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Organization of Instructional Units

For conveniences of administration, the instructional units—colleges, schools, departments, academic faculties, and divisions—of the University are grouped as follows:

Undergraduate Colleges

COLLEGE OF ADMINISTRATIVE SCIENCE

SCHOOL
Social Work

ACADEMIC FACULTIES
Accounting
Finance
Management Science
Marketing

DIVISION
Public Administration

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

SCHOOLS
Home Economics
Natural Resources

DEPARTMENTS
Agricultural Economics and Rural Sociology
Agricultural Education
Agricultural Engineering
Agronomy
Animal Science
Dairy Science
Food Science and Nutrition
Horticulture
Plant Pathology
Poultry Science

COLLEGES OF THE ARTS AND SCIENCES

(See listings for the following Colleges.)

COLLEGE OF THE ARTS
COLLEGE OF BIOLOGICAL SCIENCES
COLLEGE OF HUMANITIES
COLLEGE OF MATHEMATICS AND PHYSICAL SCIENCES
COLLEGE OF SOCIAL AND BEHAVIORAL SCIENCES

COLLEGE OF THE ARTS

SCHOOL
Music

DEPARTMENT
Theatre

DIVISIONS
Art
Art Education
Dance
Design
History of Art

COLLEGE OF BIOLOGICAL SCIENCES

DEPARTMENTS
Biochemistry
Biophysics
Botany
Entomology
Genetics
Microbiology
Zoology

COLLEGE OF HUMANITIES

DEPARTMENTS
Classics
East Asian Languages and Literatures
English
German
History
Linguistics
Philosophy
Romance Languages and Literatures
Slavic Languages and Literatures

DIVISIONS
Black Studies
Comparative Literature and Languages

COLLEGE OF MATHEMATICS AND PHYSICAL SCIENCES

DEPARTMENTS
Astronomy
Chemistry
Geodetic Science
Geology
Mathematics
Physics

DIVISION
Statistics
COLLEGE OF SOCIAL AND BEHAVIORAL SCIENCES

SCHOOL
Journalism

DEPARTMENTS
Anthropology
Economics
Geography
Political Science
Psychology
Sociology
Speech Communication

COLLEGE OF EDUCATION

SCHOOL
Health, Physical Education, and Recreation

ACADEMIC FACULTIES
Arts in Education, The
Curriculum and Foundations
Early and Middle Childhood Education
Educational Administration
Educational Development
Exceptional Children
Humanities Education
Industrial Technology
Science-Mathematics Education
Special Services
Vocational-Technical Education

COLLEGE OF ENGINEERING

SCHOOL
Architecture

DEPARTMENTS
Aeronautical and Astronautical Engineering
Aviation
Ceramic Engineering
Chemical Engineering
Civil Engineering
Computer and Information Science
Electrical Engineering
Engineering Graphics
Engineering Mechanics
Industrial Engineering
Mechanical Engineering
Metallurgical Engineering
Mineralogy
Photography and Cinema
Welding Engineering

UNIVERSITY COLLEGE

OTHER DEPARTMENTS
Air Force Aerospace Studies
Military Science
Naval Science

Professional Colleges

COLLEGE OF DENTISTRY

DIVISIONS
Dental Hygiene
Dentistry

COLLEGE OF LAW

COLLEGE OF MEDICINE

SCHOOLS
Allied Medical Professions
Nursing

DEPARTMENTS
Anatomy
Anesthesiology
Medicine
Medical Microbiology
Obstetrics and Gynecology
Ophthalmology
Otolaryngology
Pathology
Pediatrics
Pharmacology
Physical Medicine
Physiological Chemistry
Physiology
Preventive Medicine
Psychiatry
Radiology
Surgery

COLLEGE OF OPTOMETRY

COLLEGE OF PHARMACY

COLLEGE OF VETERINARY MEDICINE

DEPARTMENTS
Veterinary Anatomy
Veterinary Clinical Sciences
Veterinary Microbiology and Parasitology
Veterinary Pathology
Veterinary Physiology and Pharmacology
Veterinary Preventive Medicine

Graduate School
University Academic Requirements

STUDENT RESPONSIBILITY
The student is responsible for knowing his own standing scholastically in reference to the published regulations and standards of the University and of his college.

THE MARKING AND THE POINT SYSTEM
The grade marks given in all colleges of the University are as follows:

A  Highest quality of passing work; for each credit hour, 4 credit points shall be allowed.
B  Second quality of passing work; for each credit hour, 3 credit points shall be allowed.
C  Third quality of passing work; for each credit hour, 2 credit points shall be allowed.
D  Lowest quality of passing work; for each credit hour, 1 credit point shall be allowed.
E  Failed. This mark indicates (1) that the student has done failing work or (2) that he was absent from the final examination without excuse and his work in the course did not justify a passing mark. Credit for a course in which the Mark E (Failed) has been received can be obtained only by repeating and passing the work in class. (Faculty Rule 37.09.)

EM Examination
Section 1. This mark indicates credit given to students registered in the University on the basis of examinations taken prior to or after admission to the University. The level of achievement which must be demonstrated by the student on these examinations in order to receive EM (Examination) credit shall be determined by the department or school in which the course for credit is being given is taught. This credit, up to a maximum of 45 quarter credit hours, or of 70 quarter credit hours in the case of students registered in the School of Nursing who have completed diploma nursing programs and are licensed registered nurses, shall be assigned only upon the authorization of the chairman of such department or the director of such school and with the approval of the executive committee of the college in which the student is registered. Additional examination quarter credit hours may be assigned in the same manner but only with the prior approval of the Council on Academic Affairs.

Section 2. Examination credit shall not be given to a student for a course in which he has received a mark at this university. No credit points are allowed for courses in which a mark of EM (Examination) is given.

H Honors. This mark shall be used only by the College of Medicine for a student enrolled in the curriculum leading to the degree Doctor of Medicine, when that student has completed a course in that curriculum with an exceptionally high degree of academic performance. H (Honors) credit shall be counted as hours only and shall not be considered in determining a student's point-hour ratio under Faculty Rule 37.05.

I Incomplete
Section 1. An I (Incomplete) indicates (1) that the work of the student in the course is qualitatively satisfactory, but that for legitimate reasons a small fraction remains to be completed; or (2) that the record of the student in the course justifies the expectation that he will obtain a passing mark, but he has been unavoidably absent from the final examination.

Section 2. The Mark I (Incomplete) shall be reported on the grade card together with the mark which the Registrar is authorized to enter on the student's official record if the work is not completed, and a different mark reported to the Registrar in the manner and within the time hereinafter provided. The instructor shall also furnish the chairman of the department or the director of the school
with a statement of the work required to be completed.

Section 3. The student must complete the work and the instructor must report the final mark at the earliest possible time, but not later than six weeks following the quarter in which the I (Incomplete) was received. Upon the petition of the student within the six weeks' period, the executive committee of the college in which the student is enrolled (or, if not enrolled, of the college of last enrollment) may for good reason allow a student additional time in which to complete the work. Generally, this shall not be longer than the end of the quarter following the quarter in which the I (Incomplete) was received. Any decision of the executive committee extending the period shall set forth the time in which the student shall complete the work, and a copy of the decision shall be forwarded to the Registrar.

Section 4. As soon as the incomplete work has been made up, the instructor, or in the case of his absence from the University, the department chairman or the director of the school, shall file the proper mark in the Registrar's Office. Until such time as the final mark is recorded, the credit hours in the incomplete course shall not be counted or considered for any purpose except that of mens intercollegiate athletic eligibility.

Section 5. In no case shall a student who has received the mark I (Incomplete) be permitted to repeat the course in which such mark was received until such time as the I (Incomplete) has been removed in the manner hereinbefore provided, and then only in such cases as fall within Rule 37.09.

K Credit. This mark shall be used for work credited from other institutions and service schools and by the Director of Admissions only. K credit shall be counted as hours only and shall not be considered in determining a student's point-hour ratio under Rule 37.05. Credits accepted from another institution are recorded on the student's permanent academic record, but grades are not transferred to this record. Only courses completed at

The Ohio State University are included in the cumulative point-hour ratio.

NP Non-Pass. No credit shall be given for work marked NP. This grade shall not be considered in determining a student's point-hour ratio under Rule 37.05.

P Progress. This mark may be used to indicate that the student has shown satisfactory progress in courses other than individual studies courses that extend over more than one quarter. Until such time as a final mark is recorded, the credit hours in a P (Progress) course shall not be counted for any purpose. When a final mark is recorded, all previous P hours shall assume the value of the final mark.

PA Pass. PA credit shall be counted as hours only and shall not be considered in determining a student's point-hour ratio under Rule 37.05.

R Audit. This mark indicates that the student has registered to audit the course. No credit hours shall be awarded for this mark. (Faculty Rule 37.11.)

S Satisfactory
The mark S may be used to record either satisfactory progress in or completion of work, provided that the course has been approved for this mark by the dean of the college offering the course, and in the case of courses carrying graduate credit, by the Graduate Council. It shall be used as an alternative to U or I in individual-studies courses numbered 598, 993, 793, 993, 998, and 999, and on satisfactory completion by a graduate student of a literature review course or seminar designated by the Dean of the Graduate School as qualifying for the mark of S. S credit shall be counted as hours only and shall not be considered in determining a student's point-hour ratio under Rule 37.05.

T Temporarily excused. This mark applies only to military science, Air Force aerospace studies, or naval science; physical education; or health education. No credit hours shall be awarded to a course in which a student received a T (Temporarily excused) mark.
U Un satisfactory
The mark U shall be used for unsatisfactory work in courses in which a student would be entitled to the mark of S if his work had been satisfactory. No credit shall be given for work marked U. This grade shall not be considered in determining a student's point-hour ratio under Rule 37.05.

WF Withdrawed failing.
WP Withdrawed passing.
X Permanently excused. This mark applies only to military science, Air Force aerospace studies, or naval science; physical education; or health education. No credit hours shall be awarded to a course in which a student received an X (Permanently excused) mark.

PASS/NON-PASS OPTION
The Pass/Non-Pass Option is currently under revision. Contact the college office for procedures.

WITHDRAWAL PROCEDURES AND POLICIES
Withdrawal procedures and policies are currently under revision. Contact the college office for procedures.

COMPULSORY COURSE WITHDRAWAL
An enrollee of any undergraduate college who fails to attend a scheduled course before Saturday noon of the first week of classes, may, at the option of the department, be disenrolled immediately from that course. In the event a department chooses to take such action, it will be the responsibility of the department chairman to notify the student's college office. A change ticket removing the course from the student's schedule will be prepared in the college office, and a copy shall be forwarded to the Office of the Registrar (Faculty Rule 41.07).

A student delayed in reporting to classes may reserve class space for a period of time up to two calendar days by notifying in writing the department of each course for which he is scheduled, giving his name and college, the course name, number, and time he is scheduled to attend, when he will report to classes, and the reasons for his delay.
REPEITION OF COURSES
A student who has received a mark of E (Failed) or NP in a required course at this university may repeat the course for credit only as provided in Faculty Rule 37.07. A student who has received a mark of E (Failed) or NP in any other course at this university may repeat the course for credit at his option.

An undergraduate or professional student who has received a grade of D (lowest quality of passing work) in a course at this university may repeat the course for credit only upon the recommendation of the executive committee and with the approval of the dean of his college. A graduate student, as defined in Rule 41.03, may, when approval is given by an adviser, repeat for credit any course in which he has received a grade of D (lowest quality of passing work).

An undergraduate or professional student, as defined in Rule 41.03, who has received a grade of A, B, C, or PA in a course taken at this university or elsewhere, may repeat the course only as an auditor, upon receipt of permission of the chairman of the department or director of the school and the dean of his college. A graduate student, as defined in Rule 41.03, may, after a period of five years, and when approval is given by the graduate committee of his department and Dean of the Graduate School, repeat for credit a course in which he has received a mark of A, B, or C.

A student who has audited a course may subsequently repeat the course for credit with the permission of the executive committee of his college.

The credit hours for a repeated course shall in no case be counted more than once in meeting graduation requirements.

REMOVAL OF FAILURE IN A REQUIRED COURSE
A student is responsible for repeating in class, at his first opportunity, a required course in which he has failed, unless the executive committee of the college authorizes a substitute course.

ALTERATION OF MARKS
At the close of each quarter, the Registrar's Office notifies each student by mail of the marks earned during the quarter. These marks become a part of the official record of the student and are not subject to change except upon official authorization of the chairman of the department or director of the school and the dean of the college. Such changes shall be made only when a clerical error has been discovered.

THE POINT-HOUR RATIO
A student's academic standing for a quarter is expressed by his point-hour ratio. This ratio is determined by dividing the total number of points earned by the total number of credit hours scheduled or undertaken. Courses in which the marks EM, H, I, K, NP, P, PA, R, S, T, U, X, WF, or WP are given are not included in the computations. The following is an example: A = 4.0, B = 3.0, C = 2.0, D = 1.0, E (Failed) = 0.

<table>
<thead>
<tr>
<th>Course No. 1</th>
<th>Hours</th>
<th>Grade</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
<td>A</td>
<td>20</td>
</tr>
<tr>
<td>Course No. 2</td>
<td>3</td>
<td>C</td>
<td>6</td>
</tr>
<tr>
<td>Course No. 3</td>
<td>(3)</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>Course No. 4</td>
<td>3</td>
<td>E</td>
<td>0</td>
</tr>
<tr>
<td>Course No. 5</td>
<td>(3)</td>
<td>PA</td>
<td></td>
</tr>
</tbody>
</table>

Total: 11

Point-hour ratio: 2.36

When the final grade on Course No. 3 is recorded, the points and hours will be included in the computation of the student's point-hour ratio. When a student has a record for two or more quarters, he will have a cumulative point-hour ratio determined by dividing the total points earned by the total hours undertaken.

UNIVERSITY CLASS RANKING SYSTEM
Student rank in all the undergraduate colleges is based on total credit hours completed and recorded.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Earned Credit Hours</th>
<th>Schedule Card Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>0-48</td>
<td>1</td>
</tr>
<tr>
<td>Sophomore</td>
<td>49-97</td>
<td>2</td>
</tr>
<tr>
<td>Junior</td>
<td>98-146</td>
<td>3</td>
</tr>
<tr>
<td>Senior</td>
<td>147-195</td>
<td>4</td>
</tr>
<tr>
<td>Fifth Year</td>
<td>196 and more</td>
<td>5</td>
</tr>
</tbody>
</table>

Students enrolled in the professional divisions or colleges of Allied Medical Professions, Dentistry, Education-Professional,
Engineering-Professional, Law, Medicine, Nursing, Optometry, Pharmacy, and Veterinary Medicine begin their rank over again, as follows:

<table>
<thead>
<tr>
<th>RANK</th>
<th>SCHEDULE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Second Year</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Third Year</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Fourth Year</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Should there be any doubt in a student's mind concerning the correctness of his rank in the professional divisions and colleges, he should consult with the division or college concerned.

Students enrolled in the Graduate School receive the rank of either M (Master's) or P (Ph.D.).

**WARNING, PROBATION, AND DISMISSAL: MINIMUM SCHOLASTIC REQUIREMENTS**

These requirements shall apply only to undergraduate students. The academic standards controlling warning, probation, and dismissal of professional and graduate students shall be established by rule by the faculties of the colleges in which the professional students are registered, or of the Graduate School if the student is a graduate student.

The promulgation of these rules, and their amendment or repeal, shall be subject to the approval of the Board of Trustees.

A transfer student from another university who is admitted to advance standing in this University shall have his point-hour ratio and deficiency points computed only upon work done at this University.

In order to be in good academic standing at this University, a student must carry a cumulative point-hour ratio of 2.00 or better. A student whose point-hour ratio is less than 2.00 will be subject to warning, probation, or dismissal based upon his previous record and the number of deficiency points he possesses.

Deficiency points are defined as the number of points a student would need in order to raise his cumulative point-hour ratio to 2.00. (See previous section on point-hour ratio). A student with a point-hour ratio greater than 2.00 is said to have no deficiency points. Deficiency points may be calculated by subtracting the number of points earned from twice the number of credit hours attempted for the grades A, B, C, D, or E.

A student who has between one and fourteen deficiency points will be warned by his college office that he is in academic difficulty.

A student who has 15 or more deficiency points is subject to academic dismissal from the University or to probation. A student will be placed on probation after the first quarter in which he accumulates 15 or more deficiency points; and the college in which he is registered will indicate to him what conditions he must meet in order to continue to enroll at the University. At the end of each succeeding quarter the college will review his record and will take appropriate action to restore him to good standing, to place him on warning, continue him on probation, or dismiss him as the facts of his case may dictate. A student who has been dismissed will not be permitted to enroll for any courses at the University until he has been reinstated by his college or school.

If at any time the preparation, progress, or success of a student in his assigned work is determined to be unsatisfactory, the executive committee of the college or school in which he is registered shall be empowered to place him on probation.

Notice of dismissal or probation from the University shall be sent by the dean of the college or school in which the student is registered to the student and to the student's parents or guardian, unless the student is 21 years or older or married, provided that the student has notified the Registrar's Office not to send the grade report to his parents or guardian.

A student who is dismissed from the University may petition his college or school for later readmission to the University. Policies regarding reinstatement are developed by each college or school. A student who is reinstated following an academic dismissal shall be subject to any special requirements which may be determined appropriate by the executive committee of the college.

In colleges or schools which require a point-hour ratio higher than 2.00 to remain in good standing a student may not be permitted to enroll in that college even though his point-hour ratio is above 2.00 and he is in good standing with the University. Such students are encouraged to reconsider their academic plans and transfer to another college or school of the University.
Graduation Requirements

REQUIREMENTS FOR AN UNDERGRADUATE DEGREE
(Faculty Rule 49.03)

To obtain an undergraduate degree from this University an undergraduate student must:

a. Have been enrolled in the college, the Colleges of the Arts and Sciences, or the school recommending that degree during the last two quarters of work necessary to complete the degree requirements. The executive committee of the college, the Colleges of the Arts and Sciences, or the school recommending the degree may waive this requirement to the extent of not more than one quarter's enrollment if the student has six quarters in full-time residence (to be in full-time residence in any quarter a student must be enrolled in courses carrying twelve or more quarter hours credit) at this University, including a minimum of forty-five quarter credit hours earned through regular course enrollment at this University during the junior and senior years.

b. Have earned through regular course enrollment a minimum of forty-five quarter hours credit from this University.

c. Have satisfactorily completed the number of credit hours required for the curriculum he is pursuing. The minimum number of credit hours required in each curriculum shall include the credit hours required under Rules 31.0701 and 31.0703; however, excuses granted under Rule 31.0705 shall not reduce the stated minimum number of credit hours required in the curriculum for a degree or a certificate. Credit hours are considered as "satisfactorily completed" only if the student has received, at this University, the mark A, B, C, D, EM, K, S, or PA in those hours (Rule 35.07).

d. Have earned credit points (Rule 37.03) totaling at least twice the number of credit hours attempted at this University for which calculable grades (A, B, C, D, or E) were given.

e. Have satisfactorily met all additional college and curricular requirements for the degree involved.

f. Have filed an application for the degree in accordance with rules prescribed by the college or school.

g. Waiver of any part of this Rule (49.03) in the case of individual students may be made only by the Council on Academic Affairs following prior approval by the executive committee of the college. The Provost and Vice President for Academic Affairs shall transmit all affirmative actions of the Council on Academic Affairs under this section to the secretary of the student's college and to the Registrar for notation on the student's permanent record.

REQUIREMENTS FOR A GRADUATE OR PROFESSIONAL DEGREE
(Faculty Rules 49.05 and 49.07)

To obtain a graduate or professional degree from this University, the graduate or professional student must have met the minimum requirements established by the graduate council or the college recommending the degree and approved by the Board of Trustees.

DEGREES AND CERTIFICATES

Degrees and certificates are awarded by the Board of Trustees upon the recommendation of the college faculties, or the Graduate Council, and the Faculty Council, as transmitted to the Board by the President.

COLLEGE REQUIREMENTS

Each college has certain requirements which must be met by every student seeking to earn a degree in that college. The specific course requirements for the curriculum administered by a given college can be found in the catalog for that college. In addition to these, the University has established certain requirements outlined below.

UNIVERSITY REQUIRED COURSES

BASIC EDUCATION REQUIREMENTS

Every curriculum in the undergraduate colleges includes a body of courses from which 45 credit hours must be selected to
ensure that each student is given the opportunity to become acquainted with the three basic areas of academic study—the humanities, the social sciences, and the natural sciences—by selecting 15 credit hours in each of these three areas. These courses are specifically stated in the individual college catalogs under the heading Academic Requirements.

Students transferring from other colleges or universities can meet part or all of the following requirements with approximately equivalent courses. Credits for each transfer student shall be reviewed by the Director of Admissions and the appropriate college administrators, and credit in all courses which meet the spirit of these Basic Education Requirements shall be accepted.

The objectives of this part of the curriculum, as set forth by the University faculty, are as follows:

**Humanities (15 credit hours)**

The objectives are to introduce the student to his possibilities for continuing growth as a thoughtful and reasoning person; to acquaint him to at least some degree with the treasures of human thought and expressions at his command; and to develop in him a continuing desire to have his full share of the legacy of all creative efforts.

**Social Sciences (15 credit hours)**

The objectives are to make sure that the student has at least a basic understanding of the fundamental ideas upon which our society has been built, the social institutions through which these ideas have been given effective meaning, and the never-ending process of development through free choice limited only by concern for the rights and well-being of others. Emphasis will be put upon the values of a free society and the responsibility of the individual for participating actively in the issues and decisions of the day.

**Natural Sciences (15 credit hours)**

The objectives are to acquaint the student with the kinds of problems which lend themselves to possible solutions through the use of science, to introduce him to differing scientific techniques through significant illustrative experience, to give him a sense of perspective in the development of science, and to develop in him an understanding of the basic community of all scientific disciplines.

**NATIONAL DEFENSE OPTION**

In addition to the above requirements, all students enrolled in these colleges will select one of the following:

*Either*

a) Twelve credit hours of courses in military science, air force aerospace studies, or naval science, which offer the freshman an excellent opportunity to learn more about defense problems and the military service so that he can make an informed decision to continue his military training or to terminate it at the end of two years.

Or

b) Twelve credit hours of courses not otherwise specified in the degree requirements of the selected curriculum.

**PHYSICAL AND HEALTH EDUCATION REQUIREMENTS**

All students entering any of the undergraduate colleges, schools, or divisions, including Allied Medical Professions, Nursing, and Dental Hygiene, are required to schedule:

1. One hour of physical education each quarter offered until a total of three quarters of credit has been earned.

2. One hour of health education during one of the first three quarters offered, and thereafter, if necessary, each quarter until 1 credit hour has been earned.

Transfer to other colleges of this University shall not constitute a waiver of unfulfilled requirements of this rule.

**EXCUSES FROM REQUIRED COURSES**

The college in which a student is enrolled may excuse a student from course requirements imposed by that college.

The requirements of physical education and health education are University requirements. The President and the departments of instruction directly concerned may grant by faculty regulation excuses from these courses.
RETROACTIVE GRADUATE CREDIT

Students registered in an undergraduate college, the Division of Continuing Education, or a professional college cannot receive graduate credit for courses taken when the student is not enrolled in the Graduate School. (See below for exceptions.)

GRADUATE CREDIT FOR UNDERGRADUATES

An undergraduate student with graduate student potential who does not need to register full-time in order to complete his baccalaureate degree may petition to take certain courses for graduate credit, provided that:

a. The credit for the course is not needed to meet his baccalaureate degree requirements.

b. His cumulative point-hour ratio is 3.0 or above.

c. He secures permission before registering for the courses from:
   (1) The instructor in charge of the course.
   (2) The secretary of his college.
   (3) The chairman of the graduate committee of the department in which the courses are to be taken.
   (4) The Graduate School.

The senior petition form for obtaining the necessary approvals is available in the Graduate School Office.

He must achieve a grade of B or better in such courses in order to obtain graduate credit. A student cannot use these courses for graduate credit until he is admitted to the Graduate School and until the department in which he wishes to specialize accepts the work for graduate credit. Not more than 15 quarter hours of such work may be counted toward the student's advanced degree.
Courses of Instruction

The following pages describe courses of instruction offered by the University at undergraduate, graduate, and professional levels. These descriptions are accurate as of October 1, 1971. Courses and programs are continually being improved, but Bulletin deadlines preclude the insertion of more recent changes. The most current information regarding credit hours, sections, days, times, buildings, rooms, and instructors may be found in the quarterly Master Schedule of Classes.

A sample course listing is provided below.

A

H6311* U G 5
Structural Design V

1

W, Sp. 3 cl., 2-2 hr. labs.

2

Prereq.: 673, Engr. Mech. 605, or 3rd yr. standing.

3

Not open for credit to students majoring in Civil E.

4

Repeatable to a maximum of 15 cr. hrs.

5

Basic theory and design of reinforced concrete structures. Tilton. Fee.

6

631.01 Design of Continuous Beams

631.02 Simple Steel Structures

7

EXPLANATION OF COURSE LISTINGS

A

The course number: 631 (An "H" prefix indicates the course is open only to students enrolled in college Honors Programs, and others as designated by departments.)

Note—The University’s Classification and Course Numbering System appears in detail in the following section.

A dagger (†) denotes that the course will not be offered this year.

An asterisk (*) indicates that the course is offered every other year.

The instructional level: U G

U = Undergraduate

UG = Advanced Undergraduate and Graduate

G = Graduate

P = Professional (for professional students enrolled in that particular college)

Credit hours: 5

The course title: Structural Design V

B

1

Quarters of Offerings:

Su. = Summer

W. = Winter

Au. = Autumn

Sp. = Spring

Summer Quarter is further divided into 1st Term and 2nd Term. See the University Calendar in any catalog for dates. Lack of staff or low student enrollment may preclude offering a course, particularly at the advanced level, every quarter for which it is authorized.

2

Classroom and laboratory hours: 3 cl., 2 2-hr. labs. In the sample provided, the 5 hours of credit are earned through satisfactory completion of course work which involves attending class three days a week and attending two 2-hour laboratory periods each week.

3

Prerequisites: 673, Engr. Mech. 605, or 3rd yr. standing. The course number(s) or other information indicates the preparation or classification required to enroll in the course. If no department name is listed, the course number refers to the specific course within the same department. If a class standing such as “3rd-year standing” is listed, only students with that or higher class level are eligible for enrollment. The school, department, or college office should be consulted in cases of question as to eligibility for taking the course.

The number of the course implies the prerequisites listed in the University Classification and Course Numbering System shown in the following section.

4

Additional information affecting a student’s enrollment in a course: Not for credit to students majoring in Civil Engineering.

5

Repeatability Clause: The repeatability clause indicates the maximum number of hours a course may be repeated for credit.

6

A brief description of the course: Basic theory and design of reinforced concrete structures.

Instructor’s name: Tilton.

7

Fee: The course fee indicates an additional charge assessed for the course over and above the regular quarterly instructional fees charged. (See the Course Fees section.)

C

The decimal subdivisions:

The numbers 631.01 and 631.02 indicate subdivisions of the generic number, 631. Whenever decimals appear, a student should register for the entire number (including the desired decimal subdivision) rather than the generic number alone.
**UNIVERSITY CLASSIFICATION AND COURSE NUMBERING SYSTEM**

Established 1967-68, the system of numbering courses offered by the University is as follows:

<table>
<thead>
<tr>
<th>NUMBERS</th>
<th>COURSES</th>
<th>PREREQUISITES</th>
</tr>
</thead>
<tbody>
<tr>
<td>000-099</td>
<td>Non-Credit Courses (except certain seminars and colloquia)</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Orientation courses;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Remedial courses;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experience courses with student not under direct supervision of faculty;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Courses with credit added to graduation requirements.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>100-299</th>
<th>Courses Providing Undergraduate Credit Only</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100-199</td>
<td>Basic courses providing undergraduate credit, but not to be counted on a major or field of specialization in any department;</td>
<td>None, or specified course(s) numbered 100-199.</td>
</tr>
<tr>
<td></td>
<td>Beginning courses, required or elective courses which may be prerequisite to other courses.</td>
<td></td>
</tr>
<tr>
<td>200-299</td>
<td>Basic courses providing undergraduate credit which may be counted on a major or field of specialization (in your and/or other departments).</td>
<td>45 qtr. hrs. in collegiate courses, exclusive of ROTC and physical education; or</td>
</tr>
<tr>
<td></td>
<td>Specified course(s) numbered 100-199; or</td>
<td>Satisfactory placement on entrance examinations when applicable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>300-499</th>
<th>Courses Providing Undergraduate Credit or Professional Credit</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intermediate courses providing undergraduate credit which may be counted on a major or field of specialization;</td>
<td>90 qtr. hrs. in collegiate courses, exclusive of ROTC and physical education; or</td>
</tr>
<tr>
<td></td>
<td>Basic courses in the professional division of the College of Education.</td>
<td>Specified course(s) numbered 100-399.</td>
</tr>
<tr>
<td></td>
<td>Basic courses in the colleges of Dentistry, Optometry, Pharmacy, and Veterinary Medicine.</td>
<td></td>
</tr>
<tr>
<td>NUMBERS</td>
<td>COURSES</td>
<td>PREREQUISITES</td>
</tr>
<tr>
<td>---------</td>
<td>---------</td>
<td>---------------</td>
</tr>
<tr>
<td>500-699</td>
<td>Undergraduate Courses Which Provide Undergraduate Credit and Which May Provide Graduate Credit For Graduate Students Registered in Sections of Courses Taught by Members of the Graduate Faculty; Courses Providing Professional Credit and Which May Provide Graduate Credit for Graduate Students Registered in Sections of Courses Taught By Members of the Graduate Faculty.</td>
<td>15 qtr. hrs. in courses in the same discipline numbered 200 or higher; or 10 qtr. hrs. in courses numbered 200 or higher in the same discipline, plus 10 qtr. hrs. in courses numbered 200 or higher in specified allied disciplines. Baccalaureate degree.</td>
</tr>
<tr>
<td>600-699</td>
<td>Intermediate courses providing undergraduate credit which may be counted on a major or field of specialization, and may (or may not) provide graduate credit only in other departments; Intermediate courses in the professional division of the College of Education. Intermediate courses in the colleges of Dentistry, Optometry, Pharmacy, and Veterinary Medicine; Basic courses in the colleges of Law and Medicine.</td>
<td>15 qtr. hrs. in courses in the same discipline numbered 300 or higher; or 10 qtr. hrs. in courses numbered 300 or higher in the same discipline, plus 10 qtr. hrs. in courses numbered 300 or higher in specified allied disciplines.</td>
</tr>
<tr>
<td>700-799</td>
<td>Courses Which Provide Graduate Credit For Graduate Students Registered in Sections of Courses Taught by Members of the Graduate Faculty and Which Provide Undergraduate or Professional Credit. Courses Which Provide Professional Credit and Which May Provide Graduate Credit for Graduate Students Registered in Sections of Courses Taught by Members of the Graduate Faculty.</td>
<td>Graduate courses providing undergraduate and graduate credit. Undergraduate credit may be counted on a major or field of specialization for high ability undergraduates; Advanced courses in professional divisions and professional colleges.</td>
</tr>
<tr>
<td>800-999</td>
<td>Courses Providing Graduate Credit Only</td>
<td>30 qtr. hrs. in courses in the same discipline; or 20 qtr. hrs. in the same discipline plus 25 qtr. hrs. in specified allied disciplines.</td>
</tr>
</tbody>
</table>
Accounting

Office: 452 Hagerly Hall, 1775 College Road

Professors Fertig (Chairman), Burns, Heckert (Emeritus), Kindig, Kollaritsch, Livingstone, McCollough, McCoy, Monting (Emeritus), and Stanley; Associate Professors Brush, Burnham, Greenball, Johnston, and Northrup; Assistant Professors Bartos, Baumler, Bolon (Emeritus), Gordon, Krasniewski, and Li.

201 U 5
Outline of Accounting
A, Sp. 5 cl.
Not open to students with credit for 211 or equiv.
Survey of accounting in modern business; intended for students whose major is in fields other than business.

211 U 5
Introduction to Accounting
Su, A, W, Sp. 5 cl.
This course (honors) may be available to students enrolled in a college honors program or by permission of faculty.
Prereq.: Econ. 200, 201, or equiv.
Not open to students with credit for 201 or equiv.
The uses of accounting reports in management decisions and in control of business enterprises.

212 U 5
Introduction to Accounting
Su, A, W, Sp. 5 cl.
This course (honors) may be available to students enrolled in a college honors program or by permission of faculty.
Prereq.: 211 or equiv.; and Econ. 200, 201, or equiv.
Not open to students with credit for 201 or equiv.
The accrual interpretation of transactions and fundamentals of income determination, uses of financial statements by persons outside the firm.

