

Course Description

DIVISION OF PUBLIC ADMINISTRATION

P.Ad. 500-3. Fundamentals of Public Administration. Governmental systems; philosophy and basic concepts of public administration. Open only to graduate students who have not had an introductory course in public administration.

P.Ad. 502-3. Quantitative Analysis I. Provides a basic foundation for further course work involving the application of quantitative analysis to public problems: linear equations, matrices, inequalities, probability, introduction to research methods, and introduction to descriptive and inferential statistics. Packaged computer programs will be used for analysis throughout the course.

P.Ad. 504-3. Organization Theory and Administrative Behavior. The study of roles, structure, motivation, morale, performance, decision making, evaluation, and innovation in the management of public organizations.

P.Ad. 505-3. Financial Administration and Policy Formulation. Introduction to financial administration and policy formulation with a general study of the principal structures and processes involved as well as concentrated analysis of specific problems through supervised research. Includes principles and politics of public resources allocation, budgetary systems, taxation, intergovernmental finance, and debt management.


P.Ad. 510-3. Urban Administration. Study of the public and quasi-public organizations which formulate and implement governmental policies in urban communities, theory of organizational behavior and change, effects of agency structure and inter-agency relations on performance, intergovernmental relationships, and problems of bureaucratic performance.

P.Ad. 535-3. Seminar: Natural Resources Policy and Administration. (Pol.Sci. 535.) Examination of the American economy; consideration of constitutional, political, and geographic factors in development of resources policy; organization procedures and programs for administration and development of natural resources; selected topics.

P.Ad. 536-3. Intergovernmental Relations. (Pol.Sci. 536.) Investigation and analysis of the American federal system, including its constitutional, political, and administrative characteristics. Problems considered include federal-state relations, state-local relations, regionalism, interstate cooperation, and grants-in-aid.

P.Ad. 545-3. Administration of Public Works. (E.E. 545.) A descriptive course concerned with the administration of engineering and planning aspects of urban public works and with listing and comparing modern methodologies. Prer., graduate status in civil engineering, public administration, or consent of instructor.

P.Ad. 566-3. Collective Negotiations in Public Employment. (L.Re. 566.) An examination of the development of state and federal legislation covering public employee collective bargaining; the role and structure of public sector bargaining at the federal, state, local, and public school levels. The framework for collective bargaining, union security, scope of negotiations, strikes, and impasse procedure; the role of mediator, fact-finding, and arbitration in the settlement of disputes.

P.Ad. 570-3. Introduction to Systems. Overview of systems ranging from general system theory to the application of systems technology. Includes an introduction to information systems, process flowcharting, data standards, system security and confidentiality, simulation models, and geocoding.

P.Ad. 600-3 to 6. Field Study in Public Administration. For students who have not had government experience. Studies and reports are made while students have full- or part-time administrative traineeships, or similar positions in government agencies or government-related organizations. Consent of instructor required.

P.Ad. 601-3. Administrative Analysis. Analysis, diagnosis, and evaluation of administrative organizations, and operations at various levels of government. Special attention is given to the appropriateness of organizations and operations in relation to goals and objectives in a complex and difficult environment. Students work directly with government agencies in making analysis, evaluations, and recommendations.

P.Ad. 602-3. Quantitative Analysis II. Develops basic competence and judgment in using quantitative methods to analyze public policy problems. Symbolic reasoning and methods of numerical analysis are introduced in the context of several broad problem areas. One portion of the course deals with the use of methods of probability and statistical decision theory; another section focuses on analysis of allocations problems using the computer-based techniques of mathematical programming and operations research. Basic notions of econometrics are also examined. Prer., P.Ad. 502 or equivalent as determined by instructor.

P.Ad. 603-3. Research and Statistical Analysis. This course develops basic competence in the application of advanced statistical techniques to public problems and the use of computers for data analysis. Regression analysis, analysis of variance, survey design, factor analysis, cluster analysis, and topics in multivariate analysis. Prer., P.Ad. 602 or equivalent.

P.Ad. 606-3. Public Management Communication Systems. (C.T. 606.) The responsibilities of complex public agencies in maintaining effective communication systems, internal and external; the nature of the systems and problem areas.

P.Ad. 608-3. Organization Development. A study of the dynamics involved in managing and facilitating change in organizations by application of behavioral science knowledge. Emphasis is placed on both cognitive and experiential learning. A background in organization theory and administrative behavior is required. Prer., P.Ad. 604 or consent of instructor.

P.Ad. 609-3. Group Dynamics. An in-depth study of the patterns of interaction among group members. Emphasis is placed on the characteristics of the group as a whole and the effects of individual members. Includes a survey of the literature relating to group cohesion, power and influences, decision making, communications, leadership and performance, and motivational processes in groups.

P.Ad. 613-3. Systems Analysis for Public Programs. Develops basic competence in the application of systems analysis techniques to public problems and the use of computers for analysis. Mathematical programming, decision analysis, simulation, and other topics in operations research. Prer., P.Ad. 602 or equivalent.