221 U 5
Accounting Methods
Su, A, W, Sp. 5 cl.
Prereq.: 212 or equiv.
The application of accounting techniques to recording and reporting financial information; special emphasis given to accounting systems and the use of working papers.

415f U 5
Factory Costs
5 cl.
Prereq.: 212 or equiv.
Not open to majors in Acc.
Survey of industrial cost accounting for the student whose major interest is in fields other than accounting.

493 U 2-5
Individual Studies
Prereq.: Written permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Individual study projects in selected areas in accounting.

494 U 2-5
Group Studies
Prereq.: Written permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Group study projects in selected areas in accounting.

523 U 4
Financial Accounting
Su, A, W, Sp. 4 cl.
Prereq.: 221 or equiv.
Not for graduate credit for majors in Acc.
Analysis and interpretation of financial statements, advanced study of concepts of asset valuation and income determination.

524 U G 4
Financial Accounting
Su, A, W, Sp. 4 cl.
Prereq.: 523 or equiv.
A continuation of 523 with special emphasis on the accounting entity and business combinations.

525 U G 4
Cost Accounting
Su, A, W, Sp. 4 cl.
Prereq.: 221 or equiv.
Not open to students with credit for 415 or equiv.
Not for graduate credit for majors in Acc.
Basic concepts and techniques of industrial accounting; historical and standard costs; budgeting; management use of cost accounting information.

526 U G 4
Tax Accounting I
Su, A, W, Sp. 4 cl.
Prereq.: 201 or 212 or equiv.
Not for graduate credit for majors in Acc.
Fundamentals of federal, state, and local taxation, with major emphasis upon the federal income tax provisions having common application to all types of taxpayers.

531 U G 3
Principles of Automatic Data Processing
A, W, Sp. 2 cl., 1-2 hr. lab.
Prereq.: 212 or equiv. and Econ. 442 or equiv. or permission of instructor.
The principles of processing business data automatically; the uses and limitations of computers in business; techniques used in formulating and solving business problems on computers.

535 U G 4
Advanced Cost Accounting
Sp. 4 cl.
Prereq.: 525 or equiv.
Advanced study of selected applications of cost accounting concepts to management problems involving performance measures with emphasis on budgetary control and standard costing.

536 U G 3
Tax Accounting II
Sp. 3 cl.
Prereq.: 221 and 526 or equiv.
Advanced study of complex problem areas in taxation confronting the professional tax advisor, emphasizing the structure of tax provisions and opportunities for planning and control.

627  U G 5
Auditing Principles and Procedures
Su, A, W, Sp.  5 cl.
Prereq.: 524 and 525 or equiv.
Basic concepts and standards of auditing; audit procedures and working papers; internal and external audit reports.

628  U G 4
Accounting Practice
Su, A, W, Sp.  4 cl.
Prereq.: 524 and 525 or equiv.
A study of the accounting concepts and standards underlying corporate and non-corporate financial statements, including consideration of typical accounting problems.

689  U G 15
Field Work in Accounting
Open only to students who hold internships with public accounting firms or with industrial concerns, for which advance approval has been given by the department. 15 cr. hrs. and one qtr. of residence added to graduation requirements for students in this course.

693  U G 2-5
Individual Studies
Prereq.: Written permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Individual reports on selected accounting problems in the following fields of accounting; registration for this course number to be followed by the letter designating the field of study.
  a. Auditing
  b. Budgeting
  c. Cost Accounting
  d. Systems
  e. Taxes
  f. Theory

694  U G 2-5
Group Studies
Prereq.: Written permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Registration to be followed by the letter designating the field of study.
  a. Auditing
  b. Budgeting
  c. Cost Accounting
  d. Systems
  e. Taxes
  f. Theory

711  U G 5
Introduction to Management Accounting
A, Sp.  3 cl. and conf.
Prereq.: Stat. 505.
A survey of accounting principles from the viewpoint of management, income measurement, analysis and interpretation of accounting data, internal reports.

712†  U G 3
Introduction to Management Accounting
3 cl. and conf.
Prereq.: Approval of the Office of Graduate Business Programs.
Continuation of 711.

811  G 3
Business Controls
Prereq.: 711 or equiv.; and Bus. Adm. 801.01.
Not for graduate credit for majors in Acc.
Examination of business planning and the controls over operations and property; the use of accounting data in the management enterprise.

831  G 3
Accounting Systems
Sp.  3 cl.
Prereq.: 811 or written permission of instructor.
The principles underlying the design and installation of accounting systems.

844  G 3
Theory and Practice
A.  3 cl.
Prereq.: 524 or equiv.
Readings, reports, and advanced problems in accounting.

845  G 3
Controllership
W.  3 cl.
Prereq.: 811 or written permission of instructor.
The accounting executive's role in the management of an enterprise; accounting data for planning, coordination, control, and protection.

846  G 3
Advanced Tax Accounting
W.  3 cl.
Prereq.: 526 or equiv.
Tax alternatives and tax planning; tax research; postfilling problems and procedures.

847  G 3
Advanced Auditing
Sp.  3 cl.
Prereq.: 627 or equiv.
Growth of the auditor's liability and its effects on auditing procedures; advanced auditing problems; discussion of current material affecting the auditing profession.

851†  G 3
Accounting Problems of Financial Institutions and Fiduciaries
W.  3 cl.
Prereq.: 30 cr. hrs. in Acc. or equiv.
Accounting principles and problems peculiar to banks, insurance companies, brokerage and investment houses, receivers, executors, and trustees.
Aeronautical and Astronautical Engineering

Office: 328 Civil and Aeronautical Engineering Building, 2036 Neil Avenue
Professors Von Eschen (Chairman), Bailey, Burggraf, Edide, Gatewood, Lee, Li, and Stewartson (Visiting); Associate Professors Gregorek, Mallett, Norum, and Petrie; Assistant Professors Foster and Young.

200 U 4
Elements of Aeronautics and Astronautics
A. 3 cl., 1 2- hr. lab.
Not open to students with credit for 400.
An introduction to the aerodynamics, propulsion, structural design, stability, and control of flight vehicles; emphasis on the mechanics of fluids.

201 U 4
Elements of Aeronautics and Astronautics
W. 3 cl., 1 2-hr. lab.
Prereq.: 200 or 400.
A continuation of 200 with emphasis on aircraft propulsion, flight performance, static stability, and control.

202 U 4
Elements of Aeronautics and Astronautics
Sp. 3 cl., 1 2-hr. lab.
A continuation of 201 with emphasis on the structural loads imposed on flight vehicles and the resulting stresses.

405 U 4
Thermodynamics
A. 4 cl.
Prereq.: 201 and Math. 415.
Introduction to the properties and behavior of aerodynamic fluids from microscopic and macroscopic points of view.

440 U 4
Flight Vehicle Structures I
W. 4 cl.
Load distributions, temperature distributions, and allowable stresses for flight vehicle structures; derivations of basic equations for analysis of flight vehicle structural components.

460 U 4
One-Dimensional Gasdynamics
W. 4 cl.
Prereq.: 405 and Math. 415.
One dimensional compressible flow including chemical reactions.

480 U 4
Mathematical Methods in Aeronautical and Astronautical Engineering
W. 4 cl.
Prereq.: Math. 415 and 416.
Application of selected topics in mathematics to analysis in the field of aeronautical and astronautical engineering.

510 U 4
Aeronautical Laboratory
W. 2 cl., 2 3-hr. lab.
Prereq.: 540 and 550.
Laboratory demonstrations and experiments in aerodynamics, aeroelasticity, propulsion, and structures of flight vehicles.

515 U 4
Preliminary Design of Flight Vehicles
Sp. 2 cl., 2 3-hr. lab.
Prereq.: 520, 541, and 550.

520 U 4
Flight Vehicle Dynamics
W. 4 cl.
Prereq.: 201 and 480.
Introduction to the concept of dynamic stability and to the dynamics of rigid aircraft and satellite vehicles.

540 U 4
Flight Vehicle Structures II
Sp. 4 cl.
Stress analysis of flight vehicle structures.

541 U 4
Structural Design of Flight Vehicle Components
A. 2 cl., 2 3-hr. labs.
Prereq.: 540.
Design of joints, tension, bending, shear, and compression members; diagonal tension beams, box beams, and pressure structures.

550 U 4
Principles of Flight Vehicle Propulsion
Sp. 4 cl.
Prereq. or concur.: 561.
Functional characteristics and performance of rocket, ramjet, turbojet, turbo propeller, pulse jet, and hybrid engines.

560 U 4
Classical Aerodynamics
Sp. 4 cl.
Prereq.: 201, and Math. 415 and 416.
Fundamentals of steady incompressible, non-viscous aerodynamic flows with applications to airfoils and finite wings.

561 U 4
Compressible Aerodynamics
A. 4 cl.
Prereq.: 460, 480, and 560.
The fundamentals of the aerodynamics of compressible fluids.

570 U G 4
Viscous Flow and Heat Transfer
A. 4 cl.
Prereq.: 460.
Fundamentals of viscous flow, laminar and turbulent boundary layers, aerodynamic heating, effects of body forces and acceleration, elements of radiative transfer.

594 U 3-S
Group Studies in Aeronautical and Astronautical Engineering
A, W, Sp. 3-5 cl.
Prereq.: Permission of dept.
Repeatable to a maximum of 15 cr. hrs.
Special studies in aeronautical and astronautical engineering are undertaken to satisfy various nonrecurring needs for aeronautical and astronautical subject matter outside of the normal course structure of the department.

673 U 4
Biological Fluid Mechanics for the Engineer
Sp. 4lec.
Prereq.: Elect. E. 670 and Math. 415; or permission of instructor.
Study of pulsatile flows, low Reynolds number flows, turbulence, and separated flow phenomena as they pertain to biological systems and biomedical engineering applications.

693 U G 2-10
Individual Studies in Advanced Aeronautical and Astronautical Engineering
Prereq.: Written permission of dept.
Repeatable to a maximum of 15 cr. hrs.
Special studies in aeronautical and astronautical engineering in one or more areas, including aircraft structures, aerodynamics, propulsion, flutter and vibration, and stability and control.

694 U G 2-10
Group Studies in Aeronautical and Astronautical Engineering
Prereq.: Written permission of dept.
Repeatable to a maximum of 15 cr. hrs.
Special advanced topics in aeronautical and astronautical engineering with the specific area under consideration announced.

695 U 1
Senior Seminar
A. 1 cl.
Prereq.: Aero-Astr. E. senior standing.

711 U G 2-4
Advanced Aeronautical Laboratory
W, Sp. 4-8 lab. hrs.
Prereq.: 540 and 550.
The solution of problems in aero-space engineering by experimental methods.
720 U G 4
Stability and Control of Flight Vehicles
Sp. 4 cl.
Prereq.: 520.
To alternate with 726.
Modern methods of system response analysis, root locus analysis, and Lyapunov stability analysis.

725 U G 4
Analytical Dynamics of Astronautics
W. 4 cl.
Prereq.: 520 or equiv.
Satellite orbit analysis and multi-staging of rockets.

7261* U G 4
Perturbation of Satellite Orbits
Sp. 4 cl.
Prereq.: 520 or equiv.
To alternate with 720.
General analysis of satellite orbit perturbations; application to several specific cases.

740* U G 4
Thermal Stresses in Aircraft and Missiles
W. 4 cl.
Prereq.: 540.
To alternate with 746.
Theory of thermal stresses, aerodynamic heating and structural effects due to heating.

745 U G 4
Aeroelasticity I
A. 4 cl.
Prereq.: 540 and 560.
To alternate with 740.
Dynamic loads analysis of elastic flight vehicles subjected to unsteady airloads.

7461* U G 4
Aeroelasticity II
W. 4 cl.
Prereq.: 745.
To alternate with 740.
Continuation of 745.

751 U G 4
Advanced Propulsion
W. 4 cl.
Prereq.: 550.
Characteristics and performance of air breathing flight vehicle power plants and their components (inlets, turbo-machinery, combustors, and expansion nozzles).

760 U G 4
Advanced Compressible Flow
W. 4 cl.
Prereq.: 561 or equiv.
Two-dimensional supersonic flow theories.

761 U G 4
Advanced Aerodynamics
Sp. 4 cl.
Prereq.: 760.
Predictions of pressure distributions, forces, and moments of lifting configurations.

765 U G 4
Fundamentals of Atmospheric Fluid Dynamics
W. 4 cl.
Prereq.: 570 or permission of instructor.
Advanced level of treatment of basic topics in the dynamics and thermodynamics of atmospheric motion.

787 U G 4
Selected Problems in Oceanic Circulation
A. 4 cl.
Prereq.: 570 or permission of instructor.
First course for advanced students interested in the application of fluid mechanical principles to oceanic circulations.

771 U G 4
Aerodynamics of Viscous Compressible Flows
Sp. 4 cl.
Prereq.: 450 and 570.
Analysis of laminar and turbulent boundary layers in high speed flows.

775 U G 4
Hypersonic Flows I
W. 4 cl.
Prereq.: 561 or 661.
Introduction to the analysis of inviscid hypersonic flow fields.

800 G 4
Theory of Deformation and Flow
W. 4 cl.
Prereq.: 460, 540, and 570 or equiv.
Required of all first year graduate students.
General treatment of the basic principles underlying the mechanics of deformable media from both macroscopic and microscopic points of view Burggraf and Gatewood.

802 G 4
Analytical Methods in Engineering I
Sp. 4 cl.
Prereq.: 480, and 561 or equiv.
Advanced methods for solution of partial differential equations with applications to fluid dynamics; topics include Green's functions, method of characteristics, numerical methods, and asymptotic solutions. Burggraf, Gatewood, Li, and Mallett.

803 G 3
Analytical Methods in Engineering II
A. 3 cl.
Prereq.: 802.
Continuation of 802 with emphasis on the solution of singular perturbation problems as they arise in fluid mechanics. Burggraf, Gatewood, Li, and Mallett.

805 G 3
Aerodynamics of Chemically Reacting Fluids
A. 3 cl.
Prereq.: 405 or equiv.
The aerodynamics of one-dimensional compressible flow with chemical reactions and wave propagation. Edse.
810 G 3 Flight Vehicle Performance Analysis
A. 3 cl.
Prereq.: 550 and 761.

815 G 4 Experimental Methods in Aerodynamics
W. 8 lab.
Prereq.: 510 or permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Experimental approach to aerodynamics; similarity concepts, facilities, design of experiments, and interpretation of measurements.

820 G 3 Advanced Flight Vehicle Stability and Control
A. 3 cl.
Prereq.: 720.
Advanced studies in; stability of systems, non-linear systems, Liepunov method, dynamics in extra-terrestrial atmospheres, new control methods. Mallett.

825 G 3 Advanced Analytical Dynamics of Astronautics
W. 3 cl.
Prereq.: 725.
Advanced study in transfer orbits, satellite rendezvous, satellite attitude control, and lunar and planetary missions. Mallett.

840 G 3 Inelastic Structural Analysis
A. 3 cl.
Prereq.: 540 or equiv.
The inelastic analysis of space structures and structural components subjected to thermal, uniaxial, and biaxial loads. Bailey and Gatewood.

841 G 3 Advanced Aerelasticity
W. 3 cl.
Prereq.: 746.
The effects of compressibility, three-dimensional flow, and structural heating on the static and dynamic response of elastic and inelastic flight vehicles subjected to steady and unsteady loads. Bailey and Gatewood.

842 G 3 Advanced Structures for Flight Vehicles
Sp. 3 cl.
Prereq.: 540 or equiv.
Advanced analysis and design of aircraft structures and/or structural components including thermal, inelastic, and buckling effects. Bailey and Gatewood.

850 G 3 Non-Equilibrium Flow Dynamics
A. 3 cl.
Prereq.: 460 or equiv.
Relaxation, dissociation, waves (sound, shock) nozzle flow and design collisional energy transfer in gases. Edse, Li, and Petrie.

851 G 3 Advanced Propulsion Problems
W. 3 cl.
Prereq.: 751.
Combustion instability, free radicals as energy source, space propulsion problems, noise of exhaust jets, energy conversion, solid propellants, heat transfer in rocket engines, and cascade theory. Edse.

852 G 3 Supersonic Combustion
Sp. 3 cl.
Prereq.: 750.
Supersonic ramjet, hybrid engines, detonation waves, flame propagation, flame temperature, and combustion kinetics. Edse.

860 G 3 Advanced High Speed Aerodynamics
A. 3 cl.
Prereq.: 761.
Supersonic and hypersonic aerodynamics, unsteady aerodynamics, transonic flows, transient wave phenomena, non-equilibrium gas dynamics. Burggraf, Lee, Li, Nerem, Petrie, and Von Eschen.

861 G 4 Advanced Boundary Layer and Heat Transfer Theory
W. 4 cl.
Prereq.: 771 and 800; or permission of instructor.
Advanced topics in the areas of boundary layer and heat transfer phenomena. Burggraf, Lee, Li, and Nerem.

865 G 4 Advanced Viscous Flow Theory
A. 4 cl.
Prereq.: 771 and 800.
Three-dimensional viscous flow at low and high Reynolds number; stability theory; statistical theories of turbulence. Burggraf, Lee, Li, and Nerem.

868 G 3 Molecular Theory of Gas Flows
Sp. 3 cl.
Prereq.: 405, and 800 or equiv.

870** G 3 Aerodynamics of Plasmas
W. 3 cl.
Prereq.: 460, and Elec. E. 810 or equiv.
The governing equations of magnetofuidmechanics, similarity laws, and applications to continuum plasma problems of interest in aerodynamics. Petrie.

871** G 3 Aerohydrodynamics
Sp. 3 cl.
Prereq.: 870.
AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

876 G 4

HyPERSONIC FLOWS II
Sp. 4 cl.
Prereq.: 771, 775, and permission of instructor.
Introduction to the study of real gas effects in
hypersonics. Lee and Li.

880 G 1

Seminar
Su, A, W, Sp. 1 2-hr. cl.
Repeatable to a maximum of 15 cr. hrs. Reqd. of all
grad. students in Aero-Astro. E. each qtr.

889 G 2-5

Advanced Topics in Aeronautical
and Astronautical Engineering
Prereq.: Permission of dept.
Repeatable to a maximum of 15 cr. hrs.

999 G Arr.

Research in Aeronautical
and Astronautical Engineering
Research for thesis or dissertation purposes only.

Agricultural Economics

Office: 303 Agricultural Administration Building, 2120
Pyfke Road

Professors Boyne (Chairman), McCormick (Associate
Chairman), Phillips (Associate Chairman), Adams
Bailey, R. H. Baker, R. L. Baker, Barr, Baumer, Cravens,
Dougan, Ezzell, Hadley, Ingraham, Jacobson, Jones,
Mitchell, Sharp, Shaudys, Sitterley, Smith, Stout,
Walker, Wayt, and Williams; Associate Professors
Bauman, Darrow, Erven, Hahn, Himes, Marion,
McDonald, Moore, Rask, Simonds, Stoele, Taylor,
P. R. Thomas, Venderven, and Wessel; Assistant
Professors Bowen, Davick, Francis, Glover, Henderson,
Hitzhusen, Hushak, Larson, Lee, Li, Meyer, Napier,
Singh, D. W. Thomas, and Watkins; Instructors Pierce,
Pugh, and Tucker.

100 U 5

Economic Development of Food and Agriculture
A, W, Sp. 5 cl.
An introduction to agricultural economics; a study of
the major economic trends such as production,
consumption, marketing, prices and the economics
underlying these trends. McCormick, Himes, Hahn,
Simonds, Erven, Taylor, and Wessel.

H199 U 5

Agricultural Economics in a Changing World
Sp. 5 cl.
Prereq.: Membership in a College honors program or
eligibility for membership with permission of instructor.
Not open to students with credit for 100.
A study of basic economic principles as applied to
agricultural production, consumption, and marketing
problems in a changing world. Erven.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 300 AND 400

Unless otherwise indicated, the prerequisites for 300
and 400-level courses are 90 cr. hrs. in collegiate
courses, exclusive of ROTC and Phys. Ed.; or specified
course(s) numbered 100-299.

410 U 5

Farm Management
A, W, Sp. 5 1-hr. cl.
Prereq.: 100, and Econ. 200 or 201.
Organization and operation of farm business; economic
and management principles involved in decision
making, farm planning, enterprise selection, financing,

411 U 5

Farm Management for Developing Countries
Sp. 3 2-hr. lec.-lab. cl.
Prereq.: 100; Econ. 200 or 201, and one course each
in Agron. and Animal Sc.
Not open to students with credit for 410.
Economics and management principles in decision
making, planning, enterprise selection, organization,
financing, and tenure for farming operations in
developing countries. Rask.

412 U 5

Farm Records and Analysis
A, W. 2 2-hr. cl.
Prereq.: 100 and Econ. 200 or 201.
Nature and need for farm business records and
analysis and interpretation of essential records from
farm manager viewpoint; their use in income tax
reporting. Baker.

420 U 5

Marketing Farm Products
A, W. Sp. 5 cl.
Prereq.: 100 and Econ. 200 or 201.
Study of local wholesale, and retail marketing agencies
and principles involved in the marketing of farm

GENERAL PREREQUISITES FOR COURSES
NUMBERED 500

Unless otherwise indicated, the prerequisites for
500-level courses are 15 cr. hrs. in courses in the same
discipline numbered 200 or higher, or 10 cr. hrs. in
courses numbered 200 or higher in the same discipline,
plus 10 cr. hrs. in courses numbered 200 or higher in
specified allied disciplines; or baccalaureate degree.

502 U G 3

Prices of Farm Products
W. Sp. 3 cl.
Characteristics of agricultural price, movement,
measurement, seasonality, cycles, and forecasting,
including analysis of price formation elasticity, parity,
and other price statistics. Himes.

507 U G 5

Agricultural Economics Analysis
W. 3 1-hr. cl.
Prereq.: Econ. 442 or Stat. 125.
Application of the scientific method and statistical
analysis to problems in Agricultural Economics.
Hushak.
Agricultural Finance
A, Sp. 5 cl. 1 Sat. and 1 overnight field trip.
Prereq.: 410.
Agricultural credit, facilities, procurement, extension, and management. Bailey and Lee.

Farm Appraisal
Sp. 3 cl., 3 3-hr. field trips during qtr.
Prereq.: 410.
Farm real estate appraisal with emphasis on methods, procedure, and reporting; factors influencing land value and fluctuation in land prices. Baker.

Poultry Marketing
A. 5 cl.
Prereq.: 420.
(Of offered in cooperation with the Dept. of Poul. Sc.)
Factors affecting supply and demand for poultry products; organization to achieve technical and economic efficiency within and among industry segments. R. L. Baker.

Livestock Marketing
W. 3 cl.
Prereq.: 420.
(Of offered in cooperation with the Dept. of Animal Sc.)
Selling methods, basis of sale, agencies involved, organization of markets, transportation, financing, marketing costs, prices, when to market, grade differentials, government regulation. Stout.

Grain Marketing
Su. A. 3 cl.
Prereq.: 420.
Principles and practices involved in grain and feed marketing and the theory of grain pricing; economics of grain marketing.

Marketing Dairy Products
W. 3 cl.
Prereq.: 420.
(Of offered in cooperation with the Depts. of Dairy Sc. and Dairy Tech.)
A study of the principles of assembling, transporting, selling, pricing, distribution, marketing costs, and margin for dairy products. Hahn and Jacobson.

Marketing Fruits and Vegetables
Sp. 3 cl. 1 2-day field trip.
Prereq.: 420.
Principles involved in the marketing of fruits and vegetables and the agencies concerned. Cravens.

Agricultural Policy
A. W. 5 cl.
Not open to Juniors.

Characteristics and problems of agriculture; description and analysis of programs and policies designed to assist agriculture and alternative proposals for the future. McCormick, Stout, Glover, and Williams.

Land Economics
W. Sp. 3 cl.
Land resources and requirements; economic principles involved in land use; major land use problems; ways of achieving better land use; public’s interest in land policy. Wayt and Glover.

Foreign Agricultural Development
A. 3 cl.
Analysis of agricultural organization, production, and marketing in foreign countries; foreign agricultural policies and international competition; appraisal of foreign technical assistance programs in agriculture. Adams and Sitterley.

Food Economics
Sp. 3 cl.
Economic aspects of the production, distribution, and consumption of foods. Simonds.

U.S. Agricultural Price and Income Policy
W. 5 cl.
Prereq.: Jr. standing and membership in a College honors program or eligibility for membership with permission of instructor.
Not open to students with credit for 530.
A description, analysis, and evaluation of the United States agricultural price and income programs past, present, and proposals for the future. McCormick.

Business Management in Agricultural Marketing
A, Sp. 5 cl.
Prereq.: 420.
A detailed study of representative agricultural marketing agencies including their problems of administration, employees, financial statements, selling, purchasing, and warehousing. Hahn and Taylor.

Cooperation in Agriculture
A, Sp. 5 cl.
Prereq.: 420.
Basic principles of cooperatives including types of organizations, legal aspects, membership relations, financing, organizational and intercooperative problems, and distribution of savings. Ingraham.

Individual Studies
H593 (honors) may be available to students enrolled in a college honors program or eligible for enrollment. Repeatable to a maximum of 8 cr. hrs.
Planning, conducting, and reporting a special problem in agricultural economics to meet the needs of the student.
584 U G 2-4
Group Studies
Repeatable to a maximum of 8 cr. hrs.
Reporting of selected topics in agricultural economics
to further acquaint the student with current conditions.

585 U 1
Senior Seminar in Agricultural Economics
Prereq.: Senior standing.
An analysis of social and economic problems
encountered by the college graduate in a dynamic
world. McCormick.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 600
Unless otherwise indicated, the prerequisites for
600-level courses are 15 cr. hrs. in courses in the
same discipline numbered 300 or higher, or 10 cr. hrs. in
courses numbered 300 or higher in the same discipline,
plus 10 cr. hrs. in courses numbered 300 or higher in
specified allied disciplines.

610 U G 5
Farm Organization
A. 4 cl., 1 2-hr. lab. and 1 field trip during qtr.
Prereq.: 410, 412, Animal Sc. 200, and Agron. 411 or 412.
Detailed application of production economics,
management principles, and decision making
techniques to the organization, operation, and
administration of farms; farm plans developed.
Shaudy.

620 U G 4
Market Organization in Agricultural Industries
Sp. 4 cl.
Prereq.: 420, 541, and 521 or 522 or 523 or 526 or 528.
Analysis of agricultural market structure, behavior, and
performance; interpretation of recent changes in
agricultural market structure. Baumer.

632 U G 3
Economic Techniques
for Foreign Agricultural Development
A. 3 cl.
Prereq.: 532 or permission of instructor.
The role of agriculture in economic development,
characteristics of traditional agriculture, and the
techniques used to modernize agriculture. Adams.

633 U G 3
Economic Development
of Latin American Agriculture
Sp. 3 cl.
Analysis of agricultural land, labor, and capital
utilization in Latin America; current techniques in land
reform, credit, farm organizations, and marketing.
Adams.

683 U G 2-5
Individual Studies
H683 (honors) may be available to students enrolled in
a college honors program or eligible for enrollment.
Repeatable to a maximum of 8 cr. hrs.
Planning, conducting, and reporting a special problem
in agricultural economics.
Seminar in Linear Programming
Sp. 2 cl.
Prereq.: 800.
Application of linear programming to agriculture. R. H. Baker.

Seminar in Agricultural Price Analysis
Sp. 3 cl.
Prereq.: 800.
Intensive consideration given to theory and analysis of agricultural prices. Himes.

Economics of Agricultural Production
W. 3 cl.
Prereq.: Econ. 805 and 1 course in differential calculus.
A critical consideration of economic principles as they apply to production problems in agriculture. Hushak and Walker.

Economics of Agricultural Production
Sp. 3 cl.
Prereq.: 805.
A further consideration of economic principles as they apply to production problems in agriculture. Walker and Hushak.

Seminar in Agricultural Economic Theory
Sp.
Prereq.: 800, 805, and permission of instructor.
Repeatable to a maximum of 8 cr. hrs.

Farm Organization and Resource Management
W. 3 cl.
Prereq.: 610.
Designed to integrate resource use and the human factor under dynamic conditions of risk and uncertainty with a goal of economic progress. Shaudy, Sitterley, Rask, and Erven.

Seminar in Farm Organization and Management
W.
Application of micro-theory to farm organization and management.

Seminar in Agricultural Finance
A.
Repeatable to a maximum of 8 cr. hrs.
Intensive consideration is given to current theories and future problems in agricultural finance. Bailey and Lee.

Agricultural Marketing
W. 3 cl.
Prereq.: 620, Econ. 805, and 806.
Study of the major problems in agricultural marketing and relevant research findings. Sharp, Cravens, Hahn, Stout, Steele, and R. L. Baker.

Seminar in Agricultural Marketing
A.
Repeatable to a maximum of 8 cr. hrs.
Critical analysis of major problems in agricultural marketing.

Agricultural Policy
A. 4 cl.
Prereq.: 420, 530, Econ. 805, and 806.
Examination of values of American society concerning agriculture, reasons for these values, and alternatives for achieving various goals for U.S. agriculture. Williams and Stout.

Land Economics
Sp. 3 cl.
Prereq.: 531 and 805.
Examination of current problems in land resources use, allocation, conservation, and control. Wayt.

Seminar in Economic Development of Foreign Agriculture
Sp.
Prereq.: 632
Repeatable to a maximum of 8 cr. hrs.
Characteristic problems of developing countries, identification and analysis of limiting factors in underdevelopment, and techniques for stimulating economic development through growth in agriculture. Adams.

Seminar in Land Tenure, Agrarian Reform, and Agricultural Development
A.
Repeatable to a maximum of 8 cr. hrs.
Evaluation of land reform, agrarian reform, and land tenure systems; emphasis on parcelization, colonization, parcel consolidation, and taxation. Wayt.

Seminar in Food Economics
A.
An examination of the economic relationship of food production to population and region of the world and areas within countries. Simonds.

Interdepartmental Seminar in Natural Resources
(See under Interdepartmental Seminars.)

Interdepartmental Seminars
(See under Interdepartmental Seminars.)

Individual Studies
Repeatable to a maximum of 10 cr. hrs.
Planning, conducting, and reporting a special problem in agricultural economics fitting the needs of the student, under the guidance of an instructor.
Agricultural Education

Office: 208 Agricultural Administration Building, 2120 Fyffe Road.

Professors Bender (Chairman), Boucher, Cunningham, Gehres, Guiler, Hafertman, McCormick, Ritchie, Taylor, Warmbrod, Watson, Wilson, Wolf, and Woodin;
Associate Professors Bruny, Hull, Jenkins, Magleby, Robinson, Schroeder, and Starling; Assistant Professors Budke, Geyer, Gray, Lau, Leithaler, Lifer, McCastlin, McCracken, Norton, Oren, Walliser, C. Young, and R. Young; Instructors Archer and Pulse.

GENERAL PREREQUISITES FOR COURSES NUMBERED 500

Unless otherwise indicated, the prerequisites for 500-level courses are 15 cr. hrs. in courses in the same discipline numbered 200 or higher, or 10 cr. hrs. in courses numbered 200 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 200 or higher in specified allied disciplines; or baccalaureate degree.

581 U 5
Student Teaching in Agriculture
Prereq.: 330 and completion of departmental requirements for admission to the professional program; concur. 582 and 583.
Supervised participation in teaching and other professional responsibilities of teachers of agriculture including clinical analysis in conferences and seminars. Wilson and Boucher.

582 U 5
Student Teaching in Agriculture
Concur.: 581 and 583.
Supervised participation in teaching and other professional responsibilities of teachers of agriculture including clinical analysis in conferences and seminars. Wilson and Young.

583 U 5
Student Teaching in Agriculture
Concur.: 581 and 582.
Supervised participation in teaching and other professional responsibilities of teachers of agriculture including clinical analysis in conferences and seminars. Boucher.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600

Unless otherwise indicated, the prerequisites for 600-level courses are 15 cr. hrs. in courses in the same discipline numbered 300 or higher, or 10 cr. hrs. in courses numbered 300 or higher in the same discipline; plus 10 cr. hrs. in courses numbered 300 or higher in specified allied disciplines.

621 U G 3
Curriculum Development
Su (1st term). 3 2-hr. cl.
Prereq.: 581, 582, and 583.
Principles and practices used in developing courses of study in agriculture for high school and post-high school programs. Guiler.
Continuing Education in Agriculture
Sp. 1 3-hr. cl.
Prereq.: 581, 582, and 583.
Principles and practices involved in developing
vocational, technical, and extension programs for
out-of-school youth and adults. Bender and Wolf.

Methods in Teaching Agriculture
Su (1st term), W. 2 1/2-hr. cl.
Prereq.: 581, 582, and 583.
Theory, principles, and procedures associated with
effective instruction in agriculture at the secondary,
technical, and college levels. Bender.

Instructional Media in Teaching Agriculture
Su, Sp. 1 3-hr. cl.
Prereq.: 581, 582, and 583.
Theory and practice in developing and using
instructional media and equipment at the secondary,
technical, and college levels. Guiler and Woodin.
Fee.

Occupational Experience
in Agricultural Education
A, Sp. 1 3-hr. cl.
Prereq.: 581, 582, and 583.
Principles and procedures used in selecting, planning,
conducting, and evaluating occupational experience
programs for students. Wolf and Woodin.

Youth Organizations in Agriculture
Sp. 1 3-hr. cl.
Prereq.: 581, 582, and 583.
An analysis of youth organizations in vocational and
extension education with emphasis on planning and
conducting such programs. Bender and Boucher.

Internship in Agricultural Education
Prereq.: 581, 582, and 583.
Repeatable to a maximum of 15 cr. hrs.
Guided participation to further enhance professional
and/or technical competency in selected areas. Guiler.

Vocational Agriculture

Cooperative Extension Education

Technical

Specialized Agriculture

Individual Studies
H693 (honors) may be available to students enrolled in
a college honors program or eligible for enrollment.
Planning, conducting, and reporting a special study
appropriate to the needs of the student.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 700
Unless otherwise indicated, the prerequisites for
700-level courses are 15 cr. hrs. in courses in the
same discipline numbered 400 or higher, plus additional
specified course(s) numbered 600 or higher.

Practicum in Teaching Agricultural Mechanics
W. 1 4-hr. cl.
Prereq.: 621, 631, or 684.
Selection and use of subject matter, resources, and
methods of teaching agricultural mechanics. Johnson.

Practicum in Teaching Farm Business Planning
A. 1 3-hr. cl.
Prereq.: 621, 631, or 684.
Methods of teaching farm business planning, including
the selection of subject matter and use of resources,
with application to high school and continuing
education programs. Starling.

Evaluation
Sp. 1 3-hr. cl.
Prereq.: 621, 631, or 684.
Evaluation principles and procedures used in
developing vocational, technical, and extension
programs. Woodin.

Workshops in Agricultural Education
Minimum of 3 wks.
Prereq.: Teaching or extension experience and
permission of instructor.
A maximum of 10 cr. hrs. may be earned in any one
decimal subdivision; or 15 cr. hrs. in any combination
of decimal subdivisions.
Intensive study of selected areas of agricultural
education with emphasis on the application of
principles and methods in attaining desired objectives.

General
Su.

Agricultural Production
Su.

Agricultural Business, Supplies, and Services
Su.

Agricultural Equipment and Mechanics
Su.

Agricultural Products and Processing
Su.

Ornamental Horticulture
Su.

Agricultural Resource Conservation
Su.

Forestry
Su.

Cooperating Teachers
Su.

Supervisors
Su.

Technical School Instructors
Su.
793.23 Continuing Education Teachers
Su.
793.24 Teachers with Special Certificates
Su.
793.25 Teachers of Disadvantaged Youth
Su.

794 U G 3 or 5

Group Studies
A, W, Sp. 1 3-hr. cl.
Prereq.: Teaching or extension experience.
Repeatable to a maximum of 10 cr. hrs.
An intensive study of a selected area in agricultural education appropriate to the needs of the group not provided in other courses. Cunningham.

795 U G 1-3

Seminar
Su, A, W, Sp. 1- or 2-hr. cl.
Prereq.: Permission of instructor.
795.01 Contemporary Programs
A.
795.02 Problems and Issues
W.
795.03 Leadership Development
A, Sp.
795.04 Program Development
A.
795.05 Research and Evaluation
A, W.
795.06 Communication
Sp.

GENERAL PREREQUISITES FOR COURSES NUMBERED 800 AND 900

Unless otherwise indicated, the prerequisites for 800 and 900-level courses are 30 cr. hrs. in courses in the same discipline, or 20 cr. hrs. in the same discipline, plus 25 cr. hrs. in specified allied disciplines.

810 G 3

Principles of Vocational-Technical Education
A. 1 3-hr. cl.
Prereq.: Professional experience in vocational education.
An analysis of evolving concepts of vocational and technical education with emphasis upon principles underlying organization and practice. Woodin.

811 G 3

Administration and Supervision
Su (2nd term), A. 1 3-hr. cl.
Prereq.: Experience in Agr. Ed.
Principles in developing and administering programs in vocational, technical, and extension education with attention to federal-state-local relationships, in-service education, and supervisory procedures. McCormick and Taylor.

812 G 3

Teacher Education
Su (2nd term). 5 cl.
Prereq.: Experience in Agr. Ed.

823 G 3

Program Planning and Development
Su (1st term), W. 1 3-hr. cl.
Prereq.: Experience in Agr. Ed.
Principles, theory, and practice in developing state and local programs of vocational, technical, and extension education. Cunningham, Taylor, and Woodin.

885 G 3

Research Methods
Su (1st term). 5 cl.; W. 1 3-hr. cl.
Prereq.: 6 cr. hrs. grad. courses.
Principles and techniques of research appropriate for planning, conducting, and reporting research in vocational, technical, and extension education. Warmbrod.

886 G 3

Research Design
Sp. 2 3½-hr. cl.
Prereq.: 885 and a course in Statistics.
Development of effective design for research problems in vocational, technical, and extension education, including theory, models, sampling, and statistical analysis. Warmbrod.

889 G 3

Advanced Studies
Prereq.: 885.
Individual field study in partial fulfillment of needs for research experience.

899 G 2 or 3

Interdepartmental Seminar
W, Sp. 1 or 2 cl.
Investigation and analysis of current problems and issues in cooperation with other appropriate departments.

995 G 1-3

Seminar in Research
Su. 1 3-hr. cl.
Prereq.: 886.
Repeatable to a maximum of 3 cr. hrs.
Further development and direction of individual studies and programs of research. Cunningham, Warmbrod and Young.

999 G Arr.

Research
Research for thesis or dissertation purposes only.
Agricultural Engineering

Office: 105 Ives Hall, 2073 Neil Avenue

Problems Nelson (Chairman), Rollie (Associate Chairman), Van Wert, Barre, Buescher, Bongardt, Borens, Byr, Currie, Harrell, Herum, Huber, Johnson, Palmer, Reeves, Schwab, Stuckey, and Taiganides; Associate Professors Balday, Drew, Gill, Hamby, Miller, and Schum; Assistant Professors Bell, Fox, Henry, Short, and White; Instructors Fausey, Fous, Harkness, Keener, Noffsinger, Normand, and Walker.

GENERAL PREREQUISITES FOR COURSES NUMBERED 200

Unless otherwise indicated, the prerequisites for 200-level courses are 45 cr. hrs. in collegiate courses; exclusive of ROTC and Phys. Ed., or specified course(s) numbered 100-199.

220 U 3
Buildings and Equipment for Farmstead Operations
A, Sp. 2 cl., 2 lab. hrs.
Prereq.: Math. 117, 121, or 150.
Functional requirements and planning of buildings and facilities for livestock production and for conditioning and storage of crops; environmental control; building construction. Barre.

221 U 3
Agricultural Materials Handling Systems
W. 2 cl., 2 lab. hrs.
Prereq.: Math. 117, 121, or 150.
Principles, functional analysis and design of agricultural materials handling systems from harvest to utilization. Herum.

223 U 2
Introduction to Agricultural Engineering Design
A. 1 3-hr., 1 2-hr. lab.
Prereq.: Physics 132.
Open only to Agr. E. majors.
Principle of engineering design, emphasizing biological concepts of importance in agricultural production and processing. Harkness.

230 U 3
Power for Agricultural Operations
A, W, Sp. 2 cl., 2 lab. hrs.
Prereq.: Math. 117, 121, or 150.
A study of power in agriculture with primary emphasis upon power needs for field operations, characteristics of available power sources, selection, and use of power units. Huber.

231 U 3
Electric Power for Agricultural Operations
W. 2 cl., 2 lab. hrs.
Prereq.: Math. 117, 121, or 150.
Functional analysis of systems and components essential for distribution and control of electricity for power, heat, and illumination applications in agriculture. Harkness. Fee.

240 U 3
Teaching of Agricultural Construction and Maintenance
A, W, Sp. 2 cl., 6 lab. hrs.
Prereq. or concurs.: Agr. Ed. 230.
Principles and methods of teaching selection, use, and care of hand and power tools, materials for wood and metal construction based upon farm needs. C. Johnson.

250 U 3
Machines for Agricultural Operations
A, Sp. 2 cl., 2 lab. hrs.
Prereq.: Math. 117, 121, or 150.
Analysis of field machine operations with emphasis on recognition and qualitative solution of problems in selection and use of machines for optimum economic performance. Harkness.

270 U 3
Engineering Methods in Soil and Water Conservation
A, Sp. 2 cl., 3 lab. hrs.
Prereq.: Math. 117, 121, or 150, and Agron. 240.
Instrument surveying, aerial and topographic maps, rainfall and runoff, and engineering applications of soil and water management on farms and on recreational areas. Schwab and Taiganides.

GENERAL PREREQUISITES FOR COURSES NUMBERED 300 AND 400

Unless otherwise indicated, the prerequisites for 300 and 400-level courses are 90 cr. hrs. in collegiate courses; exclusive of ROTC and Phys. Ed.; or specified course(s) numbered 100-199.

310 U 5
Fundamentals of Food Engineering
A. 3 cl., 2 2-hr. lab.
Prereq.: 10 cr. hrs. in Math., 10 cr. hrs. in Chem., and 5 cr. hrs. in Physics.
(Offered in cooperation with the Dept. of Food Science and Nutrition.)
Introduction to heat transfer, fluid flow, and thermodynamics in food processes. Blaisdell. Fee.

411 U 5
Refrigeration Engineering in the Food Industry
Sp. 3 cl., 2 2-hr. lab.
Prereq.: 310.
(Offered in cooperation with the Dept. of Food Science and Nutrition.)
Transient heat transfer, thermodynamics of refrigeration systems, and applications of refrigeration in food processing. Blaisdell. Fee.

425 U 3
Engineering Properties of Biological Materials
A. 2 cl., 1 2-hr. lab.
Prereq.: Chem. 204 and Engr. Mech. 420, or permission of instructor.
Identification and measurement of the physical properties of agricultural materials relevant to the engineering of systems for their production, harvesting, handling, and classification. Blaisdell and Herum. Fee.
433 U 3
Analysis of Elementary Biological-Physical Systems
W. 3 cl., 1 1-hr. lab.
Mathematical model formulation and analysis techniques developed and applied to elementary biological and physical systems. Hamdy.

434 U 3
Biometeorology of Plant and Animal Systems
W. 3 cl.
Prereq.: 223.
Study of the micro- and macro-environmental variables in nature as they relate to engineering of plant and animal production systems. Schwab.

GENERAL PREREQUISITES FOR COURSES NUMBERED 500
Unless otherwise indicated, the prerequisites for 500-level courses are 15 cr. hrs. in courses in the same discipline numbered 200 or higher, or 10 cr. hrs. in courses numbered 200 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 200 or higher in specified allied disciplines; or baccalaureate degree.

500 U G 1
Farm and Home Safety
Sp. 1 cl.
Causes of accidents; methods for conducting farm and home safety programs; for students interested in vocational agriculture, extension, and farm organization work.

535 U G 4
Utilization of Energy in Agriculture
Sp. 3 cl., 1 2-hr. lab.
Study of motive and stationary power needs of agriculture, mechanics of traction, characteristics of power sources, morphology of off-the-road vehicle design. Huber.

543 U G 5
Engineering Soil-Water Management
A. 3 cl., 2 3-hr. lab.
Prereq.: 434, Agron. 671, and Civil E. 516; or equiv.
Engineering design of drainage, irrigation, and erosion control systems for optimum crop growth, environment, and related water storage structures. Schwab.

544 U G 4
Engineering Agricultural Machines
A. 3 cl., 1 3-hr. lab.
Design of agricultural machines; recognition of the economic, political, and social context in which the machinery is designed, built, distributed, and used.

550 U G 3
Pollution Control and Waste Utilization
Su, W, Sp. 3 cl.
Prereq.: Upper division or grad. standing.
Not open for graduate credit to students majoring in Agr. E.

Management and utilization of animal wastes, fertilizers, pesticides, crop residues, milk and food processing and farmstead and urban solid wastes to abate environmental pollution at the urban-rural interface. Tlaggedes and White.

551 U G 3
Advanced Farm Power and Field Machinery
A. 2 cl., 1 3-hr. lab.
Prereq.: 9 cr. hrs. Agr. E., 8 cr. hrs. Agron., or baccalaureate degree.
An advanced study of harvesting machines and power units from the mechanical, operational, and economic standpoint; emphasis is given to the development of optimum harvest systems.

570 U G 3
Agricultural and Forest Hydrology
W. 3 cl.
Prereq.: 4th yr. standing and permission of instructor.
Not open for credit to students majoring in Agr. E.
Hydrology of small watersheds as influenced by watershed management practices; water resource development; control of sediment and floods; and water quality and conservation. Schwab.

591 U G 4
Workshop
Su (1st term). First 3 wks.—full time.
Prereq.: 15 cr. hrs. Agr. E. and permission of instructor.
Principles, objectives, methods, and equipment in the organization and management of a program for teaching farm mechanics; students will plan, present, and evaluate units of instruction.

593 U G 3-5
Individual Studies
H593 (honors) may be available to students enrolled in a college honors program or eligible for enrollment.
Prereq.: Permission of instructor.
Advanced study of problems not included in regular courses of this department.

594 U G 3-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to maximum of 18 cr. hrs.
Intensive study of selected areas in agricultural engineering not provided in other courses and appropriate to the needs of the students.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600
Unless otherwise indicated, the prerequisites for 600-level courses are 15 cr. hrs. in courses in the same discipline numbered 300 or higher, or 10 cr. hrs. in courses numbered 300 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 300 or higher in specified allied disciplines.

611* U G 5
Food Engineering Design and Control
W. 3 cl., 2 3-hr. lab.
Prereq.: 310, 411, and Animal Sc. 650 or Food Science and Nutrition 632 or Home Ec. 615 or Hort. 441.
[Offered in cooperation with the Dept. of Food Science and Nutrition.]
Integration of economic principles, food sciences, and engineering in optimum design and control of processing systems. Blaisdell.

645  U G 4
Environmental Engineering of Agricultural Structures
W.  4 cl.
Pre req.: 434.
Functional requirements and principles involved in housing animals and crops; analysis of factors and properties affecting energy exchanges with the environment. Barre.

646  U G 4
Engineering Agricultural Processing Systems
W.  3 cl., 1 3-hr. lab.
Design of systems for processing agricultural food, feed, and fiber, utilizing principles of biodynamics, transient diffusion, turbulent and non-ideal transport, and particulate handling. Blaisdell and Herum. Fee.

647  U G 4
Engineering Agricultural Systems
Sp.  4 cl.
Pre req.: 543, 544, 645, 646, and Genetics 650; or equiv.
Integration of engineering and biological principles in agriculture to optimize complete operational production systems; application of relevant theory to present and future systems. Barre.

681  U G 5
Analog Simulation
A.  3 cl., 2 2-hr. lab.
Pre req.: 433 or equiv.
Principles of analog and hybrid simulation developed and applied to engineering problems in agricultural systems. Hamdy.

693  U G 3 or 5
Individual Studies
Pre req.: 15 cr. hrs. of 300-level or higher Agr. E. courses and permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Work on problems that are not included in regular courses; practice in development, organization, solution, and report on problems of student's choosing.

694  U G 3-5
Group Studies
Pre req.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Advanced studies in agricultural engineering with principal emphasis on design; work may be elected in the following general areas:
a. Machinery
b. Light Structures
c. Processing
d. Soil-Water Management

695  U G 1
Professional Development
W.  1 cl.
Pre req.: 3rd yr. standing in Agr. E.

Needs and programs for professional development in engineering related to food and agriculture; opportunities for professional advancement, engineering ethics, and responsibilities to society. Nelson.

GENERAL PREREQUISITES FOR COURSES NUMBERED 700
Unless otherwise indicated, the prerequisites for 700-level courses are 15 cr. hrs. in courses in the same discipline numbered 400 or higher, plus additional specified course(s) numbered 600 or higher.

714  U G 5
Environmental Pollution Abatement
W.  5 cl.
Pre req.: Senior or grad. majors in engineering or sciences.
(Listed in Civil E., Chem. E., Met. E.)
Problems, philosophies, principles, and methods of pollution abatement in the total environment; quantitative approaches to waste management in air, water, and land systems. Taligandies and White.

750  U G 3
Design of Waste Management Systems
Sp.  2 cl., 1 3-hr. lab.
Pre req.: Senior standing in engineering, or 714, or permission of instructor.
Application of bioengineering principles of pollution control to the design of management systems for wastes from food and fiber production, storage, and processing operations. Taligandies and White.

794  U G 3
Group Studies
Su., A, W, Sp.  3 cl.
Pre req.: 15 cr. hrs. of 400 level or higher Agr. E. courses and permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Advanced subjects in agricultural engineering; course content to be announced in previous quarter.
A. Farm Structures.
Sp. Power and machinery.

GENERAL PREREQUISITES FOR COURSES NUMBERED 800 AND 900
Unless otherwise indicated, the prerequisites for 800 and 900-level courses are 30 cr. hrs. in courses in the same discipline, or 20 cr. hrs. in the same discipline, plus 25 cr. hrs. in specified allied disciplines.

808*  G 3
Measurement in Agricultural Engineering
W.  3 cl.
Pre req.: 681, Math. 512, and permission of instructor.
Theory and principles involved in measurement and control of biophysical processes in agricultural engineering. Curry.

850  G 1
Seminar
Repeatable to a maximum of 6 cr. hrs.
Schwab.
Agricultural Engineering

8571*  G 3
Soil Machine Dynamics in Plant Environment
Sp.  3 cl.
Prereq.: Agron. 671, Civil E 651, and Math. 661.
Mass and heat transfer in soil and dynamics of mechanical actions on soil in relation to plant environment and agricultural machine design and use.

858*  G 5
Turbulent Diffusion of Aerosols
A.  5 cl.
Prereq.: Math. 704 and permission of instructor.
Dispersion of particles in turbulence; introduction of statistical theory of turbulence; measurement of fluid flow and turbulence; applications. Brazee.

877*  G 3
Advanced Agricultural Drainage
W.  3 cl.
Prereq.: 543 and Math. 512.
Theory of agricultural drainage, both tile and surface methods; measurements of drainage and frequency analysis; hydrologic characteristics of drainage systems; drainage requirements of crops. Schwab.

887  G 1
Interdepartmental Seminar in Natural Resources
(See under Interdepartmental Seminars.)

999  G Arr.
Research
Research for thesis and dissertation purposes only.

Agriculture

101  U 1
Agriculture College Orientation
A, W.  1 cl.
Not open to students with credit for UVC 100.
Orientation to the University and College exploration of curricula, opportunities, and services. Ritchie.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 300 AND 400
Unless otherwise indicated, the prerequisites for 300 and 400-level courses are 90 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.; or specified course(s) numbered 100-199.

351  U 1
Agricultural Employment
A, W.  1 cl.
Discussion conducted by outside speakers and instructor related to career opportunities, recruitment-placement techniques, interviews, job offer evaluations, and transition from campus. Darrow.

H590  U 2
Agriculture Honors Colloquium
A, W.  2 cl.
Prereq.: Enrollment in Agriculture Honors Program.
Repeatable to a maximum of 4 cr. hrs.
The relationships of technology, science, and economics in agriculture; society; discussions are led by faculty members or outside speakers. Ritchie.

695  U G 2-5
Seminar
Su, W.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
The underlying philosophy and principles for developing, organizing, and administering land-grant type institutions and related agencies of Agriculture, Home Economics, and Natural Resources. Smith and Parsons.

Agronomy

Offices: 108 Townshend Hall, 1885 Neil Avenue, 101 Lazenby Hall, 1827 Neil Avenue

Professors Velk (Chairman), Arscott, Bader, Baver, Bendixen, Clark, Clements, Davis, Dollinger, Findley, Franklin, Friday, Gist, Haghiri, Henderong, Herr, Hime, Hoff, Holwaychuk, Lafever, McLean, Mederski, R. H. Miller, R. W. Miller, Musgrave, Niehaus, Parsons, Ray (Assistant Chairman), Ryder, B. Schmidt (Associate Chairman, Wooster), Shepherd, Smith, Stroube, Sutton, Taylor, Teeter, Trippett, VanDoren, VanKeuren, Wilding, Yamazaki, and Yoder; Associate Professors Everett, Hall, Heft, W. Schmidt, Vinnerstedt, Waldron, and Wells; Assistant Professors Barta, Bone, Derickson, Follett, Goettemoeller, Hopper, Jackson, Jeffers, Logan, Smeck, Streeter, and Trierweiler; Instructors Myers and Wilson.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 200
Unless otherwise indicated, the prerequisites for 200-level courses are 45 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.; or specified course(s) numbered 100-199.

200  U 5
Plant Science in Agriculture
Su, A, W, Sp.  5 cl.
Prereq.: Biol. 100.
(Offered in cooperation with the Dept. of Hort.)
Study of environment and genetic factors that influence plant growth, and how man can alter those factors to produce plants which more adequately meet his needs. Alban, Geisman, Hartman, and Herr.

240  U 5
Soil Science
Su, A, W, Sp.  3 cl., 2 2-hr. lab.
Prereq.: Chem. 101 and 102, or 121 and 122, or equiv.
Introduction to the genetic, physical, chemical, and biological properties influencing soil productivity; laboratory exercises include observation and quantitative determination of certain of these soil properties. Places. Fee.

Plants and Man
(See Horticulture 4299)
(Offered in cooperation with the Department of Horticulture.)

GENERAL PREREQUISITES FOR COURSES
NUMBERED 300 AND 400
Unless otherwise indicated, the prerequisites for 300 and 400-level courses are 90 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.; or specified course(s) numbered 100-399.

411 Number 4
Grain Crops
A. W. 3 cl., 1 2-hr. lab.
Prereq.: 200 or junior standing.
A study of the grain crops, their classification, geographic distribution, culture, varieties, improvement, seed production, harvesting, handling, recognition, grading, and utilization. Ray.

412 Number 4
Forage Crops
A, W, Sp. 3 cl., 1 2-hr. lab.
Prereq.: 200 or junior standing.
Principles underlying characteristics, tolerances, requirements, uses; production of forage plants for hay, pasture, silage, soilage, and cover. Ray.

413 Number 4
Principles of Turfgrass Selection and Management
Sp. 4 cl.
Prereq.: 200 or 240.
Adaptation, identification, uses, growth characteristics, growth responses, and fundamental principles essential to the production of quality turf. Miller.

422 Number 4
Weed Control
A, Sp. 3 cl., 1 2-hr. lab.
Prereq.: 200.
A study of weeds, their identification, reproduction, and methods of control; emphasis on various aspects of chemical control measures. Herr.

441 Number 4
Soil Erosion and Its Control
A. 3 cl., 1 3-hr. lab.
Prereq.: 240.
A study of the mechanics of soil erosion and its control; field trips to observe erosion and conservation practices are included. Hoff. Fee.

442 Number 3
Soil Management
A. 3 cl.
Prereq.: 240.
An integrated study of fertility, tillage, erosion control, and water management in maintaining soil productivity. Hoff.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 500
Unless otherwise indicated, the prerequisites for 500-level courses are 15 cr. hrs. in courses in the same discipline numbered 200 or higher, or 10 cr. hrs. in courses numbered 200 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 200 or higher in specified allied disciplines, or baccalaureate degree.

510 Number 5
Crop Production in Developing Countries
W. 5 cl.
Prereq.: 200, 240 or equiv.
Fundamental studies of field and plantation crops in tropical and subtropical countries with emphasis on means and techniques for obtaining production increases. Arscott.

530 Number 4
Field Crop Breeding
W. 3 cl., 1 2-hr. lab.
Prereq.: 200, and 411 or 412, and Genetics 314, or equiv.
Principles of genetics and methods of plant breeding applied to the improvement of field crops and the ultimate development of superior varieties. Smith.

550 Number 5
Pedology and Edaphology
Sp. 3 cl., 1 4-hr. lab. and field trips.
Prereq.: 200, 240, and 442.
A comprehensive study of soil with respect to its components, morphology, and genesis and how morphology influences soil behavior especially as it pertains to Ohio conditions. Fahl. Fee.

589 Number 5
Field Work
Su. 3-week field trip.
Prereq.: Permission of instructor. Repeatable to a maximum of 10 cr. hrs.
A field trip to the major crop, soil, and climatic regions east or west of the Mississippi River in the U.S. and to the major industries that utilize crops. Fee.

593 Number 3 or 5
Individual Studies
Prereq.: Permission of instructor. Repeatable to a maximum of 10 cr. hrs.
Students may select special agronomic problems, not included in regular courses and involving library, laboratory, or field studies.

594 Number 3 or 5
Group Studies
Prereq.: Permission of instructor. Repeatable to a maximum of 10 cr. hrs.
Discussion of selected topics in crop science and/or soil science.

595 Number 2
Undergraduate Seminar
A, W, Sp. 2 cl.
Prereq.: 15 cr. hrs. in Agron. and 3rd or 4th yr. standing in Agron.
Review and interpretation of research publications and study of functions of agronomic industries.
GENERAL PREREQUISITES FOR COURSES
NUMBERED 600
Unless otherwise indicated, the prerequisites for 600-level courses are 15 cr. hrs. in courses in the same discipline numbered 300 or higher, or 10 cr. hrs. in courses numbered 300 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 300 or higher in specified allied disciplines.

602 U G 3
Field Crop Ecology
Sp. 3 cr.
Prereq.: 10 cr. hrs. of crops courses and 5 cr. hrs. of soils courses at the 300 level or higher.

612 U G 4
Principles of Grassland Management
Sp. 4 cr., 1 4-day field trip.
Plant-animal requirements and correlations in the maintenance, management, and utilization of meadows, pastures, and ranges. Fee.

621 U G 3
Principles of Field Crop Management
A. W. 3 cr.
Prereq.: Bot. 430 and 431, or equiv.
Principles of field crop management and their influence on cultural practices with emphasis on corn, soybeans, and wheat. Henderlong.

623 U G 4
Principles of Turfgrass Management
Sp. 4 cr.
Prereq.: 413, Bot. 430 and 431.
A study of the relationship between basic factors influencing turfgrass growth and the practical execution of maintenance practices which affect the production of quality turf. Miller.

640 U G 3
Agroclimatology
Sp. 3 cr.
Prereq.: 15 cr. hrs. of Agron., Bot., Hort. or equiv. at the 300 level or above or permission of instructor.
A study of the radiation regime of the atmosphere in relation to the thermal and water regimes of soils and their interrelationships in crop production.

643 U G 3
Tropical and Subtropical Soils
A. 3 cr.
Prereq.: 15 cr. hrs. of agron., numbered 300 or higher or permission of instructor.
A study of the physical, chemical, and biological properties and the fertilization, physical, and water management of tropical and subtropical soils; crop adaptation, plantation, and subsistence farming. Arscott.

650* U G 5
Advanced Soil Classification Morphology and Genesis
W. 4 cr., 1 2-hr. lab., 3 1-day field trips.
Prereq.: 550, 10 cr. hrs. from the following: 442, 621, Bot. 620, Geol. 550.
Theory and principles of soil classification schemes emphasizing the 7th Approximation; classification and genesis of major soils of the world; methods to establish parent material homogeneity and indices of soil weathering. Wilding. Fee.

660 U G 5
Soil Microbiology
Sp. 3 cr., 2 2-hr. labs.
Prereq.: 441, Microbiol. 607, and Chem. 231 or 532.

670 U G 3
Soil Fertility
A. 3 cr.
Prereq.: 441.
A study of the factors affecting soil productivity and the practices needed in good soil management; fertilizer properties and practices. Arscott.

671 U G 5
Soil Physics
A. 3 cr., 2 2-hr. labs.
Prereq.: 441, Physics 231, 232, 233, and Math. 152.
A study of the physical makeup and properties of soil, including structure, thermal relationships, consistency, plasticity, water, and their relationships. Taylor. Fee.

672 U G 5
Chemistry of Soils and Fertilizers
W. 3 cr., 2 2-hr. labs.
Prereq.: 550, 607, Chem. 211 and 9 additional cr. hrs. in Agron. and/or Chem. at the 300 level or higher.
A study of the chemical properties of soils and fertilizers affecting plant growth and composition including modern laboratory analysis of soil, fertilizer, and plant tissue. McLean. Fee.

693 U G 3 or 5
Individual Studies
H693 (honors) may be available to students enrolled in a college honors program or eligible for enrollment.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Students may select special agronomic problems, not included in regular courses and involving library, laboratory, or field studies.

694 U G 3 or 5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Discussion of selected topics in crop science and/or soil science.
GENERAL PREREQUISITES FOR COURSES
NUMBERED 700
Unless otherwise indicated, the prerequisites for 700-level courses are 15 cr. hrs.; in courses in the same discipline numbered 400 or higher, plus additional specified course(s) numbered 600 or higher.

750*  U G 4
Methods of Soil Mineralogical Investigations
Sp. 2 cl., 2 2-hr. labs.
Prereq.: 15 cr. hrs. selected from the following: 550, 671, 672, Geol. 602, Mineral. 621, 654, Chem. 521, 621, and 676.
Theory, interpretation, and application of mineralogical tools for soil matrices including X-ray diffraction, X-ray spectroscopy, microscope, thin section and thermal techniques. Widing. Fee.

786  U G 5
Radioactive Tracers in Plant and Soil Research
W. 2 lec., 3 2-hr. lab.
Prereq.: 672 or Chem. 211 and 15 cr. hrs. in biological sciences at the 400 level or higher.
Radiochemical principles and techniques used in soil and plant research; designed to prepare the student to conduct radio-tracer experiments. Franklin. Fee.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 800 AND 900
Unless otherwise indicated, the prerequisites for 800 and 900-level courses are 30 cr. hrs. in courses in the same discipline, or 20 cr. hrs. in the same discipline, plus 25 cr. hrs. in specified allied disciplines.

822  G 5
Physiological and Biochemical Aspects of Herbicides
W. 4 cl., 1 2-hr. lab.
Herbicide absorption, course, fate, and mode of action in plants; persistence and fate in soils. Bendixen.

830*  G 4
Advanced Field Crop Breeding
W. 3 cl., 1 2-hr. lab.
Prereq.: 530, Genetics 650, and 16 additional cr. hrs. in Agron.
A detailed study of the genetic fundamentals and modern procedures used in the development of plant breeding programs for the improvement of agronomic crops. Ray.

850*  G 3
Soils of the Cold Regions
Sp. 3 cl.
Prereq.: 30 cr. hrs. of Agron. or 30 cr. hrs. of Geog. and Geol. and Geography.
A study of the morphological, physical, chemical, and biological properties of the soils and environmental features of the polar and alpine regions. Everett.

860*  G 3
Chemistry of Soil Organic Matter
Sp. 3 cl.
A comprehensive study of soil organic matter including methods of study, theories of synthesis, physical and chemical properties, accumulation and functions of organic matter. Miller.

870*  G 3
Soil-Plant Relationships
Su (1st term). 3 cl.
Prereq.: 20 cr. hrs. of soil and/or plant sciences and 10 cr. hrs. of plant physiology.
Discussion of recent literature pertaining to growth response curves, nutrient uptake, movement of nutrients in the soil, and measurement of availability of nutrients to plants. McLean and Himes.

871*  G 3
Advanced Soil Physics
W. 3 cl.
Prereq.: 671 and permission of instructor.
Moisture, gaseous, and thermal processes and regimes in vegetated soils and their influences on plant growth. Taylor.

872  G 5
Physical Chemistry of Soils
W. 3 cl., 2 3-hr. labs.
Prereq.: 671, 672, Chem. 521 or 532, and 15 additional cr. hrs. in Agron. or Biol.
A study of the physiochemical properties of soil including methods of characterizing clay minerals, soil acidity, ionic absorption and release, and plant nutrient uptake. McLean.

880  G 2
Seminar
Repeatable to a maximum of 12 cr. hrs.
Discussion of current problems in agronomy. Bendixen.

885  G 1
Research Principles and Techniques
A. 1 cl.
The philosophy of graduate education and the description of the techniques and special equipment most useful for conducting research in crops and soils science. McLean.