P.Ad. 614-3. Manpower Planning. An examination of various models for manpower planning; analytical techniques for assessing and planning manpower needs; relation of manpower planning to personnel administration, manpower development, social planning, and selected problems in manpower planning.

P.Ad. 615-3. Applied Behavioral Sciences in Public Organizations. A seminar for advanced graduate students which includes a practicum for developing diagnostic and intervention skills in organizational development, review of applied behavioral science literature, and an examination of selected topics in relating behavioral sciences to public organizations. Prer., P.Ad. 604 and 608 or equivalent.

P.Ad. 620-3. Legal Environment of Public Administration. Examination of the role of law in society, with particular reference to its impact on the administration of public affairs. The special concerns of the law, administrative procedure, judicial decision, and the rights of individuals and groups.

P.Ad. 622-3. Seminar: Analysis of Public Processes and Priorities. Systematic analysis of the machinery and processes for establishing public policy and the resultant outcomes in an important public program area. A major program area involving the national, state, and local governments is selected for examination each year (e.g., general revenue sharing, energy, income transfers, and health programs); the nation's public sector response is traced through the various stages of latent
problem, crisis, planning, legislation, budgeting and financing, implementation, and evaluation. The objective of the seminar is to diagnose the strengths and weaknesses of the public affairs process in the past and to identify potential improvements for setting priorities and achieving greater governmental effectiveness. Per., P.Ad. 505 or consent of instructor.

P.Ad. 623-3. Intergovernmental Fiscal Relationships in the Federal System. Fiscal roles and interactions among the national, state, and local governments and the significance of the existing system for achievement of public objectives. Theory and analytical review of statistical data and reports on sharing of revenue sources and of expenditures functions. Includes examination of problems of intergovernmental tax structure, computation and cooperation. Participation in the intergovernmental grants system: categorical or conditional grants, block grants, the new federalism, including general and special revenue sharing.


P.Ad. 630-3. Seminar: Environmental Management. An examination of federal, state, and local environmental legislation, the development of environmental management in the public sector, approaches in organizing for community management, strategies for environmental management, and selected topics. Open to graduate students in other disciplines.

P.Ad. 631-3. Analysis of Environmental Policy. An examination of the theories and concepts of environmental analysis, the analytic techniques in environmental decision making, models and simulations in environmental planning, and an analysis of selected environmental policy problems.

P.Ad. 653-3. Public Policy Analysis and Evaluation. Trains students to approach unstructured problems, proceed with an evaluation and analysis, and use as results in making and implementing public policy decisions; focus is on the underlying techniques of systematic analysis, such as PPBS, cost-benefit, and cost-effectiveness; these and other techniques are applied to cases problems for which students are prepared by instruction on how to determine pertinent values, how to place cost-benefit measures, and the treatment of multiple criteria in judgment on public policies. Per., U.A. 505. P.Ad. 602 also is recommended.

P.Ad. 660-3. Administration of Human Services Agencies. Description and analysis of human service delivery systems, including: trends, unique problems and challenges in analysis of social policy; the administration of programs at federal, state and local levels, including social welfare elements of the various delivery systems such as public welfare, rehabilitation, social services, publicly sponsored medical care systems. New approaches to delivery of human services with consideration of regional approaches, integrated services delivery, "welfare reform," client advocacy, citizen advisory groups, and relationships to bureaucratic systems.


DIVISION OF URBAN AFFAIRS
The courses described below are those offered by the Division of Urban Affairs. With the approval of the student's adviser, courses which have not been listed may be included in degree plans. See, for example, courses suggested as electives in the general information section.

For information on scheduling of courses, consult the appropriate Schedule of Courses for day, time, and meeting place of classes.

U.A. 500-3. Urban Research Methods. A survey of research design, methods, and techniques, emphasizing strengths, limitations, and potentials for use in the study of urban problems. Approached from applied and theoretical perspectives; exemplary studies illustrating applications of selected methods will be discussed, and critical consideration of particular techniques will be undertaken in individual or group projects. Methods which can be applied fruitfully to administration, planning, and evaluation are identified and utilized with consideration of complex interaction of variables in the urban environment.

U.A. 501-3. Introduction to Urban Affairs. An interdisciplinary examination of the problems of man in the urban setting; analysis of urban systems within the expanding metropolitan and regional settings; examination of functional problem areas of the urban community (for example, crime, housing, discrimination in employment, etc.); consideration of the adequacy of present institutional responses to these problems.

U.A. 505-3. Financial Administration and Policy Formulation. Introduction to financial administration and policy formulation with a general study of the principles and techniques of governmental finance in the well as concentrated analysis of specific problems through supervised research. Includes principles and politics of public resource allocation, budgetary systems, taxation, intergovernmental finance, and debt management.


U.A. 510-3. Urban Administration. Study of the public and quasi-public organizations which formulate and implement governmental policies in urban communities; theory of organizational behavior and change; effects of agency structure and interagency relations on performance; intergovernmental relationships; problems of bureaucratic performance.