887  G 5
Techniques of Experimental Design
W. 5 cl.
Prereq.: Genetics 650, 651, and 10 cr. hrs. of Agron., or related subjects at the 400 level or above. A study of experimental designs and their application to agricultural research. Smith.

896  G 1-3
Interdepartmental Seminar in Polar and Alpine Studies
Sp.
(See under Interdepartmental Seminars.)

897  G 1
Interdepartmental Seminar in Natural Resources
(See under interdepartmental Seminars.)

993  G 3 or 5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Students may select special agronomic problems not included in regular courses.
Air Force Aerospace Studies

Office: 253 ROTC Building, 2121 Tuttle Park Place
Air Force Reserve Officer Training Corps
Colonel Moody and Staff.

GENERAL MILITARY COURSE
(Freshmen and Sophomores)

101 U 2
The USAF and the Strategic Offensive Forces
A. 2 cr., 1 lab. hr.
An introduction to the doctrine, organization, and mission of the USAF; and an examination of the strategic offensive forces of the U.S. Military Establishment—from the standpoint of theory and hardware. Special attention is given to SAC and its retaliatory capability.

102 U 2
Strategic Defensive Forces
W. 1 cr., 1 lab. hr.
Prereq.: 101 or permission of Professor of A. F. Aero. S. Examination of Strategic Defensive Forces of the U.S.; analysis of concepts of defense against both manned and unmanned weapons system.

103 U 2
Tactical Air, General Purpose Forces, and Other Supporting Functions
Sp. 2 cr., 1 lab. hr.
Prereq.: 102 or permission of Professor of A. F. Aero. S. Study of tactical airpower with emphasis on hardware; doctrine of General Purpose Forces; USAF's supporting commands and agencies.

201 U 2
National Power and the Nature and Principles of War
A. 2 cr., 1 lab. hr.
Prereq.: 103 or permission of Professor of A. F. Aero. S. An introduction to the nature and principles of war; overview of the changing role of the military in the achievement of national objectives.

202 U 2
General War & Sino-Soviet Military/Defense Policies
W. 1 cr., 1 lab. hr.
Prereq.: 201 or permission of Prof. of A. F. Aero. S. An introduction to theories on general war; overview of military and defense policies of the U.S.S.R. and the People's Republic of China.

203 U 2
Foreign Policy, Defense Policy, and the Search for Peace
Sp. 2 cr., 1 lab. hr.
Prereq.: 202 or permission of Prof. of A. F. Aero. S. A survey of U.S. foreign policy to U.N. and NATO; evolution and functions of Defense Department; problems in the search for peace since World War II.

PROFESSIONAL OFFICER COURSE
(Juniors, Seniors, and Graduate Students)

301 U 3
History of Aerospace Power
A. 3 cr., 1 lab.
Prereq.: Completion of General Military Course; completion of Air Force ROTC Two-Year Field Training; or permission of Professor of A. F. Aero. S. A study of the history of the Air Force and the growth and development of aerospace power.

302 U 3
Aerospace Power Today and Tomorrow
W. 3 cr., 1 lab.
Prereq.: 301 or permission of Professor of A. F. Aero. S. An investigation of the fundamental concepts and doctrine underlying aerospace forces; current and future employment of manned aircraft; introduction to astronautics and space operations.

303 U 3
Astronautics and Space Operations
Sp. 3 cr., 1 lab.
Prereq.: 302 or permission of Professor of A. F. Aero. S. A study of aerospace technology; current and future space operations and their relationship to national security.

401 U 3
Leadership and the Military Justice System
A. 3 cr., 1 lab.
Prereq.: 303 or permission of Professor of A. F. Aero. S. An analysis of the theories and techniques of leadership; study and practical applications of human relations and behavior; an introduction to the uniform code of military justice.

402 U 3
Leadership and Management of Aerospace Forces
W. 3 cr., 1 lab.
Prereq.: 401 or permission of Prof. of A. F. Aero. S. A study of the variables affecting leadership and the pre-execution phase of military management: planning, organizing, and coordinating.
403  U 3
Management of Aerospace Forces
and Preparation for Active Duty
Sp.  3 cl., 1 lab.
Prereq.: 402 or permission of Prof. of A. F. Aero. S.
A study of the execution phase of military management;
directing and controlling, and team and individual
presentations which prepare the cadet for active duty
as an Air Force Officer.

411  U 2
Flight Instruction Program
A, W, Sp.  4 cl. first 6 wks. of qtr.
Prereq.: 303 or permission of Professor of A. F. Aero. S.
Flight training fundamentals of Federal Aviation
Regulations, aerial navigation and radio procedures,
meteorology and flight planning; preparation of student
pilots in the Air Force Flight Instruction Program to
meet FAA standards.

520  U G 2
Musculoskeletal Disease
Sp.  2 cl.
Prereq.: Admission to the School of Allied Medical
Professions or permission of instructor.
Not open to students with credit for Phys. Ther. 520.
Principles, clinical aspects, and therapeutic procedures
related to diseases of the musculoskeletal system.
Adamson.

530  U G 3
Neuromuscular Disease
W.  3 cl.
Prereq.: Anat. 201 or permission of instructor.
Not open to students with credit for Phys. Ther. 530.
Survey of injury and disease of the central, peripheral,
and autonomic nervous systems; presentation of
clinical material. Cuddeford.

591  U P 3
Health Care Organization
A, Sp.  2 1/2-hr. cl.
Prereq.: Enrollment in School of Allied Medical
Professions or School of Nursing or permission of
instructor.
An examination of the roles of public and private
organizations in planning and supporting health care,
including study of health trends, social legislation,
and current professional issues. Boissonneau.

592  U P 2
Interdisciplinary Health Care—Field Study
A, W, Sp.  4 cl.
Prereq.: Enrollment in School of Allied Medical
Professions or School of Nursing or permission of
instructor.
Selected patient care experiences that will develop
the concept of the Health Care Team. Allen.

610  U G 3
The Hospital as an Educational Institution
A.  3 cl.
Prereq.: Permission of instructor.
Hospital as a clinical learning environment for medical
and allied medical professionals; in-service education;
patient and community health education; continuing
education. McCool.

625  U G 5
Critical Phases in Life
Su, Sp.  5 cl.
Prereq.: Biol. 100 and 5 cr. hrs. of Psychol, or
permission of instructor.
An examination of the developmental phases critical
to man's continuing health, presented as a frame of
reference for patient evaluation and health care.
Anderson, Burnett, and Johnson.

650  U G 3
Automated Systems in Health Care
Sp.  2 cl., 1 1-hr. lab.
Prereq.: Permission of instructor.
Not open to students with credit for 550.
Concepts of electronic data processing and automated
systems applied to health care; implications and
planning requirements for present and future
systems. Casbergue.

693  U G 1-5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Guided study of selected topics.

694  U G 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to maximum of 15 cr. hrs.
Supervised group studies of special topics within the
various professions of the allied health field.

694.01 Circulation Technology
694.02 Hospital and Health Services Administration
694.03 Medical Communications
694.04 Medical Dietetics
694.05 Medical Illustration
694.06 Medical Record Administration
694.07 Medical Technology
694.08 Occupational Therapy
694.09 Physical Therapy
694.10 Radiologic Technology
694.11 Respiratory Technology
Management of Aerospace Forces and Preparation for Active Duty
Sp 3 cl., 1 lan.
Prereq.: 402 or permission of Prof. of A. F. Aero. S.
A study of the execution of military management: directing and controlling, and team and individual presentations which prepare the cadet for active duty as an Air Force Officer.

Flight Instruction Program
A, W, Sp 4 cl. 1st 6 wks. of qtr.
Prereq.: 303 or permission of Professor of A. F. Aero. S.
Flight training fundamentals of Federal Aviation Regulations, aerial navigation and radio procedures, meteorology and flight planning; preparation of student pilots in the Air Force Flight Instruction Program to meet FAA standards.

Allied Medicine (School of Allied Medical Professions)
Office: 127 School of Allied Medical Professions Building, 1532 Perry Street
Professor Atwell; Associate Professor Schoen; Assistant Professor Allen; Instructor Odgers.

Introduction to the Health Professions
A, W, Sp 2 cl.
An examination of the professions involved in health care, with emphasis on those offered in the School of Allied Medical Professions; Allen.

Musculoskeletal Disease
Sp 2 cl.
Prereq.: Admission to the School of Allied Medical Professions or permission of instructor.
Not open to students with credit for Phys. Ther. 520. Principles, clinical aspects, and therapeutic procedures related to diseases of the musculoskeletal system; Adamson.

Neuromuscular Disease
W, 3 cl.
Prereq.: Anat. 201 or permission of instructor.
Not open to students with credit for Phys. Ther. 530. Survey of injury and disease of the central, peripheral, and autonomic nervous systems; presentation of clinical material; Chadley.

Health Care Organization
A, Sp 2 1/2 hr. cl.
Prereq.: Enrollment in School of Allied Medical Professions or School of Nursing or permission of instructor.
An examination of the roles of public and private organizations in planning and supporting health care, including study of health trends, social legislation, and current professional issues; Boissonneau.

Interdisciplinary Health Care—Field Study
A, W, Sp 4 cl.
Prereq.: Enrollment in School of Allied Medical Professions or School of Nursing or permission of instructor.
Selected patient care experiences that will develop the concept of the Health Care Team; Allen.

The Hospital as an Educational Institution
A 3 cl.
Prereq.: Permission of instructor.
Hospital as a clinical learning environment for medical and allied medical professionals; in-service education; patient and community health education; continuing education; McCool.

Critical Phases in Life
Su, Sp 5 cl.
Prereq.: Biol. 100 and 5 cr. hrs. of Psychol. or permission of instructor.
An examination of the developmental phases critical to man's continuing health, presented as a frame of reference for patient evaluation and health care; Anderson, Burnett, and Johnson.

Automated Systems in Health Care
Sp 2 cl., 1 2-hr. lab.
Prereq.: Permission of instructor.
Not open to students with credit for 550. Concepts of electronic data processing and automated systems applied to health care; implications and planning requirements for present and future systems; Castbergue.

Individual Studies
Su, A, W, Sp 1-5 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Guided study of selected topics.

Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Supervised group studies of special topics within the various professions of the allied health field.

Circulation Technology
Hospital and Health Services Administration
Medical Communications
Medical Dietetics
Medical Illustration
Medical Record Administration
Medical Technology
Occupational Therapy
Physical Therapy
Radiologic Technology
Respiratory Technology
Management of Aerospace Forces and Preparation for Active Duty
Sp. 3 cr., 1 lab.
Prereq.: 402 or permission of Prof. of A. F. Aero. S.
A study of the execution phase of military management; directing and controlling; and team and individual presentations which prepare the cadet for active duty as an Air Force Officer.

Flight Instruction Program
A, W, Sp. 4 cr. first 6 wks. of qtr.
Prereq.: 303 or permission of Professor of A. F. Aero. S.
Flight training fundamentals of Federal Aviation Regulations, aerial navigation and radio procedures, meteorology and flight planning; preparation of student pilots in the Air Force Flight Instruction Program to meet FAA standards.

Allied Medicine
(School of Allied Medical Professions)
Office: 127 School of Allied Medical Professions Building, 1593 Perry Street
Professor Atwell; Associate Professor Schoen; Assistant Professor Allen; Instructor Ogden.

Introduction to the Health Professions
A, W, Sp. 2 cr.
An examination of the professions involved in health care, with emphasis on those offered in the School of Allied Medical Professions, Allen.

Musculoskeletal Disease
Sp. 2 cr.
Prereq.: Admission to the School of Allied Medical Professions or permission of instructor.
Not open to students with credit for Phys. Ther. 520.
Principles, clinical aspects, and therapeutic procedures related to diseases of the musculoskeletal system. Adamson.

Neuromuscular Disease
W. 3 cr.
Prereq.: Anat. 201 or permission of instructor.
Survey of injury and disease of the central, peripheral, and autonomic nervous systems; presentation of clinical material. Chidley.

Health Care Organization
A, Sp. 2 1-1/2 hr. cr.
Prereq.: Enrollment in School of Allied Medical Professions or School of Nursing or permission of instructor.
An examination of the roles of public and private organizations in planning and supporting health care, including study of health trends, social legislation, and current professional issues. Boissonneau.

Interdisciplinary Health Care—Field Study
A, W, Sp. 4 cr.
Prereq.: Enrollment in School of Allied Medical Professions or School of Nursing or permission of instructor.
Selected patient care experiences that will develop the concept of the Health Care Team. Allen.

The Hospital as an Educational Institution
A. 3 cr.
Prereq.: Permission of instructor.
Hospital as a clinical learning environment for medical and allied medical professionals; in-service education; patient and community health education; continuing education. McCool.

Critical Phases in Life
Su, Sp. 5 cr.
Prereq.: Biol. 100 and 5 cr. hrs. of Psychol. or permission of instructor.
An examination of the developmental phases critical to man’s continuing health, presented as a frame of reference for patient evaluation and health care. Anderson, Burnett, and Johnson.

Automated Systems in Health Care
Sp. 2 cr., 1 2-hr. lab.
Prereq.: Permission of instructor.
Not open to students with credit for 550.
Concepts of electronic data processing and automated systems applied to health care; implications and planning requirements for present and future systems. Casbergue.

Individual Studies
Su, A, W, Sp. 1-5 cr.
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Guided study of selected topics.

Group Studies
Prereq.: Permission of instructor.
Repeatable to maximum of 15 cr. hrs.
Supervised group studies or special topics within the various professions of the allied health field.

Circulation Technology

Hospital and Health Services Administration

Medical Communications

Medical Dietetics

Medical Illustration

Medical Record Administration

Medical Technology

Occupational Therapy

Physical Therapy

Radiologic Technology

Respiratory Technology
Essentials of Embryonic Development
A. 2 cl., 1 3-hr. lab.
Prep.: Dent. 1st yr. standing.
The early embryology and organogenesis of man; emphasizing the pig embryo supplemented by human material. Delphi and Clark.

Human Anatomy
W, Sp. 3 cl., 2 3-hr. lab.
Prep.: Dent. 1st yr. standing.
Gross anatomy of the abdomen and limbs. J. Egilisi.

Human Anatomy
W, Sp. 3 cl., 3 3-hr. lab.
Prep.: Dent. 1st yr. standing.
Gross anatomy of the head, neck, and thorax. Gaughran, Boston, and Lauer.

Histology
A. 3 cl., 3 3-hr. lab.
Prep.: Dent. 1st yr. standing.
General histology of the tissues and special histology of the organ systems. Vernall, J. Egilisi, Hayes, and Martinek.

Applied Anatomy
A. 1 cl.
Prep.: Dent. 3rd yr. standing.
Anatomy of the head and neck as applied to clinical dentistry. Russell.

Individual Studies in Anatomy
Su, A, W, Sp. 1 month, offered all months.
Prep.: Permission of instructor.
Repeatable to a maximum of 24 cr. hrs. for professional credit.
Designed to enable the student to pursue a minor investigation in some anatomical field of his choice.

Mammalian Histology
Sp. 3 cl., 3 2-hr. labs.
Prep.: Enrollment in School of Allied Medical Professions or permission of instructor.
A microscopic study of mammalian cells, tissues, and organs with particular emphasis on human and other selected vertebrates; consideration of the comparative aspect of microscopic structure in relation to function for the various organ systems. Hayes.

Human Gross Anatomy
W. 3 cl., 3 3-hr. labs.
Prep.: Permission of instructor.
Regional dissections of upper limb, head, neck and thorax with a study of cross sections and normal x-rays. Gaughran.
702 U G 4
Human Gross Anatomy
Sp. 2 cl., 2 3-hr. labs.
Prereq.: Permission of instructor.
Regional dissection of abdomen, pelvis, and lower
limb with a study of cross sections and normal x-rays.
Gaughran.

703 U G 4
Human Developmental Anatomy
W. 1 cl., 1 2-hr. lab., 1 to 2 hrs. recitation.
Prereq.: Permission of instructor.
Detailed analysis of the growth and differentiation of
individual organ systems; role of growth factors in
differentiation of these systems; common anomalies;
discussions of contemporary research methods and
innovative teaching techniques. Delphila and Clark.

704 U G 6
Human Neuroanatomy
A. 3 cl., 3 2-hr. labs.
Prereq.: Permission of instructor.
Functional anatomy of the central nervous system and
its pathways, cross sections of the brain and spinal
cord will be utilized. Beran, Clark, Dom, Humbertson,
King, and Martin.

735 P G 5
Anatomy of the Visual System
Sp. 2 cl., 2 3-hr. labs.
Prereq.: 653, 653, 673, 683, or equiv., and permission
of instructor; resident standing in Ophthal.
The gross anatomy, histology, neuroanatomy, and
embryology of the human visual apparatus; its
structure, function, and some clinical applications.
I. Egilitis.

740 P G 3
Medical Education
A. Sp. 3 cl.
Prereq.: Permission of instructor.
Introductory experiences in administrative and
functional aspects of all phases of medical education,
including observation of methods, evaluation,
curriculum design, student selection, and educational
research. Tzebiakoviski.

797 U P G 1-5
Interdepartmental Seminar
A. W. Sp.
(See under Interdepartmental Seminars, Academic
Policies and Course Offering catalog.)

805 G 5
Anatomical Techniques
A. Arr.
Prereq.: Permission of instructor.
Open only to grad. students in Anat.
The preparation of biological materials for light and
electron microscopy. Wismar and Hostetler.

850 G 1
Seminar in Anatomy
W. Sp.
Repeatable to a maximum of 20 cr. hrs.
Discussions of research in progress and reports from
the literature of current anatomical problems.

911 G 3 or 5
Advanced Studies in Anatomy
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

911.01 Blood and Hemoepiesis
Morphology of normal and abnormal human blood
and bone marrow; developmental hemopoiesis and
cellular immune response in various animals.
Ackerman and St. Pierre.

911.02 Connective Tissue and Bone
Activities of fibrous connective tissues emphasizing
formation and maintenance of fibers and ground
substance; dynamics of the structure, chemistry,
and metabolism of bone. J. Egilitis, Meifti, and
Wismar.

911.03 Embryology
Mammalian embryological development emphasizing
descriptive or experimental approach; metabolic
aspects of development including enzymatic
changes, hormonal effects, environmental factors,
and teratogenic agents. Clark, Delphila, Hayes,
Sucheston, Vernail, and Wismar.

911.04 Microscopic Anatomy
Advanced studies in selected areas of microscopic
anatomy. Ackerman. J. Egilitis, Hayes, Hostetler,
Martinek, Vernail, and Wismar.

911.05 Neuroanatomy
Advanced study of a particular system or systems in the
central nervous system, including literature
perusal. Martin, Humbertson, Clark, Dom, and King.

911.06 Epithelium
Covering, lining, and glandular divisions; functional
significance of exocrine and endocrine glands. J.
Egilitis.

911.07 Ultrastructure of the Central Nervous System
Ultrastructure of neuron, neuroglia, and the neuropil
of the mammalian central nervous system. Hostetler
and King.

911.08 Electron Microscopy
Examination of specific tissues or cellular
populations using electron micrographs; no actual
use of the electron microscope. Ackerman Hostetler,
King, and Martinek.

911.89 Instrumentation and Techniques in
Experimental Neuroanatomy
Practical experience in learning techniques utilized in
neuroanatomical research problems. Martin,
Clark, Dom, Humbertson, and King.

911.10 Principles of Human Cytogenetics
Human cytogenetics as relates to autosomal and
sex chromosomes; technique of tissue culture for
study of human chromosome(s) and karyotype
analysis. Hayes.

911.11 Design of Computer Teaching Programs
Methods and logic of writing subject oriented
computer assisted instruction (CAI) programs.
Wismar and Christopher.

911.12 Anatomy of Newborn
Gross anatomy of the newborn correlated with
prenatal and postnatal development; dissection and
section study. Gaughran, Graves, and I. Egilitis.

911.13 Topographical Anatomy
Study of unmounted serial cross sections of selected
regions of the human body emphasizing the inter-
relationship of structures to another in a
three-dimensional perspective. Gaughran, I. Egilitis,
Graves, and Russell.
911.14 Advanced Regional Dissections
Careful dissection of one or more regions of the body, supplemented with literature research. Gaughrnan, I., Egitis, Graves, and Russell.

911.15 Human Anatomy: Radiological Manifestations
Methods of routine projections and interpretations for best visualizing anatomical structures. Graves.

999 G Arr.
Research in Anatomy
Research for thesis or dissertation purposes only.

Anesthesiology
Office: 632 University Hospital, 410 West 10th Avenue

Professor Hamelberg (Chairman); Associate Professors Collins, Garvin, and Lenahan; Assistant Professors Anderson, Best, DeLeo, Franklin, Gauthier, Imboden, Knisely, LeVere, Prince, Reier, Siddal, Stone, E. Warren, and Weich.

737 P 1
Clinical Anesthesiology
16 cr. hrs.
Prereq.: Med. 4th yr. standing; concur. 5 or 11 cr. hrs. Surg. 736.
Offered concur. with Surg. 736.
Didactic instruction, demonstration, and clinical observation of anesthetic agents and techniques, covering fundamentals of cardiopulmonary resuscitation, use of local anesthetic agents, inhalation therapy, premedication, and anesthetic agents and techniques. Hamelberg and Staff.

793 Individual Studies in Anesthesia
1, 2, 3, or 4 months; offered all months. P 6, 12, 18
Prereq.: Permission of instructor.
Repeatable to a maximum of 24 cr. hrs. for professional credit; repeatable to a maximum of 15 cr. hrs. for graduate credit.
Designed to offer to medical and graduate students an opportunity to pursue research related to anesthesia in either basic science or clinical science. Hamelberg and Staff.

794 P 6
Group Studies in Anesthesia
1 month, offered all months.
Prereq.: Med. 3rd or 4th yr. standing.
Repeatable to a maximum of 12 cr. hrs.
Course designed to give medical students clinical experience in the administration of anesthesia. Hamelberg and Staff.

798 P 18
Internship in Anesthesiology
12 months full time, beginning July 1.
Prereq.: Appointment as Intern, University Hospital. Repeatable to a maximum of 72 cr. hrs.

Broad exposure to principles of anesthesiology; experience in operating rooms, wards, and emergency rooms; rounds; conferences.

799 P 18
Residency in Anesthesiology
12 months full time, beginning July 1.
Prereq.: Appointment as Resident, University Hospital.
Repeatable to a maximum of 360 cr. hrs.
Rotation through services of anesthesia; rounds; conferences.

850 G 3 or 5
Seminar in Anesthesiology
Prereq.: Permission of instructor.
Group and individual discussions of current problems in anesthesiology and their management: discussions of basic and applied topics.

999 G Arr.
Research in Anesthesiology
Research for thesis purposes only.

Animal Science
Office: 110 Animal Science Building, 2029 Fyffe Road

Professors Johnson (Chairman), Cahill, Cline, Debority, Grimshaw, Harvey, Klosterman (Associate Chairman, Wooster), Kottman, Kunkle, Ludwig, Mccon, Newland, Ockerman, Parker, Preston, Reed, Swiger Teague, Tynak, Van Stavern, Venzke, and R. F. Wilson; Associate Professors Barnes, Judy, Pimlont, and G. R. Wilson; Assistant Professors Allhouse, Bishop, Boyles, Dahl, Griffo, Hutton, Isler, Mahan, McClure, Potter, Smith, and Wharton.

100 U 5
Domestic Animals in the Service of Man
A, W, Sp. 5 cr.
Offered in cooperation with the Depts. of Dairy Sc. and Poul. Sc.
The role of the animal industry in the world and the importance of the application of science in meeting the needs in the production, distribution, and utilization of animal products. Pimlont, Stephens, and McGrew.

GENERAL PREREQUISITES FOR COURSES NUMBERED 200
Unless otherwise indicated, the prerequisites for 200-level courses are 45 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.; or specified course(s) numbered 100-199.

200 U 5
Introductory Animal Science
A, W, Sp. 3 cr., 2 2-hr. lab.
Introduction to selection, breeding, feeding, management, marketing, and utilization of beef cattle, swine, and sheep; a limited discussion of the horse is included. Pimlont, Judy, and R. Wilson.
Meat Selection and Identification
A, W, Sp. 3 2-hr. lab.
The structure and composition of beef, pork, veal, and lamb are used to distinguish grades and wholesome of
meat products for domestic and institutional purposes.
Kunkle.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 300 AND 400
Unless otherwise indicated, the prerequisites for 300
and 400-level courses are 90 cr. hrs. in collegiate
courses, exclusive of ROTC and Phys. Ed.; or specified
course(s) numbered 100-399.

Principles of Animal Improvement
A, W, Sp. 5 cl.
Prereq.: 100, Math. 150 or equiv., and Genetics 140 or
314.
Not open to students with credit for Dairy Sc. 420 or
Poul. Sc. 420.
(Cross-listed in the Depts. of Dairy Sc. and Poul, Sc.)
An introduction to the methods available for bringing
about genetic change in farm animals. Fehmeimer,
Jaap, and Swiger.

Principles of Animal Nutrition
Su (1st term), A, W, Sp. 4 cl., 1 2-hr. lab.
Prereq.: Chem. 102 or 122 and Math. 150 or equiv.
Not open to students with credit for Dairy Sc. 430 or
Poul. Sc. 430.
(Cross-listed in the Depts. of Dairy Sc. and Poul, Sc.)
A study of the fundamental principles of nutrition in
mammals and birds. Cline, Latshaw, and Tyznik. Fee.

Livestock Management
W. 3 cl., 2 2-hr. lab.
Prereq.: 200 and 430.
Not recommended for animal science majors.
Feeding, breeding, and managing of beef, sheep, and
swine; laboratory exercises are concerned with major

Meat and Meat Products
A, W, Sp. 3 cl.
Prereq.: 5 credit hrs. animal sc.
Not open to students with credit for Animal Sc. 450.
Analysis of the interdependent factors of meat animals,
meat and meat products, processing and merchandising
in their relationship to man as producer, processor,
and consumer.

Meat and Meat Products Laboratory
A, W, Sp. 2 3-hr. lab.
Prereq. or concur.: 452.
Conversion of meat animals to the variety of consumer
products; slaughter, cutting, curing, preservation, and
other processing; product evaluation related to animal
value and consumer needs.

Meat Animal and Carcass Evaluation
Sp. 1 cl., 2 2-hr. lab.
Prereq.: 200.
Not open to students with credit for 451.
The factors that influence the value of meat animals,
carcasses, and wholesale cuts in accordance with
recognized grading standards; laboratory practice.
Althouse.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 500
Unless otherwise indicated, the prerequisites for
500-level courses are 15 cr. hrs. in courses in the same
discipline numbered 200 or higher, or 10 cr. hrs. in
courses numbered 200 or higher in the same discipline,
plus 10 cr. hrs. in courses numbered 200 or higher in
specified allied disciplines; or baccalaureate degree.

Livestock Selection
Sp. 5 2-hr. lab-discussions.
Prereq.: 200, 430, and 5 additional cr. hrs. Ir 541, 542,
543, or 544.
Laboratory exercises employing current standards of
animal excellence including carcass value for the
selection and improvement of farm livestock. G. R.
Wilson.

Livestock Marketing
(See Agr. Econ. 322.)
(Offered in cooperation with the Dept. of Agr. Econ.)

Horse Production and Management
A. 3 cl., 2 2-hr. lab.
Prereq.: 200, 430, and 5 additional cr. hrs. in Animal
Sc., or Dairy Sc.
The application of science and basic principles of
nutrition, genetics, physiology, and marketing to the
production and management of horses. Hutton.

Beef Cattle Production and Management
A, Sp. 3 cl., 2 2-hr. lab.
Prereq.: 200, 430, and 5 additional cr. hrs. in Animal
Sc., Dairy Sc., or Poul. Sc.
The application of science and basic principles of
nutrition, genetics, physiology, and marketing to the
production and management of beef cattle. G. R.
Wilson.

Swine Production and Management
W. 3 cl., 2 2-hr. lab.
Prereq.: 200, 430, and 5 additional cr. hrs. in Animal
Sc., Dairy Sc., or Poul. Sc.
Selection of breeding stock, reproduction, feeding,
management, and sale of commercial and breeding
swine; swine herds, markets, and research stations are

Sheep Production and Management
W, Sp. 3 cl., 2 2-hr. lab.
Prereq.: 200, 430, and 5 additional cr. hrs. in Animal
Sc., Dairy Sc., or Poul. Sc.
The application of science and basic principles of nutrition, genetics, physiology, and marketing to the production and management of sheep. Judy.

550 U G 3
Meat Processing
A. 2 cr., 1 2-hr. lab.
Prereq.: 450.
Fundamental changes in soft animal tissue resulting from comminution and application of chemicals and heat. Cahill.

593 U G 2-5
Individual Studies
H939 (honors) may be available to students enrolled in a college honors program or eligible for enrollment.
Prereq.: Junior or senior standing and permission of instructor.
Special assignments and elementary research; problems assigned after consultation with instructor in charge.

594 U G 2-5
Group Studies
Prereq.: Junior or senior standing and permission of instructor.
Special assignments and elementary research; problems assigned after consultation with instructor in charge.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600
Unless otherwise indicated, the prerequisites for 600 level courses are 15 cr. hrs. in courses in the same discipline numbered 300 or higher, or 10 cr. hrs. in courses numbered 300 or higher in the same discipline.

610 U G 3
Physiology of Lactation
A. 2 2-hr. cl.
Prereq.: Vet. Physiol. 211 and 20 cr. hrs. of Dairy Sc., Animal Sc., or vetebrate biology.
Not open to students with credit for Dairy Sc. 610. (Cross-listed in the Dept. of Dairy Sc.)
The physiological, endocrine, nutritional, and environmental factors influencing the synthesis and ejection of milk. Barr and Porter.

613 U G 3
Laboratory in Reproductive Physiology and Artificial Insemination
Sp. 2 2-hr. lab.
Prereq. or concur.: 612.
Not open to students with credit for Dairy Sc. 613.
(Cross-listed in the Dept. of Dairy Sc.) Comparative anatomy and physiology of reproduction of farm animals; physiological bases for the use of artificial insemination in research laboratory and in the field. Ludwick.

630 U G 5
Nutrition and Feeding of Monogastric Animals
A, W, Sp. 4 cr., 1 2-hr. lab.
Prereq.: 430 or equiv.
Not open to students with credit for Poul. Sc. 630.
(Cross-listed in the Dept. of Poul. Sc.)
The nutrition of swine, poultry, and laboratory animals; principles and practice. Latshaw and Mahan.
Fee.

631 U G 5
Nutrition and Feeding of Ruminant Animals
Su, A, W, Sp. 4 cr., 1 2-hr. lab.
Prereq.: 430 or equiv.
Not open to students with credit for Dairy Sc. 631.
(Cross-listed in the Dept. of Dairy Sc.)
The nutrition of dairy cattle, beef cattle, and sheep; principles and practice. Cline, Staubus, and Tynick.
Fee.

650 U G 3
Advanced Meat Technology
Sp. 2 cl., 2 2-hr. lab.
Evaluation of scientific contribution to meat products and processing. Cahill and Ockerman.

651 U G 3
Laboratory Analysis of Meat Products
W. 2 cl., 1 2-hr. lab.
Prereq.: 450, 10 cr. hrs. Chem., and 5 cr. hrs. Microbiol.
Analysis of meat products by physical, chemical, and microbiological techniques. Borton and Ockerman.
Fee.

693 U G 3-5
Individual Studies
H939 (honors) may be available to students enrolled in a college honors program or eligible for enrollment.
Prereq.: Permission of instructor.
Special assignments and advanced research; problems assigned after consultation with the instructor in charge.

694 U G 3-5
Group Studies
Prereq.: Permission of instructor.
Special assignments and advanced research; problems assigned after consultation with the instructor in charge.
GENERAL PREREQUISITES FOR COURSES
NUMBERED 700
Unless otherwise indicated, the prerequisites for 700-level courses are 15 cr. hrs. in courses in the same
discipline numbered 400 or higher, plus additional
specified course(s) numbered 600 or higher.

710† U G 3 or 5
Advanced Reproductive Physiology
Sp. 2 2-hr. cl.
Prereq.: 612 and acceptable courses in Physiol., Anat.,
and Biochem.
Not open to students with credit for Dairy Sc. 710.
(Cross-listed in the Dept. of Dairy Sc.)
Recent advances in research in mammalian
reproduction; optional individual research experience
in reproductive problems with small and large
mammals for additional credit. Comes and
VanDemark.

720 U G 5
Genetics of Animal Populations
W. 5 cr.
Prereq.: 420 or Genetics 630, and 10 cr. hrs. Math.
Not open to students with credit for Dairy Sc. 720 or
Poul Sc. 720.
(Cross-listed in the Depts. of Dairy Sc. and Poul. Sc.)
Theory and practice of analyzing and altering
the genetic composition of animal populations. Swiger.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 800 AND 900
Unless otherwise indicated, the prerequisites for 800
and 900-level courses are 30 or 40 cr. hrs. in courses in the same
discipline, or 20 cr. hrs. in the same discipline,
plus 25 or 30 cr. hrs. in specified allied disciplines.

800 G 1
Seminar
Prereq.: Animal Sci. grad. standing.
Discussions of current animal science research.

810 G 3
Advances in Physiology of Domestic Animals
A, W, Sp. 4-4 hr. cl.
Prereq.: Permission of instructor and acceptable
courses in Physiol., Anat., and Biochem.
Not open to students with credit for Dairy Sc. 810 or
Poul Sc. 810.
(Cross-listed in the Depts. of Dairy Sc. and Poul. Sc.)
810.81† Adrenal Function
A.
Brown and Gomes.
810.82† Endocrinology of Reproduction
W.
Gomes.
810.83† Immunology and Immunogenetics
Sp.
Hines.
810.84† Thyroid and Parathyroid Function
A.
Hibbs.
810.85† Mammalian Germ Cells
W.
VanDemark.
810.86† Biometry and Animal Performance
Sp.
Ludwick.

820 G 3
Current Topics in Animal Genetics
3 cr.
Prereq.: Acceptable courses in Animal Genetics, Math.,
and Statistics.
Not open to students with credit for Dairy Sc. 820 or
Poul Sc. 820. Repeatable to a maximum of 12 cr. hrs.
(Cross-listed in the Depts. of Dairy Sc. and Poul. Sc.)
820.81 Selection Index Theory
Sp.
Harvey.
820.82† Non-additive Genetic Variance
W.
Harvey and Swiger.
820.83† Polymorphic Systems
W.
Fechheimer.
820.84† Simulation of Genetic Systems
W.
Swiger.
820.85† Cytogenetics of Animal Populations
W.
Fechheimer.
820.86† Physiological Indices in Animal Breeding
A.
Fechheimer and Jaap.

830 G 3
Advanced Studies in Nutrition
Su, A, W, Sp. 3 or 4 cr.
Prereq.: Permission of instructor.
Not open to students with credit for Dairy Sc. 830 or
Poul Sc. 830.
(Cross-listed in the Depts. of Dairy Sc. and Poul. Sc.)
830.81† Energy
A.
Conrad.
830.82† Minerals
W.
Cline.
830.83† Proteins and Amino Acids
Sp.
Mahan, Naber, and Vivian.
830.84† Vitamins
A.
Naber and Tyznik.
830.85† Lipids
W.
Palmquist.
830.86† Laboratory Methods in Nutrition
Sp.
Allred, Mahan, and Vivian.
830.87† Rumen Microbiology
Su.
Dehority.

898 G 1
Interdepartmental Seminar
in Nutrition and Food Technology
(See Interdepartmental Seminars.)

999 G Arr.
Research
Research for thesis or dissertation purposes only.
Anthropology

Office: 13 Page Hall, 65 South Oval Drive

Professors Bourguignon (Acting Chairman), Estel
Emeritus: Lehka, Messenger, and Williams; Adjunct
Professor Baby; Associate Professors Arewa, Callaghan,
Hughes, and Poirier; Assistant Professors Fiedl, Post,
Schwarz, and Sumner.

200 251 U 5
Introduction to Physical Anthropology
A, W, Sp. 5 cl.
Prereq.: 2nd yr. standing.
Recommended as first course for those planning to
take 201 and 202.
Not open to students with credit for 251.
A survey of man as a biological and cultural organism;
evolutionary theory; primate evolution from living and
fossil evidence; contemporary human population
adaptability. Poirier, Post, and Staff.

201 261 U 5
Introduction to Prehistory
Su, A, W, Sp. 5 cl.
Prereq.: 2nd yr. standing; 200 strongly recommended.
Not open to students with credit for 261.
A survey of world archaeology; the origin and
development of human culture as illustrated by
selected examples. Sumner and Staff.

202 20 U 5
Introduction to Cultural Anthropology
Su, A, W, Sp. 5 cl.
H202 (Honors) may be available to students enrolled in
a college Honors Program or by permission of dept.
Prereq.: 2nd yr. standing; 200 and 201 strongly
recommended.
Not open to students with credit for 210.
Comparative survey of tribal and peasant peoples in
the several world culture regions; culture concepts;
study of selected topics. Messenger and Staff.

412 4 U 4
Indians of the Americas
Sp. 4 cl.
Prereq.: 5 cr. hrs. anthro., or equiv. or permission of
instructor.
American Indian cultures of the time of European
conquest.

414 4 U 4
Ethnology of Asia
W. 4 cl.
Prereq.: 5 cr. hrs. of anthro., or equiv. or permission of
instructor.
A survey of the peoples of Asia; high civilizations and
tribal cultures; prehistoric origins of Asian cultures;
the distribution of physical types; languages; social
customs.

415 4 U 4
Ethnology of Africa
A, W. 4 cl.
Prereq.: 5 cr. hrs. of anthro., or equiv. or permission of
instructor.
Offered in cooperation with the Black Studies
Division.

The peoples of Africa south of the Sahara; distribution
of physical types; languages; cultural areas; West
Coast kingdoms as source of the American Negro.
Arewa.

500 U 3
Peoples and Cultures of Latin America
W. 3 cl.
Prereq.: 5 cr. hrs. of anthro., or equiv. or permission of
instructor.
The pre-Columbian background; contemporary races,
cultures, and social organization; the emergence of
Latin America as a distinct culture area in the modern
world. Schwarz.

505 U 4
Social Relations in Folk Societies
A. 4 cl.
Prereq.: 5 cr. hrs. of anthrop., or equiv, or permission
of instructor.
Not open to students with credit for 401.
Forms of social organization in simpler societies;
dynamics of social relations in such societies; a
comparison of simpler forms of social structure with
complex forms. Schwarz.

510 4 U 4
Culture Contact and Technological Change
Sp. 4 cl.
Prereq.: 202 and Soc. 101 or 201 or equiv. or permission
of instructor.
Consequences for folk societies of the d ffusion of
Euro-American culture; introduction of advanced
technology to underdeveloped areas; cultural aspects
of colonialism and military government. Hughes.

515 4 U 4
Religion in Folk Societies
W. 4 cl.
Prereq.: 5 cr. hrs. of anthro., or equiv. or permission of
instructor.
Not open to students with credit for 510.
World views in folk societies, emphasizing religion and
sacred beliefs; integration of these beliefs with social
organization and the arts. Bourguignon.

520 U 3
Culture Patterns and Personality
Sp. 3 cl.
Prereq.: Soc. 470 or equiv. or Psych. 320 or equiv. or
permission of instructor.
Not open to students with credit for 509.
Anthropological contributions to the field of social
psychology; variations in personality as associated
with variations in culture; the range of personality
differences within various cultures. Bourguignon.
525 U 4
Theory and Problems of Cultural Anthropology
W. 4 cl.
Prereq.: 20 cr. hrs. in allied subjects or permission of instructor.
Not open to students with credit for 570.
Major theoretical viewpoints in cultural anthropology; significance of the cultural approach; applied anthropology in psychology and other social sciences. Schwarz.

530 U 4
Fossil Man
W. 4 cl.
Prereq.: 200 or equiv., or 15 cr. hrs. in Biological Sciences or Geol. or permission of instructor.
Not open to students with credit for 450.
A comprehensive study of the fossil hominids; fossils of Homo sapiens and their relationship to other fossil hominids. Poirier.

535 U 4
Physical Variability of Modern Man
Sp. 4 cl.
Prereq.: 200 or equiv., or 15 cr. hrs. in biological sciences, including genetics, or permission of instructor.
Not open to students with credit for 452.
The racial classification of man on a biological basis; the evolution of Homo sapiens and the development of human variability; racial differences and mixtures. Post.

540 U 2
Osteometry
W. 1 hr. lec., 3-hr. lab.
Prereq. or concwr.: 330 or equiv. or permission of instructor.
Not open to students with credit for 453.
Laboratory measurements of human skeletons.

541 U 2
Anthropometry
Sp. 1 hr. lec., 3-hr. lab.
Prereq.: 200 or concwr.: 535 or equiv. or permission of instructor.
Not open to students with credit for 456.
Laboratory measurements of living human beings.

545 U 3
Research Methods in Physical Anthropology
A. 3 cl.
Prereq.: 15 cr. hrs. of anthro. or 10 cr. hrs. of anthro. and 10 cr. hrs. of closely related work, or permission of instructor.
Not open to students with credit for 640.
Methods used in the analysis and classification of man in both comparative and evolutionary approaches. Poirier and Post.

550 U 4
American Indian Prehistory
A. 4 cl.
Prereq.: 5 cr. hrs. of anthro., or equiv. or permission of instructor.
Not open to students with credit for 460.
A survey of American Indian archaeology; the origin and development of Indian culture from the first peopling of the continent to the coming of Europeans.

555 U 4
Principles of Research in Archaeology
Sp.
Prereq.: 201 or equiv. plus 5 additional cr. hrs. of anthro. or 10 cr. hrs. of work closely related to archaeological field research, and permission of instructor.
Not open to students with credit for 662.
Instruction in basic methods of archaeological analysis, including artifact typology and cultural classification; methods of excavation and recording; one-day or weekend field sessions. Baby.

565 U 8-16
Archaeological Training Expedition
Su. 8 cr. hrs. for either term.
(Full time in expedition camps.)
Prereq.: 555 or equiv. or 10 cr. hrs. of work closely related to archaeological field research, and permission of instructor.
Not open to students with credit for 664.
Joint expedition of The Ohio State University Department of Anthropology, and the Ohio State Museum, engaged in excavating prehistoric sites in Ohio; experience in archaeological field work. Baby and Staff.

575 U 4
Introduction to Anthropological Linguistics
W. 4 cl.
Prereq.: 10 cr. hrs. of anthro. or permission of instructor.
Not open to students with credit for 430.
Relations of language to social organization, world view, socialization, and cultural analysis. Callaghan.

693 U 1-4
Individual Studies
Prereq.: 30 cr. hrs. of anthro. or permission of instructor.
Not open to students with previous credit for alphabetical subdivisions of 693, Special Problems.

693.01 Theory
693.02 History
693.03 Anthropological Linguistics
693.04 Research Methodology
693.05 Prehistory
693.36 Ethnography
693.07 Physical Anthropology
693.08 Unclassified

694 U G 2-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Designed to give groups of students an opportunity to pursue special studies in topics not otherwise offered.

H783 U 3-5
Honors Course
Prereq.: 4th yr. standing with a grade of A in at least half of the anthro. courses and an average of E in the remainder; permission of the instructor under whose supervision the work is to be completed and the Honors Committee of the College.
At least 2 crs. are required of candidates for the degree Bachelor of Arts with distinction in anthro. Failure to receive a grade of B in this course is a disqualification for special honors. Repeatable to a maximum of 15 cr. hrs.

803  G 3
Seminars in Anthropology
Repeatable to a maximum of 30 cr. hrs., not more than nine of which shall be in any one of the following topics:
  a. Theory
  b. History
  c. Anthropological Linguistics
  d. Prehistory
  e. Ethnology
  f. Physical Anthropology
  g. Cultural Anthropology
  h. Unclassified

805  G 3-5
Seminars in Ethnology
A, W, Sp.  1 2-hr. cl.
Repeatable to a maximum of 30 cr. hrs., not more than five of which shall be in any one of the following topics:
  a. North America
  b. South America
  c. East Asia
  d. Southeast Asia
  e. Oceania
  f. South Asia
  g. Middle East
  h. Africa
  i. Europe
  j. Circumpolar

810  G 3-5
Seminars in Cultural Anthropology
A, W, Sp.  1 2-hr. cl.
Repeatable to a maximum of 30 cr. hrs., not more than 5 of which shall be in any one of the following topics.
  a. Nature of Culture
  b. Acculturation, Change, and Stability
  c. Culture and Personality
  d. Enculturation
  e. Social Organization
  f. Religious Behavior
  g. Field Methods in the Study of Culture
  h. Theory and Problems in Cultural Anthropology
  i. Peasant Cultures
  j. Cultural Evolution
  k. Human Ecology

820  G 3-5
Seminars in Physical Anthropology
A, W, Sp.  1 2-hr. cl.
Repeatable to a maximum of 30 hrs., not more than 5 of which shall be in any one of the following topics.
  a. Theory and Method in Physical Anthropology
  b. Serology
  c. Primate Structure and Behavior
  d. Fossil Man
  e. Osteometry
  f. Anthropometry
  g. Physical Variability of Man
  h. The Physical Anthropology of Selected World Culture Regions

830  G 3-5
Seminars in Prehistory
A, W, Sp.  1 2-hr. cl.
Repeatable to a maximum of 30 cr. hrs., not more than 5 of which shall be in any one of the following topics.
  a. Method and Theory in Archaeology
  b. North American Archaeology
  c. South American Archaeology
  d. European Archaeology
  e. Asian Archaeology
  f. African Archaeology
  g. Oceanic Archaeology
  h. Archaeology of High Civilizations
  i. Special Problems in Archaeology

840  G 3-5
Seminars in Anthropological Linguistics
A, W, Sp.  1 2-hr. cl.
Repeatable to a maximum of 30 cr. hrs., not more than 5 of which shall be in any one of the following topics.
  a. Animal Communication and Human Language
  b. Social Structure and Language
  c. Enculturation and Language
  d. Languages and Cultural Structuring of Perceptual Patterns
  e. Ethnography of Language
  f. Language as a Research Tool in Ethnography, Ethnology, and Cultural Anthropology

850  G 3
Seminars in Museology
A, W, Sp.  1 2-hr. cl.
Repeatable to a maximum of 9 cr. hrs., not more than 3 of which shall be in any one of the following topics.
  a. Introduction
  b. Problems
  c. Research Methods

896  G 1-3
Interdepartmental Seminar
in Polar and Alpine Studies
Sp.
(See under Interdepartmental Seminars.)

899  G 1-5
Interdepartmental Seminar
(See under Interdepartmental Seminars.)

993  G 3
Individual Studies
Repeatable to a maximum of 18 cr hrs., not more than 5 of which shall be in any one of the following topics.
  a. Theory
  b. History
  c. Anthropological Linguistics
  d. Research Methods
  e. Prehistory
  f. Ethnology
  g. Physical Anthropology
  h. Cultural Anthropology
  i. Unclassified
994 G 3
Group Studies
A, W, Sp. 1 2-hr. cl.
Repeatable to a maximum of 12 cr. hrs.; topics may not be repeated.
a. Theory
b. History
c. Anthropological Linguistics
d. Research Methods
e. Prehistory
f. Ethnology
g. Physical Anthropology
h. Cultural Anthropology
i. Unclassified

998 G Arr.
Research in Anthropology: Thesis
Research for thesis purposes only.

999 G Arr.
Research in Anthropology: Dissertation
Research for dissertation purposes only.

Arabic

Office: 248 Dieter Cunz Hall of Languages, 1841 Millikin Road

Professor Bulatkin (Chairman); Associate Professor Cadora; Assistant Professor Zwettler.

101 U 5
Introduction to Modern Literary Arabic
A. 5 cl., 3 lab. hrs.
Sound and writing systems, morphological patterns, basic sentences with brief dialogues.

102 U 5
Introduction to Modern Literary Arabic
W. 5 cl., 3 lab. hrs.
Prereq.: 101.
Continuation of morphological patterns and basic syntactic structures, with long dialogues and simple pieces of expository prose.

106 U 3
Conversational Arabic
A. 2 cl., 2 lab. hrs.
Prereq.: Permission of instructor.
Introduction to the phonology and grammar of the spoken language of educated urbanites of the Eastern Arab world.

107 U 3
Conversational Arabic
W. 2 cl., 2 lab. hrs.
Prereq.: 106 or permission of instructor.
Continuation of 106; analysis of and drill in morphological and syntactic patterns; expansion of vocabulary; practice in conversation.

110 U 10
Intensive Elementary Arabic
Su, A, W, Sp. 10 cl.
Prereq.: Permission of dept.
Not open to students with credit for 101 or 102.
Elementary Arabic for students wishing to acquire the basic skills in one quarter; intensive drill in forms, syntax, vocabulary, and idioms; equivalent to 101 and 102.

112 U 5, 10, 15
Intensive Modern Literary Arabic
Su. 5 cl. Enrollment limited to 25 students.
Prereq.: Permission of chairman.
Full time of student and full fees required.
Equiv. of 101, 102, and 601. Students with credit for 101 or the equiv. may not register for more than 10 hrs. Students with credit for 101 and 102 or the equiv. may not register for more than 5 hrs. Students with credit for 601 or the equiv. may not register for credit.
Elementary and intermediate literary Arabic; intensive drill in forms, syntax, vocabulary and idioms; reading of selected material in modern Arabic.

193 U 1-15
Individual Studies
Prereq.: Permission of dept.
Repeatable to a maximum of 30 cr. hrs.

194 U 1-15
Group Studies
Prereq.: Permission of dept.
Repeatable to a maximum of 30 cr. hrs.

271 U 3
Introduction to Arabic Literature in Translation
A. 3 cl.
Prereq.: Engl. 100 or equiv.
A general survey of classical Arabic literature in its historical and cultural context.

272 U 3
Medieval Arabic Literature in Translation
W. 3 cl.
Prereq.: Engl. 100 or equiv.
A general survey of the major genres, movements, and masterpieces of medieval Arabic literature; literary interrelationships in the west.

273 U 3
Modern Arabic Literature in Translation
Sp. 3 cl.
Prereq.: Engl. 100 or equiv.
A general survey of modern Arabic literature, emphasizing the impact of western literary concepts.

401 U 5
Intermediate Conversational Arabic
Sp. 2 cl., 3 lab hrs.
Prereq.: 107.
Intensive practice in speaking Arabic with emphasis on various cultural aspects of Arab life.
Modern Literary Arabic I
Sp. 5 cl., 3 lab. hrs.
Prereq.: 602.
Presentation of complex morphological forms and reintroduction and expansion of the basic syntactic structures of modern literary Arabic with readings on various aspects of Arabic culture.

Modern Literary Arabic II
A. 5 cl., 3 lab. hrs.
Prereq.: 601.
Review of morphology and introduction of complex syntactic structures found in journalistic and formal expository writings.

Modern Literary Arabic III
W. 5 cl., 3 lab. hrs.
Prereq.: 602.
Selected readings on a wide range of topics in a variety of genres and styles; practice in oral comprehension; conversation; and controlled composition.

Modern Literary Arabic IV
Sp. 5 cl., 3 lab. hrs.
Prereq.: 603.
Continuation of Arabic 603.

Modern Literary Arabic V
A. 5 cl., 3 lab. hrs.
Prereq.: 604.
Selected readings on social, political, economic, and intellectual aspects of Arab life; oral and written compositions on selected topics.

Classical Arabic I
Sp. 5 cl.
Prereq.: 602.
Elements of Classical and Medieval Literary Arabic grammar; selected readings from Eastern Arabic literary works.

Classical Arabic II
A. 5 cl.
Prereq.: 608.
Selected readings from Western (especially Spanish) Arabic literary works.

Introduction to the History of the Arabic Language
W. 3 cl.
Prereq.: Permission of instructor.
A non-technical survey of the Arabic language in its social and historical setting. Cadora.

Contemporary Arabic Readings
W. 5 cl.
Prereq.: 603.
Reading of contemporary expository prose selections on a variety of technical subjects such as politics, anthropology, religion, literature, language, and social mores. Cadora.

Contemporary Arabic Short Stories
Sp. 5 cl.
Prereq.: 603.
Reading of a selection of modern short stories by some of the representative writers in the Arab world. Cadora.

Contemporary Arabic Poetry
Sp. 5 cl.
Prereq.: 603.
Cadora.

Introduction to the Qur'an
W. 5 cl.
Prereq.: 609.
A linguistic and cultural analysis of selected chapters from the Qur'an. Zwettler.

Classical Arabic Prose
Sp. 5 cl.
Prereq.: 609.
Selected readings reflecting the evolution of Arabic prose literature from its origins to the Abbasid period. Zwettler.

Group Studies in Arabic
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.

Individual Studies in Arabic
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

Group Studies in Arabic
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
Architecture

Office: 171 Brown Hall, 190 West 17th Avenue

Professors Baumer (Emeritus), Borchers, Clark, Coddington, Konda, Phillips, Ronan (Emeritus), Tilley, Whitaker, and Wilson (Emeritus); Associate Professors Brosser, Brinkers, Dippin, Passe, and Young (Chairman); Assistant Professors Markwood and Marzuki.

221 U 3
Architectural Graphics
A. 3 cl.
Open only to students enrolled in the School of Architecture.
Descriptive geometry and related applications of orthographic projection in architecture; lettering; perspective; shades and shadows.

222 U 3
Construction Materials
W. 3 cl.
Open only to students enrolled in the School of Architecture.
Basic properties and production of architectural building materials; theory of working drawings and dimensioning; calculations and drawings of site work.

223 U 3
Construction Methods
Sp. 3 cl.
Prereq.: 222.
Detailing of building sections, simple enclosures, and structural assemblies; analysis of acoustics.

241 U 5
Architectural Design
A. 2 cl., 12 lab. hrs.
Open only to students enrolled in School of Architecture. Not open to students with credit for 111.
Principles of perception, graphic communication, and form organization; composition in two and three dimensions.

242 U 5
Architectural Design
W. 2 cl., 12 lab. hrs.
Prereq.: 221 and 241.
Not open to students with credit for 112.
The use of color in graphic communication and form organization; functional and aesthetic arrangement of physical objects.

243 U 5
Architectural Design
Sp. 2 cl., 12 lab. hrs.
Prereq.: 242.
Not open to students with credit for 113.
Function and scale as factors in architectural design; expression and organization of spaces for human occupancy.

321 U 3
Wood and Masonry Construction
A. 3 cl.
Not open to students with credit for 521.
Building loads; wood structural elements and their connections; masonry construction principles and procedures; foundations and footings; exercises in structural detailing and computations.

322 U 3
Steel and Concrete Construction
W. 3 cl.
Prereq.: 321.
Not open to students with credit for 522.
Steel structural elements and their connections; trusses; reinforced concrete structural elements; exercises in structural detailing and computations.

323 U 3
Application of Construction Principles
Sp. 3 cl.
Prereq.: 322 and 663.
Not open to students with credit for 523.
Lectures, discussions, and field investigations of construction procedures; specifications; scheduling and estimating; site improvements.

341 U 5
Architectural Design
A. 2 cl., 12 lab. hrs.
Prereq.: 243; prereq. or concur. 321.
Not open to students with credit for 211.
Influence of the nature of materials and of technology on the design of objects, furnishings, and major architectural elements.

342 U 5
Architectural Design
W. 2 cl., 12 lab. hrs.
Prereq.: 341; prereq. or concur. 322.
Not open to students with credit for 212.
Design of the building envelope; integration of interior spaces and exterior form and expression.

343 U 5
Architectural Design
Sp. 2 cl., 12 lab. hrs.
Prereq.: 342; prereq. or concur. 661.
Not open to students with credit for 213.
Architectural expression of diverse and complex activities; relation of structure to spatial organization; expression of function and meaning in the building.

393 U 1-5
Individual Studies in Architecture
Prereq.: Permission of School.
Repeatable to a maximum of 15 cr. hrs.
For students not majoring in Arch. who desire to pursue special studies in the field of Architecture.
394 U 1-5
Group Studies in Architecture
Prereq.: Permission of School
Repeatable to a maximum of 15 cr. hrs.
For students not majoring in Arch. who desire to pursue special studies in the field of Architecture.

441 U 5
Architectural Design
A. 2 cl., 12 lab. hrs.
Prereq.: 334; prereq. or concur. 662.
Not open to students with credit for 511.
Site design; environmental influences on building form and location; vehicular circulation; building groups.

442 U 5
Architectural Design
W. 2 cl., 12 lab. hrs.
Prereq.: 441; prereq. or concur. 663.
Not open to students with credit for 512.
Design of a major building emphasizing the integration of the functional, technical, and aesthetic aspects of design with particular attention to structure, environmental control, and mechanical circulation.

443 U 5
Architectural Design
Sp. 2 cl., 12 lab. hrs.
Prereq.: 442; prereq. or concur. 333.
Not open to students with credit for 513.
Recognition of community forces affecting architectural form; expression of social and cultural values; integration of new buildings with existing neighborhoods; selection among competing design values.

501 U 3
History of Ancient Architecture
A. 3 cl.
Analysis of primitive structures and ancient architecture before the Christian era to illustrate basic principles of shelter, natural building techniques, and organization of space. Borchers.

502 U 3
History of Medieval and Renaissance Architecture
W. 3 cl.
Analysis of architecture from the early Christian era through the Baroque, related to the spirit of the age, social organization, and increasing structural knowledge. Borchers.

503 U 3
History of Contemporary Architecture
Sp. 3 cl.
Analysis of architecture from the Industrial Revolution to the present, reflecting changes of society, fashion and architectural practice; new materials and structural techniques. Borchers.

561 U 3
Lighting and Electrical Equipment in Architecture
Sp. 3 cl.
Prereq.: Physics 112.
Lighting fundamentals; light sources and their characteristics; lighting applications; electricity and electrical circuits; electrical materials and installation methods; exercises in design of electrical wiring.

662 U 3
Space Conditioning in Architecture
A. 3 cl.
Prereq.: Physics 112.
Environmental comfort; heat loss and gain; principles of heating and cooling; space conditioning; heating by electricity.

663 U 3
Mechanical Systems in Architecture
W. 3 cl.
Prereq.: Physics 112.
Air handling systems; direct space conditioning; fire protection; water and plumbing systems; principles of storm and sanitary drainage; waste treatment; cleaning and disposal systems.

689 U 2
Inspection Trip
Sp.
Prereq.: Arch., or Land Arch., 3rd or 4th yr. standing.
Taken between Winter and Spring Quarters; trip to inspect architects' offices and buildings in Ohio and neighboring states; written report required. Fee.

693 U G 1-5
Individual Studies in Architecture
Prereq.: Permission of School.
Repeatable to a maximum of 15 cr. hrs.
For students majoring in Arch. desiring to pursue special studies not offered in the fixed curriculum.

694 U 1-5
Group Studies in Architecture
Prereq.: Permission of School.
Repeatable to a maximum of 15 cr. hrs.
For students majoring in Arch. desiring to pursue special studies not offered in the fixed curriculum.

700 U 3
Allied Arts
A. 3 cl.
Prereq.: Arch. senior standing.
Analysis of arts related to architecture and the expression of the nature of materials in architectural ornament, furniture and furnishings, and the garden. Borchers.

724 U G 5
Structural Design in Architecture
W. 5 cl.
Prereq.: B.S. in Arch. or permission of School.
Steel structural systems; analysis and design of components by current specifications; inelastic behavior of continuous frames; connections and fabrication limitations.
Structural Design in Architecture
Sp. 5 cl.
Prereq.: 725.
Reinforced concrete structural systems analysis and design of continuous frameworks by ultimate strength specifications, including deformations; prestressed concrete systems.

Practice of the Design Professions
A. 3 cl.
Prereq.: Admission to grad. curriculum in Arch. or permission of instructor.
History of professions and their clients; the professional's interaction with society and government; substantive aspects of practice, including organization and communication; legal aspects of construction.

Practice of the Design Professions
W. 3 cl.
Prereq.: Admission to grad. curriculum in Arch. or permission of instructor.
Management of construction contracts; bonds and insurance; operational procedures during negotiation and construction phases; arbitration; office and project case studies.

Seminar
A. 2 cl.
Prereq.: Admission to grad. curriculum in Arch. or permission of instructor.
Seminars and related research on contemporary problems, issues, and concerns in architectural theory and practice.

Seminar
W. 2 cl.
Prereq.: Admission to grad. curriculum in Arch. or permission of instructor.
Continuation of 801.

Seminar
Sp. 2 cl.
Prereq.: Admission to grad. curriculum in Arch. or permission of instructor.
Continuation of 802.

Construction Systems Design
A. 3 cl., 10 lab. hrs.
Prereq.: 725.
Comparative study of the behavior of construction systems; properties and specifications of systems materials; interface consequences of complex assemblies; industrialized buildings.

Construction Systems Design
W. 3 cl., 10 lab. hrs.
Prereq.: 831.
Methodology of design programming; processes for solving complex functional relationships; design decision-making and management tools; network planning and scheduling; communication.

Construction Systems Design
Sp. 3 cl., 10 lab. hrs.
Prereq.: 832.
Systems product and component development; dynamic, major institutional or industrial project; structural modeling.

Advanced Construction Systems Design
A. 3 cl., 10 lab. hrs.
Prereq.: 833.
Sub-systems design at building scale; detailed behavior considerations of structure, enclosure, comfort and safety sub-systems.

Advanced Construction Systems Design
W. 3 cl., 10 lab. hrs.
Prereq.: 824.
Production as design feedback, materials handling, processing, assembly, distribution and installation; macrosystems, utilities, transportation.

Advanced Construction Systems Design
Sp. 3 cl., 10 lab. hrs.
Prereq.: 835.
Obligations to systems users, society and the environment; optimization, economic justification; summary project of urban proportions.

Advanced Architectural Design
A, W, Sp. 15 lab. hrs.
Prereq.: Admission to grad. curriculum in Arch. or permission of Graduate Committee.
Not open to students with credit for 811.
Studies in design methods stressing coordination and expression of technical requirements, human needs and values, and aesthetic qualities; application in architectural projects of considerable complexity and scope.

Advanced Architectural Design
A, W, Sp. 15 lab. hrs.
Prereq.: 811.
Not open to students with credit for 812.
Continuation of 811; development of projects requiring a high level of aesthetic attainment.

Advanced Architectural Design
A, W, Sp. 15 lab. hrs.
Prereq.: 842.
Not open to students with credit for 813.
Continuation of 842; design of projects requiring integration with other disciplines.
844    G 5
Advanced Architectural Design
A.  15 lab. hrs.
Prereq.: 843.
Not open to students with credit for 814.
Advanced studies and individual research; development of independent design projects.

845    G 5
Advanced Architectural Design
W.  15 lab. hrs.
Prereq.: 844.
Not open to students with credit for 815.
Continuation of 844.

846    G 5
Advanced Architectural Design
Sp.  15 lab. hrs.
Prereq.: 845.
Not open to students with credit for 816.
Continuation of 845.

899    G 1-5
Interdepartmental Seminar
(See under interdepartmental seminars.)

993    G 1-5
Individual Studies in Architecture
Prereq.: Grad. standing.
Repeatable to a maximum of 15 cr. hrs.
993.01 Environmental Design
993.02 Construction Systems and Technology
993.03 Architectural History and Criticism
993.04 Management and Professional Practice
993.05 Architectural Photogrammetry
993.06 Architectural Education
993.07 Otherwise Unclassified

994    G 1-5
Group Studies in Architecture
Prereq.: Grad. standing.
Repeatable to a maximum of 15 cr. hrs.
994.01 Environmental Design
994.02 Construction Systems and Technology
994.03 Architectural History and Criticism
994.04 Management and Professional Practice
994.05 Architectural Photogrammetry
994.06 Architectural Education
994.07 Otherwise Unclassified

999    G Arr.
Research in Architecture
Research for thesis purposes only.

Art
Office: 440 Hopkins Hall, 128 North Oval Drive
Professors Ruzicka (Chairman), Black, Chafetz, Csuri, Freeman, Friley, R. Gatrell, Hall, King, and Sherman;
Associate Professors Baughman, Fristick, M. Gatrell, Hehner, Krueger, Krumm, and Wynne; Assistant
Professors Heinze, Katz, Schwartz, and Wright;
Instructors Camp, Chipperfield, Farley, Sunderson, Kolbenschlag, Lawson, Raabe, Sacco, Shineman, Tomlinson, and Zaima.

170    U 5
Drawing and Fine Arts Orientation
A, Sp.  5 2-hr. labs., 1 lec.
Open only to majors in the Divisions of Art, Art Education, Design, and History of Art, and to majors in Medical Illustration, except by permission of the Division of Art chairman.
Not open to students with credit for Fine Arts 170.
Introduction to studio activity, laboratory experience, with emphasis on drawing and design; lectures and discussion about field of specialization in art. Fee.

171    U 5
Drawing
A, W.  5 2-hr. labs.
Prereq.: 170 or Fine Arts 170 or permission of instructor.
Not open to students with credit for Fine Arts 171.
The use of various drawing media with continuation of the underlying principles as utilized in 170; laboratory and field problems. Fee.