U.A. 521-3. The Politics of Urban Management. An in-depth examination of administrative practices and behavior within urban political and administrative decision making. Special emphasis is given to the politics of administrative policy making, citizen participation in administrative decisions, managerial competition for limited urban resources, long-range planning in a political system, and the conflicts between urban politics and administrative efficiency.

U.A. 525-3. Urban Economics. (Econ. 525.) Research on economics of urban problems. Topics to be chosen among poverty, housing, discrimination, land use, urban finance, and transportation.

U.A. 530-3. Urban Social Systems. Examines the social and cultural organization and disruption of the urban environment with special attention given to an analysis of community social forces.

U.A. 536-3. Intergovernmental Relations. (Pol.Sci. 536.) Investigation and analysis of the American federal system, including its constitutional, political, and administrative characteristics. Problems considered include federal-state relations, state-local relations, regionalism, interstate cooperation, and grants-in-aid.

U.A. 540-3. Minority Groups in Urban Society. Analysis of the social, economic, and political aspects of minority groups in urban society. Special emphasis on the forces of change in the Black, Chicano, and Native American communities, attention to political and bureaucratic responses to the needs of minority groups.

U.A. 560-3. Volunteer Program Administration. An introduction to the process of volunteer program administration, including an overview of problems and responsibilities involved in administering volunteer service agencies. Course topics include areas such as line-staff support; recruiting and screening volunteers; fiscal management and techniques such as funding, budgeting, and cost analysis; and communications and public relations functions in volunteer programs. Emphasis is placed upon integration of course material into actual program planning.

U.A. 570-3. Introduction to Systems. Overview of systems ranging from general system theory to the application of systems technology. Includes an introduction to information systems, process flowcharting, design considerations, system security and confidentiality, simulation models and geocoding.

U.A. 611-3. Local Government Finance and Analysis. Theory and major policy issues in local government financial administration with emphasis on such topics as fiscal problems of local governments, debt management strategies, local marketing, and use of revenue sharing programs. The role of various kinds of urban jurisdictions and their legal bases and fiscal foundations are examined. Per., U.A. 616-3. Public Relations and the Urban Administrator. Examination of the role of governmental public relations in contemporary urban society; emphasis on the urban administrator's interface with mass media and interest and citizens' groups; the future of public relations in urban society.

U.A. 622-3. Seminar: Analysis of Public Processes and Priorities. Systematic analysis of the machinery and processes for establishing public policy and the resultant outcomes in an important public program area. A major program area involving the national, state, and local governments is selected for examination each year (e.g., general revenue sharing, energy, income transfers, health programs). The nation's public sector response is traced through the various stages of latent problem, crisis, planning, legislation, budgeting and financing, implementation, and evaluation. Other sessions are given to consideration of potential impacts from intergovernmental grants, legal constraints and probable future trends. The role of various kinds of urban jurisdictions and their legal bases and fiscal foundations are examined. Per., P.Ad. 505 or consent of instructor.

U.A. 654-3. Intergovernmental Fiscal Relationships in the Federal System. Fiscal roles and interactions among national, state, and local governments and the significance of the existing system for achievement of public objectives. Theory and analytical review of statistical data and reports on sharing of revenues, revenues transfers, and functions. Includes examination of problems of intergovernmental tax structure,
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C.J. 610-3. Administration of Criminal Justice. Analysis of the policies and practices of agencies involved in the operations of the criminal justice process from detection of crime and arrest of suspects through prosecution, adjudication, sentencing and imprisonment to release and revocation. The patterns of decisions and practices are reviewed in the context of the entire criminal justice system, including the relationship of the public, the legislature, court, and agency in policy determination and control. Specific attention is given to techniques of offender rehabilitation, particularly to experimental intervention programs.

C.J. 620-3. Criminal Justice Policy Analysis and Evaluation. Techniques (Delphi, statistical projection, and simulation) for assessing the probability and desirability of future possible states of society, and particularly of social control systems, will be considered in relation to the goals of the criminal justice system. Normative factors (needs, desires, missions, external pressures, etc.) in planning generally and in the criminal justice field and their importance in projections will be stressed.

C.J. 630-3. Seminar on Police Administration. The role of the police in a rapidly changing society; relationship between police services, the courts, and correctional administration.


C.J. 632-3. Research in the Criminal Justice Process. Examination of current research in criminal justice; problems in the implementation of research findings.


C.J. 642-3. Juvenile Justice Administration. Policies and practices of agencies in processing young persons through the juvenile court system; trends in juvenile justice; examination of disposition of cases by probation, foster home placement, training schools and transfer to adult correction programs.

C.J. 650-3. Nature and Causes of Crime. Survey of theories of crime causation ranging through biological, psychological, sociological, cultural, and political theories. Close attention to the problems inherent in approaching the study of crime from a ‘cause of crime’ perspective. Key concepts used in theories of crime emphasizing the multidisciplinary source of these concepts, how they are changed when applied to criminological theory, and their importance for understanding the present state of criminological theory.

C.J. 660-3. Seminar: Judicial Administration and Organization. An analysis of judicial organization, court administration and criminal court judges as participants in the operation of the criminal justice process; attention to the prosecutor and public defender systems.

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