175    U 5
Painting
W, Sp.  5 2-hr. labs.
Prereq.: 171 or Fine Arts 171.
Not open to students with credit for Fine Arts 175.
Emphasis on the use of color, drawing, and design in the development of a personal idiom of expression; opaque media; laboratory and field problems. Fee.

180    U 5
Sculpture
Su, A, W, Sp.  3 3-hr. labs., 6 hrs. arr.
Open only to majors in the Divisions of Art, Art Education, Design, and History of Art, and to majors in Medical Illustration, except by permission of the Division of Art chairman.
Not open to students with credit for 581 or Fine Arts 180 or 581.
An introduction to the principles of sculpture, emphasizing basic forming processes and materials. Fee.

190    U 3
Introduction to Fine Art Activities
Not open to candidates for the degrees B.F.A. and B.S. in Ed. with Art, Design, or Hist. of Art as a major,
or to students with credit for 170 or 290, or Fine Arts 170, 190, or 290.
An investigation of visual form, its perception, development, and use through studio experience. Fee.
240 U 3
Elementary Ceramic Art
Su, A, W, Sp. 1 cl., 6 lab. hrs.
Not open to majors in Art, Art-Educ., Design, or Hist. of Art or to students with credit for Fine Arts 240. Introduction to the art phases of the ceramic field; laboratory practice in the hand forming process. Fee.

242 U 3
Introduction to Ceramic Art
Su, A, W, Sp. 1 cl., 6 lab. hrs.
Open only to majors in Art, Art-Educ., Design and Hist. of Art.
Not open to students with credit for Fine Arts 242. Introduction to the Ceramic Arts through the use of the potter's wheel with lectures covering a broad survey of the field of ceramics.

244 U 3
Ceramic Art Laboratory I
Su, A, W, Sp. 9 lab. hrs.
Prereq.: 240 or 242 or Fine Arts 240 or 242, or permission of instructor.
Not open to students with credit for Fine Arts 244. Laboratory practice utilizing the potter's wheel as a basis for more involved forming processes. Fee.

245 U 5
Ceramic Art Laboratory II
A, W, Sp. 15 lab. hrs.
Prereq.: 244 or Fine Arts 244 or permission of instructor.
Not open to students with credit for Fine Arts 245. Laboratory practice in designing ceramic wares with emphasis on the hand forming processes. Fee.

246 U 3
Ceramic Art Laboratory III
Su, A, W, Sp. 9 lab. hrs.
Prereq.: 245 or Fine Arts 245 or permission of instructor.
Not open to students with credit for Fine Arts 246. Fee.

272 U 5
Life Drawing
Su, A, W, Sp. 5 3-hr. labs.
Prereq.: 171 or Fine Arts 171.
Not open to students with credit for Fine Arts 272. Drawing from the human figure, using a variety of media; discussion of drawing as related to important styles; laboratory problems and field trips. Fee.

273 U 5
Oil Painting
Su, A, W, Sp. 5 3-hr. labs.
Prereq.: 175 or Fine Arts 175.
Not open to students with credit for Fine Arts 273. Painting from still life, with the object of developing the color sense and acquiring directness of presentation; problems in the organization and execution of pictures. Fee.

274 U 5
Water Color Painting
Sp. 5 3-hr. labs.
Prereq.: 171 or Fine Arts 171.
Not open to students with credit for Fine Arts 274. Special emphasis on water color's unique capacities for personal expression; problems in landscape, still life, and the figure. Fee.

276 U 5
Introduction to Printmaking
Su, A, W, Sp. 5 2-hr. labs.
Prereq.: 171 or Fine Arts 171.
Not open to students with credit for Fine Arts 276. The basic tools, methods, and materials of printmaking; study and examination of original prints. Fee.

280 U 5
Construction Sculpture
A, W. 3 3-hr. labs., 6 hrs. arr.
Prereq.: 180 or Fine Arts 180.
Not open to students with credit for Fine Arts 280. Study of three-dimensional form through the use of power and hand tools. Fee.

281 U 5
Modeling and Carving
Sp. 3 3-hr. labs., 6 hrs. arr.
Prereq.: 180 or Fine Arts 180.
Not open to students with credit for Fine Arts 281. An intermediate studio course dealing with modeled and carved sculpture in media such as clay, wax, wood, plaster, and stone. Fee.

282 U 5
Life Sculpture
A, W. 3 3-hr. labs., 6 hrs. arr.
Prereq.: 180 and 272 or Fine Arts 180 and 272, or permission of instructor.
Not open to students with credit for Fine Arts 282 or (562). Aspects of the human form studied in relation to the materials of sculpture; experimentation in a choice of materials: clay, wax, cement, plaster, and metal. Fee.

290 U 5
Fundamentals of Art
Su, A, W, Sp. 5 2-hr. labs.
Not open to majors in Art, Art-Educ., Design, or Hist. of Art, or to students with credit for Fine Arts 290.
An introduction to art through studio experience, exploring two-dimensional and three-dimensional media, by an analysis of form, and expression. Fee.

294 U 5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Group studies for students in specialized programs.
295† U 3
Drawing
A. 6-hr. lab.
Prereq.: Art, 2nd yr. standing.
Not open to students with credit for Fine Arts 295.
Visual fundamentals as expressed through drawings; emphasis upon configuration and visual relationships. Fee.

296† U 3
Drawing from Life
W. 6-hr. lab.
Prereq.: Arch. 2nd yr. standing and 295 or Fine Arts 295.
Not open to students with credit for Fine Arts 296.
Drawing from the human figure, study of posture and planar relationships in two and three dimensional space. Fee.

297† U P 3
Form Organization
A, Sp. 3 2-hr. labs.
Prereq.: Dent. 1st yr. standing or Arch. 2nd yr. standing.
Not open to students with credit for Fine Arts 297.
Drawing and sculpture, with emphasis on visual organization. Fee.

411 U 3
Ceramic Composition
A. 2 cl., 2 2-hr. labs.
Not open to students with credit for Fine Arts 441.
Ceramic computations course for art students; methods of representing ceramic composition; laboratory study and discussion of raw materials and their uses in bodies and glazes.

442 U 3
Ceramic Composition
W. 2 cl., 2 2-hr. labs.
Prereq.: 441 or Fine Arts 441.
Not open to students with credit for Fine Arts 442.
Laboratory practice in development of the aesthetic aspects of ceramic glazes and bodies; methods of presenting their fired composition and correction faults. Fee.

443 U 3
Ceramic Composition
Sp. 2 cl., 2 2-hr. labs.
Prereq.: 442 or Fine Arts 442.
Not open to students with credit for Fine Arts 443.
Laboratory study and development of individual projects leading to creation of ceramic compositions of aesthetic merit; further studies in texture and color. Fee.

468 U 5
Elements of Weaving
A, W, Sp. 5 2-hr. labs.
Prereq.: 290 or Design 251 or Fine Arts 251 or 290, or permission of instructor.
Not open to students with credit for Fine Arts 468.
An introduction to the creative and functional aspects of handweaving; experience in the construction, weaving, threading, and the manipulation of both standard and modern design techniques.

469 U 3
Weaving
A, W, Sp. 3 2-hr. labs.
Prereq.: 468 or Fine Arts 468.
Not open to students with credit for Fine Arts 469.
The use of weaving materials and equipment, with an emphasis on creative design of functional and decorative fabrics.

550 U 3
Development of Interior Design I
A. 3 cl.
Prereq.: History of Art 210, 211, and 212 or Fine Arts 210, 211, and 212, or Hist. 101 and 102 or equiv.
Not open to students with credit for Fine Arts 550.
A survey of European Interiors from 1300 to 1850, followed by a study of French design from Louis XIII through the Empire period. Fee.

551 U 3
Development of Interior Design II
W. 3 cl.
Prereq.: 550 or Fine Arts 550.
Not open to students with credit for Fine Arts 551.
A study of the Tudor, Jacobean, Carolean, Georgian, and Regency Periods—considering the aesthetic, political, and economic implications. Fee.

552 U 3
Development of Interior Design III
Sp. 3 cl.
Prereq.: 551 or Fine Arts 551.
Not open to students with credit for Fine Arts 552.
A survey of American interiors since 1850, followed by a study of the development of interior design in the western world since 1880; field trips. Fee.

570 U 5
Advanced Life Drawing
Su, A, W, Sp. 5 3-hr. labs.
Prereq.: 272 or Fine Arts 272.
Not open to students with credit for Fine Arts 570.
Advanced problems in drawing from life and figure composition. Fee.

573 U 5
Advanced Oil Painting
Su, A, W, Sp. 5 3-hr. labs.
Prereq.: 272 and 273 or Fine Arts 272 and 273.
Not open to students with credit for Fine Arts 573.
Painting in oil from still life and the costume model; advanced problems in composition. Fee.

580 U G 5
Ceramic Sculpture
W. 3 3-hr. labs., 6 hrs. arr.
Prereq.: 281 or Fine Arts 281.
Not open to students with credit for Fine Arts 580.
An advanced level studio course dealing with various methods of building and firing clay sculpture; emphasis on clay's unique structural and forming possibilities. Fee.
581 U G 5
Welded and Forged Sculpture
Sp. 3 3-hr. labs., 6 hrs. arr.
Prereq.: 280 and 281 or Fine Arts 280 and 281.
Not open to students with credit for Fine Arts 581.
An introduction to metal construction in sculpture by oxyacetylene welding, arc welding, and forming
methods with forge and hammer. Fee.

582 U G 5
Sculpture Foundry
A. 3 3-hr. labs., 6 hrs. arr.
Prereq.: 240, 281, and 282 or Fine Arts 280, 281 and 282.
Not open to students with credit for Fine Arts 582.
An introduction to traditional and experimental
methods used in the development and casting of
sculpture; experience in the operation of foundry
material and equipment. Fee.

591 U 2 5
Studio Practice I
Prereq.: Permission of instructor.
Open only to juniors and seniors majoring in Art.
Each decimal subdivision repeatable to a maximum of 20 cr. hrs.
Intermediate studio practice in the student's major
field, following and continuing the basic program of
courses undertaken in the first two years.

591.03 Ceramics
591.06 Graphics
591.07 Weaving
591.09 Drawing
591.10 Painting
591.11 Sculpture

640 U G 5
Studio Kilns and Firing Practices
Sp. 15 lab. hrs.
Prereq.: Permission of instructor.
Not open to students with credit for Fine Arts 640.
The design, construction, and use of simple gas and
electric ceramic studio kilns; practice in the various
types and methods of firing. Fee.

641 U G 5
Ceramic Reproduction Processes
W. 15 lab. hrs.
Prereq.: Permission of instructor.
Not open to students with credit for Fine Arts 641.
Studies in the designing, fabrication, and uses of
models and molds in such multiple ceramic
production processes as casting, jiggering, and
pressing. Fee.

642 U G 5
Advanced Ceramic Laboratory
A. 15 lab. hrs.
Prereq.: Permission of instructor.
Not open to students with credit for Fine Arts 642.
Design and construction of large ceramic art forms.
Fee.

670 U G 5
Comprehensive Drawing
A. 3 3-hr. labs.
Prereq.: 272 or Fine Arts 272.
Not open to students with credit for Fine Arts 670.
Exploration of the structure and interrelationships of
visual form in drawing, painting, and sculpture;
examination of the principal historical modes of
drawing. Fee.

677 U G 5
Graphic Processes
W. 5 3-hr. labs.
Prereq.: 175 or Fine Arts 175.
Open to Grad. students with 15 cr. hrs. in drawing and
painting.
Not open to students with credit for Fine Arts 677.
Lithography and serigraphy explored by students as
part of their professional experience in print-making.
Gatrell. Fee.

678 U G 5
Graphic Processes
A. 5 3-hr. labs.
Prereq.: 175 or Fine Arts 175.
Open to Grad. students with 15 cr. hrs. in drawing and
painting.
Not open to students with credit for Fine Arts 678.
Woodcuts, etchings, and engravings explored by
students as means for individual expression. Chaletz.
Fee.

680† U G 5
Large Sculpture Projects
Sp. 5 3-hr. labs.
Prereq.: 280 and 281 or Fine Arts 280 and 281.
Not open to students with credit for Fine Arts 680.
An advanced level studio course dealing with
large-scale sculpture constructed in relation to
architecture. Fee.

681 U G 5
Advanced Figurative Sculpture
A, W. 3 3-hr. labs., 6 hrs. arr.
Prereq.: 281 and 282 or Fine Arts 281 and 282.
Not open to students with credit for Fine Arts 681.
An advanced level studio course dealing with
individual study of the relationship of sculpture to the
model; various media. Fee.

691 U G 5
Studio Practice II
Prereq.: Permission of instructor.
Open only to grad. students or seniors majoring in Art.
Each decimal subdivision repeatable to a maximum of 20
hr. hrs.
Advanced studio practice in the student's major field
beyond 591.

691.03 Ceramics
691.06 Graphics
691.07 Weaving
691.09 Drawing
691.10 Painting
691.11 Sculpture
691.13 Interior Design
693  U  G 2-5
Individual Studies
Prereq.: Permission of instructor.
Each decimal subdivision repeatable to a maximum of 45 cr. hrs.
Advanced study for students in specialized programs.
693.03  Ceramics
693.06  Printmaking
693.07  Weaving
693.09  Drawing
693.10  Painting
693.11  Sculpture

694  U  G 2-5
Group Studies
Prereq.: Permission of instructor.
Each decimal subdivision repeatable to a maximum of 15 cr. hrs.
Group studies for students in specialized programs.
694.03  Ceramics
694.06  Printmaking
694.07  Weaving
694.09  Drawing
694.10  Painting
694.11  Sculpture
694.12  Intermedia

695  U  G 2
Professional Problems and Issues for Studio Artists I
A.  1 2-hr. cl.
Not open to students with credit for Fine Arts 695.
A seminar dealing with teaching disciplines and research specializations of studio faculty and faculty
from related areas of study.

696  U  G 2
Professional Problems and Issues for Studio Artists II
Sp.  1 2-hr. cl.
Not open to students with credit for Fine Arts 696.
Current events, directions, and movements in art.

698  U  G 5-15
Study Tour in Art
Prereq.: 175 and 180, or Fine Arts 175 and 180, or permission of instructor.
First hand investigation of source material to be found abroad; including meetings and discussions with
international members of the art community.

879  G 2
Perception-Art Form Seminar
W.  2 cl.
Not open to students with credit for Fine Arts 879.
Seminar utilizing the Ames Visual Demonstration
Center as a basis for discussion of perception and aesthetic form. Sherman.

881  G 3-5
Advanced Sculpture
A.
Not open to students with credit for Fine Arts 881.
Advanced sculpture with a wide range of choice in media. Fee.

885  G 3-5
Advanced Sculpture
W.
Prereq.: 881 or Fine Arts 881.
Not open to students with credit for Fine Arts 885.
Continuation of 881. Fee.

887  G 3-5
Advanced Sculpture
Sp.
Prereq.: 885 or Fine Arts 885.
Not open to students with credit for Fine Arts 887.
Continuation of 885. Fee.

891  G 2-5
Studio Practice III
Prereq.: Grad. standing in Art.
Each decimal subdivision repeatable to a maximum of 45 cr. hrs.
Graduate level studio practice in the student's major field.
891.03  Ceramics
891.06  Graphics
891.09  Drawing
891.10  Painting
891.11  Sculpture

940  G 3-5
Research Problems in Ceramics
Repeatable to a maximum of 45 cr. hrs. Fee.

971  G 3-5
Research Problems in Printmaking
Repeatable to a maximum of 45 cr. hrs. Fee.

980  G 3-5
Research Problems in Sculpture
Repeatable to a maximum of 45 cr. hrs. Fee.

991  G 2-5
Studio Practice IV
Prereq.: Grad. standing in Art.
Each decimal subdivision repeatable to a maximum of 45 cr. hrs.
Advanced graduate studio practice in the student's major field.
991.03  Ceramics
991.06  Graphics
991.09  Drawing
991.10  Painting
991.11  Sculpture
993  G 1-5
Individual Studies
Each decimal subdivision repeatable to a maximum of
45 cr. hrs.

993.03 Ceramics

993.06 Printmaking

993.10 Painting

993.11 Sculpture

994  G 1-5
Group Studies
Prereq.: Permission of instructor.
Each decimal subdivision repeatable to a maximum of
15 cr. hrs.
Group studies for students in specialized programs.

994.03 Ceramics

994.06 Printmaking

994.10 Painting

994.11 Sculpture

994.12 Intermedia

999  G Arr.
Research in Art
Research for thesis and dissertation purposes only.

Art Education

Office: 340 Hopkins Hall, 128 North Oval Drive

Associate Professor Marentz (Chairman); Professor
Serville; Associate Professors Duncan, Effland, and
Orr; Assistant Professors Arnold, Cardinale, Clark,
Kenn, and Norris; Instructor Linehan.

200  U 4
Orientation to Art Education
W. 2 cl., 2 2-hr. labs.
Prereq.: 2nd yr., standing.
Not open to students with credit for Fine Arts 200.
Historical and current issues in art education,
laboratory experience in preparing teaching materials,
tryout and assessment of teaching skills. Fee.

210  U 5
Beginning Jewelry and Metalsmithing
A, W, Sp. 5 2-hr. cl., 5 hrs. arr.
Prereq.: 15 cr. hrs. in Art studio courses or permission of
instructor.
Fundamental knowledge of and processes for
manipulating metals for the design and creation of
jewelry and metalwork.

401  U 5
Laboratory and Field Experience in Art Education
A, W. 5 3-hr. labs.
Prereq.: 400, Ed. P., standing, and successful completion
of 5 studio courses.
Not open to students with credit for Fine Arts 401.
Laboratory problems for the teaching of art studio
criticism and history; supervised field experience as
teacher aide in an elementary school.

402  U 5
Laboratory and Field Experience in Art Education
W, Sp. 5 3-hr. labs.
Prereq.: 401.
Not open to students with credit for Fine Arts 402.
Laboratory problems for teaching of art studio criticism
and history; supervised field experience in recreation
centers or settlement houses.

500  U 3
Art for Elementary Teachers
Su, A, W, Sp. 3 2-hr. labs.
Prereq.: Art 290 or Fine Arts 290.
Not open to students with credit for Fine Arts 500.
Problems of teaching in terms of personal knowledge
about art, insight into children's art work, and
understanding of elementary school curriculum. Fee.

587  U 4
Teaching Art Elementary 3-2

587-A Teaching Art Secondary Ed.

587-B Teaching Art Secondary Ed.

587-C Teaching Art Secondary Ed.

603  U 4
Theory of Art Education
A, Sp. 5 cl.
Prereq.: 402, Ed. 435, and 461.
Not open to students with credit for Fine Arts 603.
A consideration of the formal and informal theories in
art education, with emphasis on building a theoretical
basis for education in the arts.

604  U G 3-5
Multi-Media Materials Development
for Art Education
Development and presentation of instructional
packages for art education; practical audio-visual
instruction and theory of teaching materials
development in the context of a multi-media laboratory.

610  U G 5
Advanced Jewelry and Metalsmithing
W, Sp. 5 2-hr. cl., 5 hrs. arr.
Prereq.: 210 or permission of instructor.
Extends the skills in manipulating metals and the
concepts of designing and executing jewelry and
metalwork.
691  U G 2-5
Applied Research in Art Education
Repeatable to a maximum of 10 cr. hrs.
Studies in empirical, philosophical, curriculum or studio problems in Art Education.

693  U G 2-5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 45 cr. hrs.
Advanced study for students in specialized programs.

694  U G 2-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Group studies for students in specialized programs.

804  G 3-5
Issues in Art Education
An introduction to alternative conceptions of the functions of art education within the context of general education and the contemporary culture milieu.

805  G 5
Empirical Problems in Art Education
A.
An introduction to the language, methodology, and application of empirical research in art education; the identification and isolation of appropriate empirical problems in the field.

806  G 5
Philosophical Problems in Art Education
A study of the conceptual difficulties encountered when initiating and carrying out philosophical investigations in the field of art education.

807  G 3-5
Curriculum Problems in Art Education
Not open to students with credit for Fine Arts 807.
An examination of the functions of curricular plans as tools for transforming selected conceptions of art education into teacher and student activities in the classroom.

911  G 3-5
Research Problems in Art Education
Su, A, Sp.
Repeatable to a maximum of 45 cr. hrs.

993  G 1-5
Individual Studies
Repeatable to a maximum of 45 cr. hrs.

994  G 1-5
Group Studies
Repeatable to a maximum of 15 cr. hrs.
Group studies for students in specialized programs.

998  G Arr.
Research in Art Education: Thesis
Research for thesis purposes only.

999  G Arr.
Research in Art Education: Dissertation
Research for dissertation purposes only.

Arts and Sciences

294  U 3-5
Interdisciplinary Group Studies
H294 (Honors) may be available to students enrolled in a college Honors Program or by permission of dept.
Prereq.: Open to students who meet instructor's stated prerequisites.
Repeatable to a maximum of 15 cr. hrs.
Study of special or interdisciplinary topics at an introductory level.

594  U 3-5
Interdisciplinary Group Studies
H594 (Honors) may be available to students enrolled in a college Honors Program or by permission of dept.
Prereq.: Open to students who meet instructor's stated prerequisites.
Repeatable to a maximum of 15 cr. hrs.
Study of special or interdisciplinary topics at an intermediate level.

805  U G 5
Foundations of Contemporary Civilization
A.
A study of the major movements of thought in science, social philosophy, the humanities, and religion in the development of Western civilization.
Brown.

608  U G 5
Development of Modern Science
Su, Sp. 5 cr.
Prereq.: 4th yr. standing.
The nature of science and its place in human culture as revealed by detailed sequences of discovery from the history of its development. LaRocque.
Astronomy

Astronomy

Offices: 5040 Smith Laboratory of Physics, 174 West 18th Avenue; Perkins Observatory, Delaware, Ohio

Professors: Slettbak (Chairman), Bobrowichoff (Emeritus), Czyzik, Keenan, Keller, Ko, Kraus, Mitchell, and Protheroe; Associate Professors: Caprotti, Collins, Roark, and Wing; Assistant Professors: Byard, Ehman, and Newcom.

150 U 5
Descriptive Astronomy
Not open to students with credits for 101, 102, 191 or 192.
An introductory course emphasizing the place of astronomy in man's cultural and scientific development.

191 U 5
General Astronomy I
A. Lec./Lab.
Prereq. or concurs: Math. 150 or equiv. or permission of instructor.
Not open to students with credit for 101 or 150.
Astronomy 191 and 192 form a comprehensive introduction to modern astronomy. 191 deals with the solar system and the earth as an astronomical body.

192 U 5
General Astronomy II
W. Lec./Lab.
Prereq.: Either 191 or permission of instructor.
Not open to students with credit for 102 or 150.
A continuation of 191 with emphasis on the stellar universe and physical astronomy.

300 U 3
Spherical Astronomy
W. Lec./Lab.
Prereq.: Either 101, 150, 191, or equiv.; Math. 254; and Physics 112 or 131, or 231; or permission of instructor.
Not open to students with credit for 611.
The application of spherical trigonometry to stellar positions and motions; stellar coordinate systems; time; fundamental measurements of star positions.

301 U 3
Observational Astronomy
Sp. Lec./Lab.
Prereq.: Either 101, 102, 191, 192, or 150, and permission of instructor.
Selected intermediate level experiments and observations for the obtaining and treatment of astronomical data.

601* U 3
History of Astronomy
W.
Prereq.: Either 101, 102, 191, 192, 150, or permission of instructor.
Babylonian, Egyptian, Chinese, and Mayan Astronomy; Graeco-Roman period and Middle Ages; Renaissance and Reformation; modern trends in Astronomy.

605F* U 3
Introduction to Celestial Mechanics
W.
Prereq.: Math. 255 or 556; and Physics 525; or permission of instructor.
Application of the laws of motion to planets, satellites, and stars; the two-, three-, and N-body problems; introduction to orbit and perturbation theory.

650 U 4
Stellar Astronomy
A.
Prereq.: Either 102, 192, or 150; Math 254; Physics 232 and 233 or 132 and 133; or permission of instructor.
Distances, motions, luminosities, and masses of stars; the motions and distribution of stars and interstellar matter; star clusters and galaxies.

651 U 4
Introduction to Astrophysics
W.
Prereq.: Math. 255 or 556; prereq or concurs, Physics 580.01 or 705; or equiv.; or permission of instructor.
Study of radiation from stars and nebulae to determine the composition and physical conditions of matter in and between the stars; stellar nuclear energy sources.

652 U 4
Solar System
Sp.
Prereq.: 101 or 102 or 150 and 651; or permission of instructor.
The physical nature of the solar surface, planets, satellites, comets, asteroids, meteoroids, and diffuse matter in the solar system; cosmogony of the solar system.

689F* U 3
Astronomical Uses of Applied Mathematics
A.
Prereq.: Math. 255 or permission of instructor.
Application of numerical methods for solution of integral, differential, and linear equations of particular interest to astronomy; treatment of aspects of statistics of particular relevance to astronomy.
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 40 cr. hrs.
Independent study or laboratory work on a special
problem in observational or theoretical astronomy.

Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Designed to give groups of students an opportunity to
pursue special studies not otherwise offered.

Observational Techniques I
A.
Prereq.: 300 or 611, and 651, Physics 657, and 705; or
permission of instructor.
Astronomical spectroscopy, astrometry, photographic
and photoelectric photometry.

Observational Techniques II
W.
Prereq.: 785.
Continuation of 785.

Observational Techniques III
Sp.
Prereq.: 786.
Continuation of 786.

Radio Astronomy Instrumentation
(See Elec. E. 715.)

Astronomy Seminar I
A.
Prereq.: 10 cr. hrs. in 600-level courses or higher in
Astron., Physics, and Math., or permission of
instructor.
Repeatable to a maximum of 8 cr. hrs.
Seminars conducted on astronomical topics of current
interest; students will participate actively in the
presentation and discussion of materials.

Astronomy Seminar II
W.
Prereq.: 801.
Repeatable to a maximum of 8 cr. hrs.
Continuation of 801.

Astronomy Seminar III
Sp.
Prereq.: 802.
Repeatable to a maximum of 8 cr. hrs.
Continuation of 802.

Single Stars I
A.
Prereq.: 651, Physics 580.01 or 707, Math. 551, and 255
or 556; or permission of instructor.
Not open to students with credit for 821, 822, 823, 851,
or 852.
Radio and optical observational and theoretical aspects
of the atmospheres, interiors and evolution of single
stars including the quiet and active sun.

Single Stars II
W.
Prereq.: 831 or permission of instructor.
Not open to students with credit for 821, 822, 823, 851,
or 852.
Continuation of 831.

Single Stars III
Sp.
Prereq.: 832 or permission of instructor.
Not open to students with credit for 821, 822, 823, 851,
or 852.
Continuation of 832.

Current Topics in Astronomy
Prereq.: 10 cr. hrs. in 600-level courses or higher in
each of Astron., Physics, and Math., or permission of
instructor.
Repeatable to a maximum of 15 cr. hrs.
Staff members and visiting lecturers will present
material on their current research problems.

Radio Astronomy I
W. 3 cr.
Prereq.: 651 and Physics 656 or Elec. E. 810 or
permission of instructor.
Fundamental theory of radio astronomy and
interpretation of basic radio observations; given in
collaboration with the Department of Electrical
Engineering.

Radio Astronomy II
Sp. 3 cr.
Prereq.: 862 or permission of instructor.
Advanced theory of generation, propagation and
absorption of cosmic radio waves; given in collaboration
with the Department of Electrical Engineering.

Stellar Systems and Interstellar Matter I
A.
Prereq.: 651, Physics 656 or Elec. E. 810, Statist. 521
or Physics 782.20, Math. 551, and 255 or 556; or
permission of instructor.
Not open to students with credit for 841, 842, 843, 853,
or 863.
Radio and optical observational and theoretical aspects
of multiple star system dynamics, structure and
statistics; interstellar gas and dust; external systems
and cosmology.
Stellar Systems and Interstellar Matter II
W.
Prereq.: 871 or permission of instructor.
Not open to students with credit for 841, 842, 843, 853, or 863.
Continuation of 871.

Stellar Systems and Interstellar Matter III
Sp.
Prereq.: 872 or permission of instructor.
Not open to students with credit for 841, 842, 843, 853, or 863.
Continuation of 872.

Interdepartmental Seminar in Radio-Astronomy
(See under Interdepartmental Seminars.)

Research in Astronomy and Astrophysics
Research for thesis or dissertation purposes only.

Aviation
Office: Ohio State University Airport, 3165 Case Road
Professor Eggspuehler (Chairman); Associate Professors Billings, Chapman, Easter, Gerke, Gilson, Hubbard, and Weislogel; Adjunct Assistant Professor Vorbeck; Instructors.

Introduction to Aviation
W, Sp. 3 cl.
A comprehensive study of the nation's air transportation system.

Primary Flight
Su, A, W, Sp. 5 lab.
Prereq. or concur.: 211 and secure permission slip at University Airport prior to scheduling.
A laboratory course provided for students to achieve greater understanding of 211. Fee.

Elements of Aviation
Su, A, W, Sp. 3 cl., 2 lab.
Prereq.: Math. 116 and Physics 111 or equiv.
Problems in fundamentals of flight and aircraft operation; objective studies of aviation laws and regulations.

Advanced Flight
Su, A, W, Sp. 5 lab.
Prereq.: 211 and secure permission slip at University Airport prior to scheduling.
The student must register for specific studies in areas indicated below, and may register for more than one at a time.
Repeatable to a maximum of 16 cr. hrs.; subdivisions repeatable.

Precision Flight Maneuvers
Fee.

Flight Navigational Procedures
Fee.

Performance Evaluation
Fee.

Flight Safety
Fee.

Aircraft Performance
A. 3 cl.
Prereq.: 211.
Studies of airframe components, performance and design characteristics, power plants, and federal certification of aircraft equipment.

Air Traffic Control and Flight Meteorology
W, Sp. 3 cl.
Prereq.: 211.
Precision navigational techniques for position control, flight planning and cruise control, aids to navigation, fundamentals of meteorological analysis, and effects of weather on flight.

Analysis of Problems in Aviation Safety
Sp. 3 cl.
Prereq.: 411 and 415.
Detailed analysis of standard and proposed procedures relating to safety, studies in pilot behavior, accident investigation, and safety programs.

Individual Studies in Aviation
Prereq.: 3rd yr. standing and written permission of instructor.
Repeatable to a maximum of 10 cr. hrs.

Group Studies in Aviation
Prereq.: 3rd yr. standing and written permission of instructor.
Repeatable to a maximum of 10 cr. hrs.

Individual Studies in Aviation
Prereq.: Written permission of dept.
Repeatable to a maximum of 10 cr. hrs.
Biochemistry

Office: 780 Biological Sciences Building, 484 West 12th Avenue
Professors: Sefton (Chairman), Barber, Behrman, Buben, Deatherage, Doxskotch, Harper, Ives, McConnell, Moore, Snell, and Van Winkle; Associate Professors Marzulli and Scott; Assistant Professors Aune, Gross, Klapper, Mayer, Meleca, and Royer.

511 U G 4
Introduction to Biological Chemistry
Su, A, W, Sp. 3 cl.
Prereq.: Chem. 235 or 241, and 2 qtrs. of biological sciences; or permission of instructor.
An introductory course in biochemistry dealing with the molecular basis of structure and metabolism of plants, animals, and microorganisms.

513 U G 4
Biochemistry and Molecular Biology
W. 3 cl.
Prereq.: Chem. 242 or 253; 2 qtrs. of biological sciences. Not open to students with credit for 511 without permission of instructor.
An introductory course in biochemistry and molecular biology dealing with the molecular basis of structure and function of life forms.

514 U G 4
Biochemistry and Molecular Biology
Sp. 3 cl.
Prereq.: 513.
Not open to students with credit for 511 without permission of instructor.
Continuation of 513.

521 U G 5
Introduction to Biological Chemistry; Laboratory
Su, A, W, Sp. 2 cl., 2 3-hr. labs.
Prereq. or concurs.: 511, 513, or 514.
Laboratory work to accompany 511, 513, or 514; assay techniques for chemical constituents and metabolic reactions of living cells. Fee.

551 U G 5
Chemistry of Foods and Food Processing
W. 3 cl., 2 3-hr. labs.
Prereq.: Chem. 211 and 235 or equiv.
The chemical, physical, and biological nature of foods in relation to handling, processing, packaging, quality, and consumer acceptance.

Biochemistry
(See Chem. 661).
(Offered in cooperation with Chem., Biochem., and Phys. Chem.)

694 U G 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

705 U G 5
General Biological Chemistry
A. 3 cl.
Prereq.: Chem. 242, 244 or 253, 254; Physical Chem. background of Kinetics and Thermodynamics or permission of instructor.
Not open to students with credit for Biochem. 611, 612, 613, or Physiol. Chem. 705.
(Cross-listed in the Dept. of Physiol. Chem.)
An intensive treatment of modern biochemistry; protein structure, enzyme catalyzed reactions, chemistry and metabolism and carbohydrates.

706 U G 5
General Biological Chemistry Laboratory
A. 2 4-hr. labs.
Prereq. or concurs.: 705; 706, 708, and 710 should be taken in sequence.
Laboratory to accompany 705. Fee.

707 U G 5
General Biological Chemistry
W. 3 cl.
Prereq.: 705 or Physiol. Chem. 705.
Not open to students with credit for Physiol. Chem. 707.
(Cross-listed in the Dept. of Physiol. Chem.)
An intensive treatment of modern biochemistry; energy utilization and electron transport, photosynthesis, membranes and lipid metabolism.

708 U G 5
General Biological Chemistry Laboratory
W. 2 4-hr. labs.
Prereq.: 706.
Laboratory to accompany 707. Fee.

709 U G 5
General Biological Chemistry
Sp. 3 cl.
Prereq.: 707 or Physiol. Chem. 707.
Not open to students with credit for Physiol. Chem. 709.
(Cross-listed in the Dept. of Physiol. Chem.)
An intensive treatment of modern biochemistry; intermediary metabolism of amino acids, proteins and nucleic acids.

710 U G 5
General Biological Chemistry Laboratory
Sp. 2 4-hr. labs.
Prereq.: 708.
Laboratory to accompany 709. Fee.

721 U G 5
Physical Biochemistry
W. 3 cl.
Prereq.: Chem. 253 and 553, or permission of instructor.
721.01 Physical Biochemistry I
Physical biochemistry of biological macromolecules including polymer statistics, water structure, solution theory, multiple equilibria, osmotic pressure, Gibbs-Donnan equilibrium and sedimentation equilibrium.
721.02* Physical Biochemistry II
Physical biochemistry of biological macromolecules including light scattering and irreversible thermodynamics and its application to diffusion, sedimentation-diffusion, viscosity, and electrophoresis.

721.03* Physical Biochemistry III
Physical biochemistry of biological macromolecules including X-ray diffraction and the important spectroscopic techniques used to study proteins and nucleic acids.

721.04* Physical Biochemistry IV
Physical biochemistry including the conformational statistics of biopolymers, protein and nucleic acid conformation and denaturation and enzyme kinetics.

731 Molecular Photobiology
A. 3 cr.

731.01* Molecular Photobiology I
A comprehensive study of the photosynthetic process and photobiological origins of life.

731.02* Molecular Photobiology II
A molecular approach to contemporary photobiological reactions excluding photosynthesis.

785 U 2-5 G 2-10
Research Principles and Techniques
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs. for undergrad. credit and to a maximum of 40 cr. hrs. for grad. credit. Fee.

811* G 3
Proteins and Nucleic Acids
Sp. 3 cr.
Prereq.: 709 or equiv.
An examination of the current research on the chemistry and metabolism of proteins and nucleic acids.

821* G 3
Enzymes
W. 3 cr.
Prereq.: 709 or equiv.
Advanced studies of enzymes and the mechanism of enzyme action.

831* G 3
Carbohydrates
Sp. 3 cr.
Prereq.: 709, Chem. 635 recommended.
Advanced study of the metabolism of the carbohydrates.

850 G 2
Seminar in Biological Chemistry
A, W, Sp. 1 or 2 cr.
Repeatable to a maximum of 40 cr. hrs.

851* G 2
Special Topics in Food Chemistry
W. 2 cr.
Prereq.: 551; Chem. 243, 531, 532; or equiv.
Advanced study of the chemistry of foods. Deatherage.

898 G 1
Interdepartmental Seminar in Nutrition and Food Technology
Sp. 1 cr.
(See under Interdepartmental Seminars.)

999 G Arr.
Research in Biochemistry
Research for thesis or dissertation purposes only.

Biology
Office: 105 Biological Sciences Building, 484 West 12th Avenue
(See also Biochemistry, Biophysics, Botany, Entomology, Genetics, Microbiology, and Zoology.)

100 U 5
General Biology
Su, A, W, Sp. 3 cr., 2 lab. hrs.
Not open to students with credit in Biol. 102.
An introduction to the biological sciences emphasizing the important concepts and principles which tend to unify the study of life at various levels of organization. Melecia. Fee.

101 U 5
General Biology
Su, A, W, Sp. 3 cr., 2 lab. hrs.
Prereq.: 100.
Further development of the biological concepts and principles introduced in 100, with emphasis upon the molecular and cellular levels of organization. Fee.

205 U 2
Ecology and Environmental Concern
Sp. 2 cr.
An analysis of environmental problems, the facts underlying them, and their implication for the human future as seen by professional ecologists. Colinvaux and Mitchell.

H299 U 1-5
Biological Sciences Honors Colloquium
Prereq.: Participation in the Honors Program or permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Discussion of the rationale and instrumentation of specific fields of biological research; topics vary quarterly.
Introduction to Ecology
Prereq.: 101.
An introduction to biotic communities, inter-relations of a community with its physical environment, and the application of ecological principles to human affairs. Colinaux and Mitchell.

312.01 Lecture and Laboratory U 5
A, W, Sp. 3 cl., 2 lab. hrs.
Not open to students with credit for 313 or 313.02.

313.02 Lecture U 3
A, W, Sp. 3 cl.
Not open to students with credit for 313 or 313.01.

Evolution
A, Sp. 5 cl.
Prereq.: Bot. 100 and 101, or 102; Zool. 201.
The principles of organic evolution; demonstrations and discussions of the facts and theories underlying the evolution of man and other living things. Tidd.

History of Biology
Su, Sp. 5 cl.
Prereq.: 15 cr. hrs. in biological sciences at the 400 level or above or permission of instructor.
Origin and development of important biological approaches, concepts, and theories including those of the contemporary period. Rudolph.

General Cellular Biology
(See Microbiology 640.)

Radiation Biology
Su.
Prereq.: High-school teacher status and Zool. 201 or equiv., Physics 314 or concur, and 10 cr. hrs. in General Chem. and Physics.
(A.N.S. Summer Institute students only.)
A study of the principles of radiation biology and their application to high school and college teaching.

Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs. for undergraduate credit and to a maximum of 35 cr. hrs. for graduate credit.
Some of the areas of faculty specialization available for group studies in Biology are shown in the Biological Sciences section of the Arts and Sciences Catalog.

Study Tours
Sp. Classroom at OSU, Arr., travel and study abroad.
Prereq.: Permission of tour leader/instructor.
Repeatable for different-titled Study Tour only.
Study tours for the biological sciences.

Environmental Pollution Abatement
(See Civil E. 714.)

Honors Course
Prereq.: 4th yr. standing with a grade of A in a least half of the courses in Biological Sciences and an average of B in the remainder; permission of instructor under whose supervision the work is to be completed and the Arts and Sciences Honors Committee.
At least 2 qtrs. are required of candidates for the degrees Bachelor of Science or Bachelor of Arts with Distinction in a biological science. Failure to receive at least a grade of B in this course is a disqualification for special honors.
Repeatable to a maximum of 15 cr. hrs.
A program of reading and research for each student with individual conferences, reports, and honors thesis.

Ecological Investigations of Biotic Areas of North America
A. Pre-field trip from Sept. 1-30; 12-hr. seminar on campus during A. Quarter.
Prereq.: Bot. 620 or Zool. 650 or 661, 20 additional graduate cr. hrs. in Biological Sciences and permission of instructor.
Fee of $125 for travel and subsistence.
Full time of the student will be required traveling and living away from the campus; intensive field work in a variety of environments will involve both supervised and independent study. Fee.

Principles of Systematics
A. 2 cl., 2 hr. lab.
Prereq.: 15 cr. hrs. of Zool. or Entom. at the 600 level or above.
A study of the principles and techniques used in the identification, classification, and nomenclature of organisms. Valentine.

Biophysics
Office: 980 Biological Sciences Building, 484 West 12th Avenue
Professors Liptz (Chairman), Blackwell, Bozler, Corson, Hill, Hollander, Rothstein, Smith, Snell, and Van Winkle; Associate Professors Biersdorf, Cassim, Gilbert, Ingling, Kornacker, McConnell, Ross, and Stow.

Introduction to Biophysics
A. 5 cl.
Prereq.: Physics 111 and 112, Chem. 121 and 122, Biol. 100, and Math. 117; or equiv.
An introduction to the attitudes and principles which characterize the physico-chemical understanding of biological systems; examples of current biophysical research. Liptz.
610  U  G 5
Introductory Photobiology
Sp.  5 cl.
Prereq.: Chem. 123 or equiv., 1 course in organic
chem., and permission of instructor.
The physico-chemical processes underlying various
photobiological phenomena, with emphasis on those
underlying vision. McConnell.

641  U  G 5
Introduction to Molecular Biophysics
A.  5 cl.
Prereq.: Math. 153 and Chem. 521 and Physics 251; or
permission of instructor.
An introduction to applications of modern physics to
problems in molecular biology; conceptual rather than
mathematical aspects are stressed. Cassim.

642  U  G 5
Bioenergetics
A.  5 cl.
Prereq.: Chem. 132, Physics 132, and Math. 117; or
equiv.; 10 cr. hrs. in physical sciences.
Thermodynamics and molecular mechanisms of the
cell: ATP-ADP system, electron transport in the
respiratory chain, photosynthesis, phosphorylation,
muscle contraction, active transport, restig and action
potentials. Ross.

694  U  2-5  G  2-10
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs. for
undergraduates and 15 cr. hrs. for graduates.
Group study of special topics in biophysics.

695  U  G  2
Seminar in Biophysics Research
A, W, Sp.  2 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
Survey of the areas of specialization and approaches
to research in biophysics.

700  U  G  1
Seminar in Biophysics
Prereq.: Permission of instructor.
Repeatable to a maximum of 9 cr. hrs.

702  U  G  1-3
Advanced Experimental Methods in Biophysics
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Fee.

705  U  G  5
Psychophysical Measurement
A.  4 cl., 1 2-hr. lab.
Prereq.: Permission of instructor.
May be taken separately or as part of the sequence
708-710-805.
Analysis and evaluation of methods of psychophysical
measurement. Smith.

710  U  G  5
Sensory Psychophysics
W.  4 cl., 1 2-hr. lab.
Prereq.: Permission of instructor.
Psychophysical, electrophysiological, and anatomical
data on the visual system are examined with the aim of
understanding the structure and function of the
visual pathway. Ingling.

714  U  G  5
Biophysics of Cell Membranes
A.  5 cl.
Prereq.: 642 or permission of instructor.
Critical discussion of modern experimental and
theoretical methods for studying cell transport and
electrical excitability. Kornacker.

715  U  G  5
Sensory Neurophysiology
W.  4 cl., 1 2-hr. lab.
Prereq.: 714 or permission of instructor.
Introduction to the biophysical analysis of sensory
transducers and pattern-recognizing neural networks.
Kornacker. Fee.

720†  U  G  5
Biocybernetics
Sp.  5 cl.
Prereq.: Math. 255, Physics 223, and permission of
instructor.
Physical models of organisms: mass, energy and
information flow, non-linear oscillators, linear and
non-linear control systems; adaptive systems; control
system analysis for biologists. Lipetz.

741†  U  G  5
Molecular Biophysics I
A.  4 cl.
Prereq.: Chem. 522 or equiv.
The chemical physics approach to the study of
macromolecules as applied to important biological
problems; for students in all biological disciplines.
Cassim.

742†  U  G  5
Molecular Biophysics II
W.  4 cl.
Prereq.: 741.
Continuation of 741. Cassim.

743  U  G  5
Nonequilibrium Thermodynamics
Sp.  5 cl.
Prereq.: 642 or Chem. 521 or Math. 254.
A coordinated theory of the thermodynamics of
irreversible processes is presented; applications of the
theory are made to biological transport processes. Ross.

Radiation Biophysics
(See Physiol. 745.)

Physical Instrumentation for Biologists
(See Physiol. 749.)
Molecular Basis of Motility
W.
Prereq.: Chem. 113 or equiv., Physics 113 or equiv., Math. 153 or equiv.; and one course in Biol. or Biochem.; or permission of instructor.
Biological contractile systems—structure and function with emphasis on the molecular level. Cassim. Fee.

Mechanisms of Psychobiological Integration
W.
Prereq.: Permission of instructor and 1 course in advanced vertebrate or mammalian physiology or physiological psychology. Pharmacol. 522, Physiol. 601-602 or 825-826 are recommended.
All the central nervous system, control and integration of physiologic and behavioral functions by the central nervous system; sensory, visceral, neuroendocrine psychologic, and genetic factors; effects of stress. Cortison.

Physical Analysis of Organized Systems in Biology
Su, Sp. 3 cl.
Prereq.: 1 course in physical chemistry.
A unified approach to the analysis of structure-function relations in enzymes, membranes, and neural nets based on an extension of statistical thermodynamics. Kornacker.

Individual Studies in Biophysics
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.

Interdepartmental Seminars
(See under Interdepartmental Seminars.)

Advanced Sensory Psychophysics
Sp. 4 cl., 1 2-hr. lab.
Prereq.: 610, 705, 710, or 715 or permission of instructor.
Input-output characteristics of human sensory systems, primarily vision and audition. Smith and Ingling.

Systems Bioelectricity
A. 5 cl.
Prereq.: 715 and Math. 152.
The principles of organization of neurons into networks supplying the information handling and control functions needed for the integration and survival of the animal. Lipetz.

Neural Integration of Multiple Sensory Inputs
Sp.
Prereq.: Mammalian Physiol.
Differential coding, gating, selective habituation and dishabitation by integrative centers of the nervous system which modulate auditory, tactile, visual, and kinesthetic stimuli. Hill. Fee.

Quantum Biology
Sp.
Prereq.: Chem. 971 or equiv.
Quantum mechanics of excited states of conjugated systems of polypeptides and polynucleotides; dynamics of molecular processes involving energy and momentum storage and transfer. Cassim.

Bioelectric Potentials
(See Pharmacol. 845.)

Interdepartmental Seminar in Developmental Biology
A, W, Sp. 1 2-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Students will present oral reports and lead discussion on research progress in specific areas of developmental biology.

Group Studies in Biophysics
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

Research in Biophysics
Research for thesis and dissertation purposes only.

Biostatistics
Office: 112 Mathematics Building, 231 West 18th Avenue
Professors Harvey, Keller, Rustagi, and Whitney; Associate Professor Srivastava; Assistant Professor Altaire.

Stochastic Processes in the Biological Sciences
A. 3 cl.
Prereq.: Math. 520 and at least 10 cr. hrs. in Biol.
Introduction to discrete stochastic processes, random walk, Markov Chains, birth and death processes, epidemic process, processes for competing among species, diffusion processes, and applications.

Population Dynamics
W. 3 cl.
Prereq.: Math. 521.
Study of birth, death, and growth process, use of rates and ratios, force of mortality, competing risks, and selected epidemiological problems.
Black Studies

Office: 232 Dieter Cunz Hall, 1841 Millikin Rd

Professors Nelson (Acting Chairman) and Dethorne;
Associate Professor Odita; Assistant Professors Barber,
Ekanem, Mouluou, Rajopsa, Van Horne, and Zwinoira;
Instructors Esipiku and Moreland.

101 U 5
Introduction to Black Studies
Su, A, W, Sp. 3 cl., 2 1-hr. labs.
An introduction to the goals, purposes, and basic
preparation necessary for other black studies courses.

130.01 U 5
African History
A, W. Sp. 5 cl.
Not open to students with credit for History 130.01.
(Cross-listed in the Dept. of Hist.)
A general introduction to the history of Africa from
prehistoric to recent times.

201 U 5
Elementary Swahili
Su, A, W, Sp. 5 cl.
Prereq.: 201 or permission of instructor.
Continuation of elementary Swahili with an emphasis
on grammar.

202 U 5
Intermediate Swahili
W, Sp. 5 cl.
Prereq.: 202 or permission of instructor.
Continuation of Swahili with emphasis on reading and
writing; translation of simple sentences or words from
Swahili to English, English to Swahili.

204 U 5
Intermediate Swahili
W, Sp. 5 cl.
Prereq.: 203 or permission of instructor.
Intermediate grammar, sentence analysis with
reference to parts of speech.

230 U 3
The Black Woman: Her Role in the
Liberation Struggle
A. 3 cl.
The political role of the black woman in the struggle
for black freedom; examination of changing laws and
customs affecting the status of black women.
244 U 3
Survey of African and African-Derived Music in the Western World
Su, Sp. 3 cl.
Not open to students with credit for Music 244.
(Cross-listed in the School of Music.)
An introduction to traditional African music and its role in the history and development of Afro-American music with its concomitant socio-political milieu.

247 U 5
Africa in the 19th Century
W. 5 cl.
Not open to students with credit for History 247.
(Cross-listed in the Dept. of Hist.)
Emphasis on African societies during the century of the European scramble for colonies.

248 U 5
Leadership and Mass Movements in Contemporary Africa
Su, A, W. 5 cl.
Not open to students with credit for History 248.
(Cross-listed in the Dept. of Hist.)
A survey of modern African leaders, their philosophies and methods, and a study of the historical, geographical, economical, and political factors that gave rise to the drive for national independence after 1945.

251 U 5
Introduction to African Literature
A. 5 cl.
An assessment of the oral prose tradition and written prose of African literature; specific emphasis placed on student reading from primary sources.

Introduction to Afro-American Literature
(See English 281.)
(Offered in cooperation with the Black Studies Division.)

294 U 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Groups of students are given an opportunity to pursue special studies not otherwise offered.

325 U 5
Freedom Versus Equality: Blacks and the Political Order
W, Sp. 5 cl.
A systematic analysis of the impact of the simultaneous quest for equality and freedom by blacks and other minorities upon the social and political order.

326 U 5
Black Americans and the Legal System
Sp. 5 cl.
An examination of the role of the legal system in the social and political dynamics of blacks in American society.

327 U 5
Introduction to African Politics
A, W. 5 cl.
Examination of dynamics of nation-building in African countries in transition from colonial dependencies to modern nation-states.

338 U 5
African Territories as Nation-States: Selected Case Studies
W. 5 cl.
Case studies of selected African territories gaining independence in the aftermath of the second World War.

351 U 5
Caribbean Literature in English
Sp. 5 cl.
A consideration of prose, poetry, and drama written by Caribbean authors focusing on Caribbean literature in English within the framework of black literature.

352 U 5
The Afro-American Cultural and Intellectual Tradition
A. 5 cl.
Salient themes in the experience of the black man in America including slavery and bondage, emancipation, integration, and revolt.

401 U 5
Advanced Swahili Grammar
Sp. 5 cl.
Prereq.: 204 or permission of instructor.
Review of fundamental principles of grammar and syntax; exercises in Swahili.

402 U 3
Advanced Swahili, Grammar and Composition
W. 5 cl.
Prereq.: 401 or permission of instructor.
Introduction to advanced Swahili composition and grammar.

Ethnology of Africa
(See Anthropology 415.)
(Offered in cooperation with the Black Studies Division.)

450 U 5
The History of Malawi
A. 5 cl.
A detailed study of human events in Malawi from early times to the colonial period focussing on iron-age state systems.

451 U 5
The Black Experience in Caribbean, African, and Afro-American Literatures
W. 5 cl.
Prereq.: Junior or senior standing.
Exploration of themes, attitudes, and parallels in black literatures of Africa, the United States, and the Caribbean; particularly stressed will be negritude and Pan-Africanism.
500  U 5
Contemporary African Thinkers
A, Su. 3 cl.
Prereq.: 201 or permission of instructor.
A study of the writings and achievements of
contemporary African thinkers.

504  U 5
Black Politics
A. 5 cl.
Not open to students with credit for Pol. Sc. 208 or 504.
(Cross-listed in the Dept. of Pol. Sc.)
Economic, political, and social constraints on the
development of black political power; the efforts made
by black people in recent times to organize for
effective political action.

510  U 5
Kwame Nkrumah
Su, W, Sp. 5 cl.
Prereq.: 101 or permission of instructor.
A study of the life, writings, and work of Kwame
Nkrumah.

520  U 5
Divergence in Educational Development;
The Case of Kenya, Uganda, and Tanzania
A, Sp. 5 cl.
A comparison of educational policies in three East
African nations before and after independence.

525  U 5
European Colonial Politics in Africa
W. 5 cl.
An examination of the social, economic, and political
impact of policies pursued by major European colonial
powers toward Africa and African people.

527  U 5
Pan-Africanism and Nationalism
A. 5 cl.
Pan-Africanism and nationalism in the development of
Africa.

530  U 5
African Political Systems:
A Comparative Analysis
Sp. 5 cl.
A comparative examination of problems of
nation-building and national integration faced by
selected African nations in the postcolonial period.

533  U 5
Social and Political Order:
A Comparative Study
Sp. 5 cl.
Comparison of significant black and white thinkers on the
concept of order in social and political life.

536  U 5
The History of Rhodesia
W. 5 cl.
Prereq.: Permission of instructor.
An examination of Zimbabwe (Rhodesia) focussing on
Ndebele and Shona reactions to British incursions.

537  U 5
History of Southern Africa
Sp. 5 cl.
Not open to students with credit for History 537.
(Cross-listed in the Department of History.)
A study of the processes and patterns of social change
from early times to the present.

538  U 5
West African History
A. 5 cl.
Not open to students with credit for History 538.
(Cross-listed in the Department of History.)
An examination of the processes of state formation,
trade, and civilization in Africa's Sudanese and
Guinean regions.

545  U 5
Early Afro-American Thinkers
Su, A, W. 5 cl.
Prereq.: 101 or permission of instructor.
A study of the writings and achievements of early
Afro-American thinkers.

546  U 5
Human Migration in Southern Africa
W. 5 cl.
Prereq.: Permission of instructor.
A survey of the complex patterns of human movements
in Southern Africa from prehistoric to modern times,
with emphasis on environmental incentives and
constraints.

551  U 5
Selected Topics in Afro-American and
Related Literature
Sp. 5 cl.
Prereq.: 251 or 351.
Topics selected will relate to specific interests of
enrolled students, who will develop an intensive
analysis of the topic of their choice.

552  U 5
Contemporary Afro-American Culture
Sp. 5 cl.
Afro-American culture in 20th century America.

590  U 5
Contemporary Afro-American Leaders
Su, W. 5 cl.
The evolution of black leadership after World War II,
from non-violence to black nationalism.

591  U 5
Philosophy in Contemporary African Literature
W. 5 cl.
Discussion of African social and political thought as
presented by selected African novelists.

594  U 3-5
Group Studies
Prereq.: 101 or permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
The investigation of particular problems in various
areas of black studies.
Botany

Office: 108 Botany and Zoology Building, 1735 Neil Avenue

Professors Schmitt (Chairman), Allison, Bendixen, Bohning, Elliott, Janson, Paddock, Partyka, Popham, Rudolph, Schopf, Swanson, and Taft; Associate Professors Bradfute, Garaway, Giesy, Gilbert, Johnson, and Stuckey; Assistant Professors Bart, Cline, Collins, Evans, Fratianne, Hostettler, Larsen, Morris, Platt, Racine, Raghavan, Seymour, Snyder, and Stueyss; Instructor Slater.

102 U 5
General Botany
Prereq.: Biol. 100.
Not open to students with credit for 100 or 500.
An observation and discussion course with emphasis on the structure, processes, and reproduction of the seed plants. Fee.

105 U 1-5
Fundamental Concepts in General Botany

194 U 1-5
Group Studies
Prereq.: Permission of instructor.
Group study of topics in Botany.

202 U 5
Plant Development
A, W, 3 cl., 2 2-hr. labs.
Prereq.: 102.
Not open to students with credit for Biol. 202.
An introductory course in plant development at the organismic level, emphasizing physiology, morphology, and anatomy. Raghavan.

210 U 5
Local Flora
Su, Sp. 2 2-hr. cl.; several Sat. field trips.
Prereq.: 101 or 102 or 500 or permission of instructor.
Not open to students with credit for 410.
A laboratory, field and discussion course in identifying common Ohio plants; emphasis on taxonomic principles, use of keys and manuals, and field recognition of plants. Stuckey and Stueyss. Fee.

260 U 5
Fungi and Man
A. 5 cl.
Prereq.: 102 or permission of instructor.
The interrelationships of fungi and man, as exemplified by those activities beneficial or detrimental to mankind. Schmitt.

430 U 3 or 5
Introductory Plant Physiology
Su, A, Sp. 3 cl., or 3 cl., 2 2-hr. labs.
Prereq.: 101 or 102 or 500; 10 cr. hrs. in Chem., or permission of instructor.
Laboratory optional.
Topics in plant physiology at introductory level; solutions, diffusion, osmosis, transpiration, absorption and translocation of water, metabolism, enzymes, respiration, carbohydrate and lipid metabolism. Cline, Evans, and Fratianne.

431 U 3 or 5
Introductory Plant Physiology
W. 3 cl., or 3 cl., 2 2-hr. labs.
Prereq.: 101 or 102 or 500; 10 cr. hrs. in Chem., or permission of instructor.
Laboratory optional.
Topics in plant physiology at introductory level; pigments, photosynthesis, protein metabolism, absorption and utilization of mineral salts, solute translocation, hormones, plant growth and development. Cline, Evans, and Fratianne.

440 U 5
The Plant Kingdom
A. 5 cl.
Prereq.: 101 or 102 or 500.
Evolutionary sequences in living representatives of the great plant groups; emphasis on forms especially significant to man. Collins.

500 U G 5
Basic Concepts in Botany
A, W.
Prereq.: 10 cr. hrs. Chem.
Not open to students with credit for 100 or 102.
Graduate credit only to participants in the Academic Year Institute.
A course in the basic concepts of botany for advanced students with a fundamental knowledge of chemistry. Taft.

610 U G 4
Field Botany
Su (1st term).
Prereq.: 101 or 102 or 500, and 15 additional cr. hrs. in Biological Sciences or permission of instructor.
Given only at Franz Theodore Stone Laboratory.
Collection, preservation, field and laboratory identification, and local distribution of plants of the major groups.
History of Biology
(See Biology 610.)

611 U G 4 or 5
Higher Aquatic Plants
Su. A.
  a. Su. (4 cr. hrs.) Given only at Franz Theodore Stone Laboratory. 3 all-day cl.
  b. A. (5 cr. hrs.) Given only on Columbus campus. 2 cl., 1 4-hr. lab., several Sat. field trips.
Prereq.: 101 or 102 or 500, and 15 additional cr. hrs. in Biological Sciences.
Aquatic plants, other than those of Great Lakes region; field and laboratory work on their identification, and
ecological and geographical relations. Stuckey. Fee.

6121* U G 5
Taxonomy of Vascular Plants
A. 3 cl., 2 2-hr. lab. Several Sat. field trips.
Prereq.: 210 or 610, and 10 additional cr. hrs. in biological sciences or permission of instructor.
A laboratory, field, and discussion course concerning the classification of vascular plants; emphasis on
taxonomic principles, systems of classification, family characteristics and relationships. Stuckey and Stuessy. Fee.

620 U G 5
Basic Principles of Plant Ecology
A, Sp. 3 cl., 1 3-hr lab., several Sat. field trips, 1 3-day field trip.
Prereq.: 101 or 102 or 500, and 15 additional cr. hrs. in Biological Sciences.
The establishment, development, succession, and dynamics of plant communities and their interrelations with
historic, climatic, soil, and biotic factors. Gilbert and Race. Fee.

621 U G 4
Field Plant Ecology
Su (2nd term).
Prereq.: 101 or 102 or 500, and 15 additional cr. hrs. in Biological Sciences.
Given only at Franz Theodore Stone Laboratory.
Principles of plant ecology as exemplified by the study of aquatic and terrestrial habitats; emphasis on field
work with supplementary lectures and laboratory work.

630 U G 3
Plant Physiology
A, Sp. 3 cl.
Prereq.: 101 or 102 or 500, plus Chem. 242 or 252 or Biochem. 511; or permission of instructor.
An advanced course in plant physiology, solutions, diffusion, osmotic quantities, transpiration, absorption and translocation of water, protein metabolism, enzymes, and respiration. Cline, Evans, Fratiannne, Platt, and Swanson.

631 U G 3
Plant Physiology
Su, W. 3 cl.
Prereq.: 101 or 102 or 500, plus Chem. 242 or 252 or Biochem. 511; or permission of instructor.
An advanced course in plant physiology, pigments, photosynthesis, carbohydrate and fat metabolism, absorption of mineral salts, translocation of solutes, regulation of plant growth and development. Cline, Evans, Fratiannne, Platt, and Swanson.

The Cytological Basis of Genetics
(See Genetics 631.)

632 U G 4
Physiology of Aquatic Plants
Su (1st term).
Prereq.: 101 or 102 or 500 or equiv. and 20 cr. hrs. of Chem.
Given only at Franz Theodore Stone Laboratory.
Lectures, discussions, laboratory and field work on basic topics in the physiology of aquatic plants.

Plant Genetics
(See Genetics 632.)

633 U G 3
Plant Physiology Laboratory
A, Sp. 2 3-hr. labs.
Prereq. or concurr.: 630 or permission of instructor.
An experimental approach to the topics listed under 630. Cline, Evans, Fratiannne, Platt, and Swanson. Fee.

634 U G 3
Plant Physiology Laboratory
Su, W. 2 3-hr. labs.
Prereq. or concurr.: 631 or permission of instructor.
An experimental approach to the topics listed under 631. Cline, Evans, Fratiannne, Platt, and Swanson. Fee.

640 U G 5
Bryophytes, Pteridophytes, and Gymnosperms
Sp. 4 2-hr. labs.
Prereq.: 101 or 102 or 500, and 15 additional cr. hrs. in Biological Sciences or permission of instructor.
Comparative structures and life histories of liverworts, mosses, ferns, conifers; heritable variations within and
among these groups during geologic time; world distribution, past and present. Collins. Fee.

641 U G 5
Morphology of the Angiosperms
A. 4 2-hr. cl.
Prereq.: 101 or 102 or 500, and 15 additional cr. hrs. in Biological Sciences.
Reproductive mechanisms and processes in angiosperms with application to problems in genetics, plant
breeding, and crop production. Raghvan. Fee.

642 U G 5
Plant Microtechnic
W. 4 2-hr. lab./labs.
Prereq.: 101 or 102 or 500, and 15 additional cr. hrs. in Biological Sciences.
Principles and methods of preparing permanent plant tissue microscopical preparations; student has
opportunity to prepare a personal slide collection suitable for teaching or research. Johnson. Fee.

643 U G 5
Developmental Plant Anatomy
Su, W. Sp. 4 2-hr. cl.
Prereq.: 101 or 102 or 500, and 15 additional cr. hrs. in Biological Sciences or permission of instructor.
The initiation and development of tissues and organs of vascular plants. Popham. Fee.
644 U G 4 or 5
Algae
Sp. 4 2-hr. cl.
Prereq.: 101 or 102 or 500, and 15 additional cr. hrs. in Biological Sciences or permission of instructor.
In Summer Qtr. given only at Franz Theodore Stone Laboratory.
A general course covering identification, growth, reproduction, evolution, distribution and economic importance of the algae. Taft. Fee.

660 U G 5
Mycology
A. 3 cl., 2 2-hr. lab.
Prereq.: 101 or 102 or 500, and 15 additional cr. hrs. in Biological Sciences.

662 U G 5
Medical Mycology
The fungi pathogenic to man, their structure and distribution, and the importance of human mycotic diseases. Schmitt.
662.01 Lecture and Laboratory U G 5
W. 3 cl., 2 2-hr. lab.
Prereq.: Microbiol. 509 or 607 or Med. Microbiol. 625, and 10 cr. hrs. in Biological Sciences.
Fee.

663 U G 4 or 5
Aquatic Mycology
Su. Sp.
a. Su. (4 cr. hrs.) Given only at Franz Theodore Stone Laboratory during odd numbered years. 3 all-day cl.
b. Sp. (5 cr. hrs.) Given only on Columbus campus during even numbered yrs. 3 cl., 2 2-hr. lab.
Prereq.: 101 or 102 or 500, and 15 additional cr. hrs. in Biological Sciences.
A lecture, laboratory, and field course designed to acquaint the student with the fungi found in aquatic habitats including soil water. Seymour. Fee.

Cytologic Preparations in Electron Microscopy
(See Microbiology 670.)

693 U G 1-5
Individual Studies
Prereq.: 101 or 102 or 500, and 15 additional cr. hrs. in Biological Sciences.
Problems may be selected in the fields of taxonomy, morphology, anatomy, phycology, physiology, ecology, genetics, cytology, mycology, or ichthyology.

694 U G 1-5
Group Studies in Botany
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Group study of special topics in botany.

708 G 1
Botanical Colloquium
Repeatable to a maximum of 15 cr. hrs.

720 U G 5
Ecological Relations of World Vegetation
Sp. 3 cl., 1 3-hr. lab., 1 4-day field trip.
Prereq.: 620.
A consideration of the distribution pattern and structure of the vegetation of the world with emphasis on North America. Racine. Fee.

740 U G 5
Plant Morphogenesis
Sp. 3 cl., 2 2-hr. labs.
Prereq.: 430 and 431 or 630 and 631; 643.
Factors of growth, organization, and differentiation in plants with emphasis on modern experimental approaches to the understanding of the integrated control of plant growth. Raghavan.

810* G 5
Experimental Taxonomy
A. 3 cl., 2 2-hr. lab., several Sat. field trips.
Prereq.: 210 or 610, and Genetics 500 or permission of instructor.
Biosystematic categories, population analysis of mass collections, individual variations, hybridization, and introgression are studied in relation to the methods and materials of experimental taxonomic research. Stuessy. Fee.

819 G 2
Seminar in Plant Taxonomy
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs. Stuckey and Stuessy.

829 G 2
Seminar in Plant Ecology
Prereq.: 620 and permission of instructor.
Repeatable to a maximum of 12 cr. hrs. Gilbert and Racine.

832 G 3
Advanced Plant Physiology: Metabolism
A. 3 cl.
Prereq.: 631, Biochem. 521, or Chem. 532.
Advanced study of selected topics, mainly respiration, metabolic syntheses, absorption, and utilization of mineral salts, metabolism of growth substances, photosynthesis, and translocation. Platt.

833 G 3
Advanced Plant Physiology: Growth
W. 3 cl.
Prereq.: 630, 631, and 10 additional cr. hrs. in biology, sciences; or permission of instructor.
The physiology of growth and reproduction; special attention given to the interrelated effects of internal and external factors on these processes. Cline, Evans, and Frestanne.
Advanced Plant Physiology: Water and Solute Relations
Sp.  3 cl.
Prereq.: 630, 631, and 10 additional cr. hrs. in biol. sciences; or permission of instructor.
Osmotic relations, mechanisms of water and solute uptake and transport; salt metabolism, drought and salt tolerance. Swanson.

Seminar in Plant Physiology
Prereq.: Permission of instructor,
Repeatable to a maximum of 15 cr. hrs.
Cline, Evans, Fratianne, Platt, and Swanson.

Seminar in Plant Anatomy and Morphology
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Discussions of theoretical and most current concepts in anatomy and morphology. Collins, Johnson, Popham, and Raghavan.

Advanced Mycology
Sp.  3 2-hr. lab.
Prereq.: 660.
Advanced detailed study of specific groups of fungi, with emphasis on their morphology, cytology, and genetics. Rudolph, Schmitt, and Seymour. Fee.

Physiology of Fungi
W.  3 cl., 2 2-hr. lab.
Prereq.: 630, 631, 660, or permission of instructor.
The physiology of the nutrition, growth, and reproduction of fungi, Garway and Larsen. Fee.

Seminar in Cryptogamic Botany
A, W, Sp.  1 2-hr. cl. arr.
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.

Interdepartmental Seminar in Developmental Biology
A, W, Sp.  1 2-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Students will present oral reports and lead discussion on research progress in specific areas of developmental biology.

Interdepartmental Seminar in Polar and Alpine Studies
Sp.
(See under Interdepartmental Seminars.)

Interdepartmental Seminar in Natural Resources
(See under Interdepartmental Seminars.)

Interdepartmental Seminar in Nutrition and Food Technology
Sp.
(See under Interdepartmental Seminars.)

Research in Botany
Research for thesis and dissertation purposes only.

Business Administration

Offices of Academic Faculties: 1775 College Road
Accounting: 452 Hagerty Hall; Chairman—Paul E. Fertig
Finance (including Business Law, Insurance and Risk, and Real Estate): 308D Hagerty Hall; Chairman—Leo O. Stone.
Management Sciences (including Management Processes, Manpower and Industrial Relations, Organizational Behavior, Production and Operations Management, and Quantitative and Research Methods): 414 Hagerty Hall; Chairman—Robert C. Miljus

Professors Abramowitz, Bartels, Beckman (Emeritus), Behling, Bickelhaupt, Burns, Cole, Craig (Emeritus), Cullman, Davidson, James H. Davis, Ralph C. Davis (Emeritus), Dickerson (Emeritus), Donaldson (Emeritus), Doody, Engel, Fertig, Foster, Heckert (Emeritus), Hicks, Hoagland (Emeritus), Howland, Juclius (Emeritus), Kindig, Kollaritsch, Kolait, LaLonde, Livingstene, McCollough, McCoy, Miljus, Powell, Shonting (Emeritus), Smith, Stanley, Stern, Stogdill, and Stone;
Associate Professors Blackwell, Bobbit, Brush, Burnham, Close, Cordell (Emeritus), Gibson, Gordon, Grabner, Greenbell, Hardy, Harvey, Howell, Johnson, McNaul, Mullins, Northrup, Racster, Rapp, Ritzman, Roberson, Vitt, and Yanvey; Assistant Professors Barton, Baumer, Bolot (Emeritus), Campagna, Dunfee, Gordon, Kerr, Krajewski, Krasniewski, Krouse, Li, Rich, Squire, and Talasick.

Groups of courses in Business Administration are:
Accounting, see page 18.
Business Law 510, 611, 612, 613, 810
Business Policy and Special Studies 493, 494, 693, 694, 795, 809, 998, 999
Insurance and Risk 640, 741, 743, 749, 840, 841, 843
International Business 757, 857
Management Processes 700, 701
Manpower and Industrial Relations 660, 761, 762, 769, 850, 861, 862, 960, 961
Marketing 650, 750, 751, 753, 754, 755, 756, 758, 850, 852, 854, 950, 951, 959, 959

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Organizational Behavior 301, 500, 708, 803, 804, 805, 911, 912, 913, 914, 915, 917, 918, 919
Production and Operations Management 630, 731, 732, 734, 720, 630, 825, 821, 826, 690, 931
Quantitative and Research Methods in Business 490, 601, 601.01, 601.02, 607
Real Estate 670, 771, 772, 773, 870, 871, 873
Transportation and Logistics 780, 781, 880, 889

220 U 3
Personal Finance
A, W, Sp. 3 cl.
Prereq.: 2nd yr. standing.
Not open to students in College of Administrative Science majoring in either Acc. or Finance.
Budgeting, credit, borrowing money, bank relationships, savings, insurance, real estate, stocks and bonds, income taxes, social security, annuities, wills, trusts, estates, and taxes. Donaldson and Staff. Staff.

490 U 3
Industrial Statistics
Su, A, W, Sp. 3 cl.
Prereq.: Econ. 442 or equiv.
The application of statistical methods to the design and analysis of experiments, with a view to planning, organizing, and controlling the output of industry. Kindig.

493 U 2-5
Individual Studies
Prereq.: Written permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Individual study projects in selected areas in business administration.

494 U 2-5
Group Studies
Prereq.: Written permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Group study projects in selected areas in business administration.

496 U 3
Black Business Studies
W. 1 2-hr. cl., 1 hr. arr.
Prereq.: Permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Methods of securing improved buying and employment opportunities for black people in small and large marketing institutions; guest speakers from the black community. Blackwell.

500 U G 3
Principles of Management
Su, A, W, Sp. 3 cl.
Prereq.: Econ. 200, 201, 400, 402, or equiv.
An intensive examination of the basic fundamentals of organization and management underlying the solution of management problems. Close.

510 U 4
Legal Environment of Business
Su, A, W, Sp. 4 cl.
Prereq.: 3rd yr. standing.
American legal institutions and sources of law; analysis of basic contractual concepts; and an introduction to government regulation. Howell, Gibson, and Dunfee.

601 U G 4
Business Statistics
W. 3 cl., 1 2-hr. lab.
Prereq.: Econ. 442 or equiv. or Soc. Work 380 or equiv.
Price and production indexes; analysis of time series; linear correlation applied to economic and business problems. Kindig.

611 U G 3
Regulatory Environment of the Business Firm
W. 3 cl.
Prereq.: 3rd year standing.
Analysis of the legal basis of government regulation, and a survey of the principal federal regulatory and antitrust statutes with emphasis on current application.

612 U G 3
Legal Aspects of the Distributive Processes
W, Sp. 3 cl.
Prereq.: 510 or equiv.
Problems arising out of the distribution of consumer goods; obligations of sellers, including product liability; analysis of selected pricing, consumer protection, and commercial paper statutes. Howell and Squaire.

613 U G 3
Legal Environment of Institutional Management
A, W, Sp. 3 cl.
Prereq.: 510 or equiv.
Examination of business associations, emphasizing the legal aspects of the management process and the societal influence and responsibilities of the corporation. Dunfee and Gibson.

620 U G 4
Corporate Finance
Su, A, W, Sp. 2 2-hr. cl.
H620 (honors) may be available to students enrolled in a college Honors Program or by permission of faculty.
Prereq.: Econ. 200, 201, 400, 402, or equiv.; and Acc. 201, 212, or equiv.
Forms of business organization; corporate securities, financing through securities; sources and management of working capital; administration of income; expansion and combination; reorganization, receivership, and dissolution. Cole, Foster, and Staff.
630 U G 4
Introduction to Production and Operations Management
Su, A, W, Sp.  4 cl.
H630 (honors) may be available to students enrolled in a college honors program or by permission of faculty.
Prereq.: 490 or equiv.
Topics and problems in managing and controlling systems including demand-capacity relationships, product factors, physical factors, process factors, and system maintenance. Abramowitz and Hardy.

640 U G 4
Insurance and Risk
A, W, Sp.  2 2-hr. cl.
Prereq.: Econ. 200, 201, 400, 402, or equiv.
Principles and practices of insurance and risk management, including personal, business, and social viewpoints in regard to insurance for life, health, property, and liability risks. Bickelhaupt and Close.

650 U G 4
Marketing
Su, A, W, Sp.  4 cl.
H650 (Honors) may be available to students enrolled in a college Honors Program or by permission of faculty.
Prereq.: Econ. 200, 201, 400, 402, or equiv.
Critical survey of field of marketing; structure, functions, policies, costs, and problems analyzed from consumer and other viewpoints; emphasis on principles, trends, and quantitative expression. Davidson, Doody, and Staff.

660 U G 3
Introduction to Manpower and Industrial Relations
Su, A, W, Sp.  3 cl.
H660 (Honors) may be available to students enrolled in a college Honors Program or by permission of faculty.
Prereq.: Econ. 400, 402, or equiv.
Principles and practices of recruiting, selecting, developing, collective bargaining, compensating, and utilizing effective manpower resources. Campagna.

670 U G 4
Real Estate and Urban Land Economics
A, W, Sp.  2 2-hr. cl.
Prereq.: Econ. 200, 201, 400, 402, or equiv.
Introduction to investment decision making in land resource utilization; consideration of factors such as real estate markets, public influence, legal principles, financing, and administration. Racster and Smith.

693 U G 2-5
Individual Studies
Prereq.: Written permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Individual study projects in related areas in business administration.

694 U G 2-5
Group Studies
Prereq.: Written permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Group study projects in selected areas in business administration.

700 U G 5
Management Processes: Planning and Controlling
Su, A, W, Sp.  5 cl.
Prereq.: 490, 620, 630, 650 or equiv.
Business goals and policies; phases of decision making; analysis of alternatives; establishing, evaluating, and controlling plans of action. Krajewski.

701 U G 5
Management Processes: Organizing
Su, A, W, Sp.  5 cl.
Prereq.: 490, 620, 630, 650 or equiv.
Establishing, maintaining, and controlling resources to accomplish business objectives; authority and responsibility relationships; formal and informal organizational arrangements; structure of business systems and procedures. Close and Hicks.

703 U G 3
Measurement and Change of Organizational Climate
W.  3 cl.
Prereq.: 700 and 701.
Examination of organization climate as a variable, methods of measurement, and managerial approaches to altering it. Kerr.

708 U G 3
Introduction to Administrative Behavior
Su, A, W, Sp.  2 1½-hr. cl.
Prereq.: Permission of instructor.
Open only to students preparing for grad. work in administration.
Introduction to behavioral concepts of concern to management. Close and Kerr.

720 U G 3
Corporation Finance
A, W, Sp.  2 1½-hr. cl.
Prereq.: Acc. 711 or equiv.; and Econ. 200, 201, 400, 402, or equiv.
Open only to students preparing for grad. work in business.
A critical study of the field of corporation finance from an economic point of view. Mullins, Ricks, and Staff.

721 U G 3
Managerial Finance
A, W, Sp.  3 cl.
Prereq.: 620 or equiv.
Financial management of business units with emphasis on finance organization structure, collecting and using financial data, judging profitability, liquidity, sources of capital, internal financial operations. Foster, Mullins, and Staff.

722 U G 3
Investment Management
Su, A, W, Sp.  3 cl.
Prereq.: 620 or equiv.
Investment objectives; types of investments and their relative merits; security prices and yields; investment programs; and taxes. Stone, Harvey, and Staff.
723 U G 3
Investment Analysis
W, Sp. 3 cl.
Prereq.: 722 or equiv.
Methods of investment analysis; analysis of investment data; principles and standards for selection of specific investments; portfolio management. Harvey and Stone.

724 U G 3
The Stock Market
A, Sp. 3 cl.
Prereq.: 620 or equiv.
Practices, procedures, and regulations relating to listing and to buying and selling securities in the organized security markets. Donaldson.

725 U G 3
International Finance
A. 2 1/3-hr. cl.
Prereq.: 620 or equiv.
The international financial environment; management of financial risks inherent with international business; problems of implementing corporate finance principles overseas; financial aspects of parent-subsidiary relationships. Ricks.

726 U G 3
Financial Institutions
A, W, Sp. 3 cl.
Prereq.: 620 and Econ. 520 or equiv.
Structure, operations, regulation, and economic significance of financial institutions with emphasis on savings, trust, mortgage lending, consumer lending, regulatory, and investment banking institutions. Rapp, Cole, and Staff.

727 U G 3
Management of Financial Institutions
Sp. 2 1/3-hr. cl.
Prereq.: 726 or equiv.
Examination of the objectives, functions, policies, organization, practices, and procedures of financial institutions from the viewpoint of the institutional management. Cole and Rapp.

729 U G 3
Cases in Managerial Finance
A, W, Sp. 2 1/3-hr. cl.
Prereq.: 490 or equiv.
Analysis of qualitative and quantitative financial factors involved in managerial decisions in actual business cases. Rapp, Cole, and Staff.

730 U G 3
Fundamentals of Production and Operations Management
A, Sp. 2 1/3-hr. cl.
Prereq.: 490 or equiv. or permission of instructor.
Open only to students preparing for grad. work in business. Topics and problems in managing the production and operational systems in various types of organizations; consideration of managerial and economic implications. Krajewski and Hardy.

731 U G 4
Production and Operations Management I
Su, A, W, Sp. 2 2-hr. cl.
Prereq.: 700, or permission of instructor.
Analysis of capacity related problems, including forecasting, capital investments, product selection and design, maintenance, plant location, materials handling, and facilities design. Hardy and Ritzman.

732 U G 4
Production and Operations Management II
Su, A, W, Sp. 2 2-hr. cl.
Prereq.: 731 or permission of instructor.
Analysis of operating and control problems, including aggregate planning, scheduling, inventory control, quality assurance, work measurement, and cost analysis. Vitt.

734 U G 3
Analysis and Design of Operating Systems
W. 3 cl.
Prereq.: A course in computer programming or permission of instructor.
Analysis and design of modern production planning and control systems, including model building and computer simulation. Vitt.

739 U G 3
Problems in Production and Operations Management
A, Sp. 2 1/3-hr. cl.
Prereq.: 731, 732, or permission of instructor.
Case study approach to problem-solving and decision-making for production and operations management. Abramowitz.

741 U G 4
Personal Insurance Planning
A. 2 2-hr. cl.
Prereq.: 640 or equiv.
Analysis of personal consumer needs for life, health, property, and liability insurance; development of contracts, legal aspects, rates, and the technique of estate programming. Bickelhaupt and Cose.

743 U G 4
Insurance Operations and Regulations
W. 2 2-hr. cl.
Prereq.: 640 or equiv.
Examination of the major functions of insurers of all types; product development, underwriting, rating, reinsurance, marketing systems, loss payment, financial analysis, management, and regulation. Bickelhaupt.

749 U G 4
Business Risk Management
Sp. 2 2-hr. cl.
Prereq.: 640 or equiv.
Development of insurance and risk management programs for business consumers; risk identification, evaluation and treatment; all lines, including group insurance, business life insurance and pensions. Bickelhaupt.
750 U G 3
Marketing
Su, A. W. 3 cl.
Prereq.: Permission of instructor.
Open only to students preparing for graduate work in business.
A critical study of the field of marketing institutions and functions primarily from a social point of view. Doody, Grabner, and Lalonde.

751 U G 4
Managerial Marketing
Su, A. W. Sp. 2 2-hr. cl.
Prereq.: 700 and 701 or equiv.
Marketing policies and strategy; organization, demand analysis, product planning, pricing, physical distribution, and promotion from a managerial viewpoint. Davis, Stern, and Talarzyk.

752 U G 4
Cases in Managerial Marketing
Su, A. W. Sp. 2 2-hr. cl.
Prereq.: 751.
Analysis of marketing policies and strategy, with emphasis on actual business cases. Grabner, Robeson, and Stern.

753 U G 4
Retailing
A, W. Sp. 4 cl.
Prereq.: 650 or equiv.
Principles and methods of management as applied to retailing, including location, organization, personnel, buying, inventory control, selling and advertising, services, expenses, and profits. Davidson, Doody, and Kollat.

754 U G 4
Wholesaling
A, Sp. 4 cl.
Prereq.: 650 or equiv.
Nature, history, institutional compositions, competitive factors, economic and government aspects; scientific management of wholesale establishments, including functions of sales, internal operations, and operating expense control. Davis.

755 U G 4
Promotional Strategy
A, W. Sp. 2 2-hr. cl.
Prereq.: 650 or equiv.
Consumer behavior, fundamentals of communication, setting goals and objectives, creative strategy, media strategy, social and economic issues. Engel, Kollat, and Talarzyk.

756 U G 4
Credit Administration
A, W. 2 2-hr. cl.
Prereq.: 650 or equiv.
Nature of credit; social and economic aspects of its use; management strategies in mercantile and consumer credit administration; competitive and legal constraints. Bartels.

757 U G 4
Environment for International Business
A, Sp. 4 cl.
Prereq.: 650 or equiv.
International, foreign, and United States environments for global business; trade systems of different nations; management implications of cultural, social, and economic aspects of the environment. Bartels, Cullman, and Ricks.

758 U G 4
Marketing Research
A, Sp. 4 cl.
Prereq.: 650 and Econ. 442 or equiv.
The role of research in the solution of marketing problems; emphasis on available data analysis and methods of the field of investigation. Miner, Engel, Blackwell, and Talarzyk.

761 U G 3
Industrial Relations Administration
A, W. 3 cl.
Prereq.: 660 or 701, or permission of instructor.
Examination of the process of accommodation and rule-making among management, employees, and government relative to their respective goals and strategies, and pertinent legislation and environmental constraints. Miljus and Yaney.

762 U G 3
Compensation Administration
W, Sp. 3 cl.
Prereq.: 660 or 701, or permission of instructor.
Managerial aspects of motivation and compensation principles and practices for administrative, operative, research, and professional employees in private and public organizations. Yaney.

769 U G 3
Problems in Manpower and Industrial Relations
A, Sp. 2 1/2-hr. cl.
Prereq.: 761, 762, or permission of instructor.
Problems and case histories are utilized to develop proficiency in applying principles and developing decision-making powers in regard to manpower and human relations areas. Yaney.

771 U G 3
Real Estate Administration
Sp. 2 1/2-hr. cl.
Prereq.: 670 or equiv.
Administration of real estate business in the performance of economic functions; the managerial aspects of brokerage, development, construction, property management, and financial firms. Racster and Smith.

772 U G 3
Real Estate Finance
A. 2 1/2-hr. cl.
Prereq.: 670 or equiv.
Sources and methods of obtaining funds for real estate investment; financial institutions, legal considerations, the construction industry and cycles, and financing policies, practices and experiences. Smith and Racster.
Real Estate Valuation
W. 2 1/2-hr. cl.
Prereq.: 670 or equiv.
Professional valuation as a guide to business decisions; valuation theory and procedures; factors influencing real estate values, and the selection and analysis of data. Smith and Racster.

Micro-Logistics
A. 4 cl.
Prereq.: 700.
Management of logistics activities of the firm from the viewpoint of both the provider and user of logistics system components. Grabner and Robeson.

Analysis and Design of Logistics Systems
Sp. 2 2-hr. cl.
Prereq.: 780 and Econ. 576.
Analysis of internal and environmental factors affecting logistics systems and the effect of such factors on the development and implementation of integrated logistics systems. Robeson and Grabner.

Business Policy
Su, A, W, Sp. 4 cl.
Prereq.: Approved application for B. S. in Business Administration.
Analysis of major policy decisions in the context of the entire philosophical framework of business; emphasis on consideration of interrelationships of major functions of business. Foster and Staff.

Quantitative Methods in Business
Su, A, W, Sp. 2 1/2-hr. cl.
Prereq.: Math 123 or equiv. and Econ. 442 or equiv.
Derivation and application of analytical, mathematical, and statistical techniques to the solution of recurring management problems.

Deterministic
Harvey and Ritzman.

Stochastic
Bartos and Gordon.

Systems Research Organization and Methodology
A, W, Sp. 1 1/2 hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.; subdivision not repeatable.
Selection, definition, organization, development, and presentation of a system research project. Howland.

Introduction to Management Systems Research
A.

Approaches to Systems Management
W.

Cybernetic Modeling of Adaptive Management Systems
Sp.

Formal Organization Theory
Su, A, W, Sp. 2 1/2-hr. cl.
Prereq.: 708 or placement examination.
An introduction to the various sociological and psychological theories which underlie the concept of the formal organization. McNeul, Kerr, and Staff.

Advanced Topics in Organization Theory
W. 2 1/2-hr. cl.
Prereq.: 803 or permission of instructor.
A continuation of 803 designed for students interested in treating organization concepts in more depth as they pertain to modern business groups. Bezbitt.

Introduction to Administrative Systems
Sp. 2 1/2-hr. cl.
Prereq.: 803 or permission of instructor.
The organization of an administrative system; types of systems and the problems involved. Hicks.

Principles and Techniques of Research
A, Sp.
Prereq.: 801.02
Not open to students with credit for 800.
Principles of research methods in business and the use of research by management; scientific method in business, sampling theory, variable analysis, research cases. Blackwell and Engel.

Business Policy
Su, A, W, Sp. 2 1/2 hr. cl.
Prereq.: Final qtr. of M.B.A. studies or permission of graduate committee.
Examination of fundamental factors in organization and management; analysis of major policy decisions; effects of policy decisions on sales, production, personnel, and finances. Cullinan and Staff.

Government Regulation and Business Decisions
Sp. 2 1/2-hr. cl.
Prereq.: 510 or equiv.
Analysis of methods utilized by government to regulate business and maintain competition, emphasizing the impact of administrative and judicial interpretation upon managerial decisions. Howell, Gistin, and Dunfee.

The Legal Environment of the Business Firm
A. 2 1/2-hr. cl.
Systems view of interaction of business firm and the legal structure; regulation of form and functional processes; integration of legal advice into the management process. Gibson and Dunfee.

Advanced Finance
Su, W, Sp. 2 1/2-hr. cl.
Prereq.: 720, Acc. 711 or permission of instructor.
A critical study of internal financial management of business enterprises, based primarily on comprehensive case analyses. Foster, Mullins, and Staff.
821  G 3
Seminar in Corporate Financial Analysis
W.  2 1½-hr. cl.
Prereq.: 820 or permission of instructor.
Critical study of the growing number of analytical
techniques and research findings that lie between
present practices and the frontiers of financial
research. Mullins and Foster.

822  G 3
The Security Market
Su.  2 1½-hr. cl.
Prereq.: Permission of instructor.
A critical study of the markets for listed and unlisted
securities and the factors influencing security prices.
Stone.

823  G 3
Quantitative Methods in Investment Management
A.  2 1½-hr. cl.
Prereq.: 722 or 822 and 801.02 or equiv. or permission
of instructor.
Recent developments in quantitative methods applied
to investment analysis and portfolio management
including the Markowitz portfolio model, random walk
hypothesis, utility in risk analysis and valuation models.
Harvey.

826  G 3
Seminar in Financial Institutions
Sp.  2 1½-hr. cl.
Prereq.: 726 and 820 or permission of instructor.
Review, analysis, and evaluation of pertinent literature
and research findings related to financial institutions.
Cole and Rapp.

830  G 3
Advanced Operations Management
A.  2 1½-hr. cl.
Prereq.: 730 or equiv., and 801.01.
A critical survey and examination of the current
trends and advanced problems in production and
operations management, including analysis and policy
formulation. Ritzman and Abramowitz.

832  G 3
Design of Operating Systems
Sp.
Prereq.: 830 or permission of instructor.
A study of problems in the development of productions
and operations management, systems design, and
operational control processes. Vitt.

834  G 3
Advanced Topics In Capacity Planning
Sp.  2 1½-hr. cl.
Prereq.: 830.
A study of current research and mathematical models
for selected capacity topics which may include capital
input selection, capacity maintenance, facility design,
or location assignments. Ritzman.

835  G 3
Advanced Topics In Operations Analysis
A.  2 1½-hr. cl.
Prereq.: 830.
Extensive applications of management science
techniques for selected topics which may include
aggregate planning, production sequencing, inventory
theory, or cost analysis. Krajewski and Hardy.

840  G 3
Seminar in Life and Health Insurance
A.  1 2-hr. cl.
Prereq.: Permission of instructor.
Critical consideration of current topics of significance
in the field of life and health insurance through class
discussions and individual research reports.
Bickelhaupt and Close.

841  G 3
Seminar in Property and Liability Insurance
W.  1 2-hr. cl.
Prereq.: Permission of instructor.
Investigation through class discussion and reports of
the current literature on significant topics in property
and liability insurance. Bickelhaupt and Close.

843  G 3
Risk Analysis and Administration
Sp.  2 1½-hr. cl.
Prereq.: Permission of instructor.
A comprehensive view of general nonspeculative risk
problems as well as specific problems in the students'areas of concentration with emphasis on insurance as a
tool. Bickelhaupt and Close.

850  G 3
Advanced Marketing
Su, A, W.
Prereq.: 750.
A critical study of management of marketing activities
in business enterprises, based primarily on
comprehensive case analyses. Davis, Kotlar, and Stern.

852  G 1-3
Seminar in Specialized Areas of Marketing
Prereq.: 650 or equiv.
Repeatable.
Regular class meetings and group discussions of the
subject matter embodied by one of the following areas
in the field of marketing:
include decimal with number on schedule card.
852.01 Advertising
852.02 Credits and Collections
852.03 Marketing Research
852.04 Retailing
852.05 Sales Management
852.06 Channels of Distribution
852.07 Marketing Theory
852.08 Logistics
852.09 Consumer Research

854  G 3
Consumer Behavior
A, W.  2 1½-hr. cl.
Prereq.: 850 or permission of instructor.
Development of the consumer decision process and its
application to marketing strategy decisions. Blackwell,
Engel, Kotlar, and Talarzyk.
856 G 3
Multinational Business Administration
Su, A, W, Sp. 2 1/4-hr. cl.
Prereq.: 757.
Bases of management strategies in multinational companies, including legal forms, organizations, personnel, financing, pricing, antitrust, and risk. Bartels and Ricks.

857 G 3
Problems in International Business Administration
W. 2 1/2-hr. cl.
Prereq.: 856.
Management decision-making in business enterprises operating in and between many nations. Bartels and Ricks.

860 G 3
Administration of Interpersonal Behavior
Prereq.: 708 or placement examination.
Analysis of interpersonal relations, manpower programs and policies, communication practices, and morale factors relative to the effect upon productivity, organizational effectiveness, and personal systems. Milijus, Behling, and Staff.

861 G 3
Seminar in Industrial Relations Administration
Su, W. 1 2-hr. cl.
Prereq.: 850 or equiv., or permission of instructor.
Interaction and accommodation processes between institutionalized collective groups of employees and managers of goal oriented organizations located in both the private and public sectors of society. Campagna and Milijus.

862 G 3
Problems in Manpower Administration
W. 2 1/2-hr. cl.
Prereq.: 850 or equiv., or permission of instructor.
Theory and problems involved in selecting, developing, retaining, motivating, utilizing, and allocating manpower resources within complex organizations. Yaney.

870 G 3
Seminar in Real Estate
W. 1 3-hr. cl.
Prereq.: 670 plus one of the following: 771, 772, 773, or equiv.
Issues and problems in the economics and administration of real estate resources critically examined through an intensive investigation of the literature. Smith and Racster.

871 G 3
The Urban Environment
Su. 1 3-hr. cl.
Prereq.: Permission of instructor.
Urban problems and the business man's role in solving them through study of the history of urbanization, functions of urban areas, and community involvement by private and public agencies. Humker and Racster.

873 G 3
Urban Real Estate Analysis
A. 3 1/2-hr. cl.
Prereq.: Permission of instructor.
The process of analysis and the tools employed in making decisions about the planning, financing, marketing, rehabilitation, and production of real estate resources. Smith and Racster.

880 G 3
Physical Distribution Management
A.
Prereq.: 630, 650, Econ. 442 or equiv.
Management of movement services and coordination of demand and supply patterns for optimization of physical systems in terms of cost and customer service. Grabner and LaLonde.

889 G 3
Theory of Business Logistics
Sp.
Prereq.: Permission of instructor.
Critical examination of various theories of the structure and operation of logistics systems; research methodology for testing logistics theory and the application of logistics theory to contemporary logistics problems. LaLonde.

899 G 1-5
Interdepartmental Seminar
(See under Interdepartmental Seminars.)

911 G 3
Concepts In Organization and Management
A, W, Sp. 1 2-hr. cl.
Prereq.: Permission of instructor.
Research and theoretical advances in various aspects of social organization and behavior as they relate to the management of the complex organization. McNaul and Behling.

912 G 3
Analysis of Organization Theory
Sp. 1 2-hr. cl.
Prereq.: Permission of instructor.
Not open to students with credit for 563.
Analysis and comparison of recent theories of organization; their integration with older theories. Stogdill.

913 G 3
Advanced Topics In the Management of Individual Behavior in Formal Organizations
A. 1 2-hr. cl.
Prereq.: Permission of instructor.
Treats constructs and results drawn from disciplines including psychology, anthropology, information science, and behavioral zoology as applied to motivation and decision-making in formal organizations. Behling.
914  G 3
Work Groups In the Organizational Setting
W.  1 2-hr. cl.
Prereq.: Permission of instructor.
Theory and research on formal and informal structures
in work groups and their influence on productivity
and management. Stogdill and Kerr.

915  G 3
Management of Formal Organizations
Sp.  1 2-hr. cl.
Prereq.: Permission of instructor.
Theory and research on the structural characteristics
of formal organizations with particular emphasis on
the management of the organization as a dynamic
system. McNaul.

917  G 3
Seminar In Integrative Management Theory
A.  1 2-hr. cl.
Prereq.: Permission of instructor.
The administrative process and the factors and forces
within an organization which impinge upon it and
affect decision-making. Bobbitt.

918  G 3
Seminar in Integrative Management Research
W.  1 2-hr. cl.
Prereq.: Permission of instructor.
A continuation of the general subject matter of 917,
focusing upon the manner in which socio-cultural
milieu influences organization action. Powell.

919  G 3
History of Management Thought
Sp.  1 2-hr. cl.
Prereq.: Permission of instructor.
Seminar in the historical evolution of fundamental
concepts underlying the theory and practice of modern
management; discussion of pioneers in the
management fields. Bobbitt.

920  G 3
Seminar in Finance
W.  1 2-hr. cl.
Prereq.: 920 or equiv.
A critical study of current practices, trends, and
problems in the field of finance. Foster.

929  G 3
Industrial Consolidations and Mergers
Sp.  1 2-hr. cl.
Prereq.: 620 or equiv.
Historical and analytical study of industrial
consolidation and mergers. Stone.

930  G 3
Seminar In Production
and Operations Management
A.  1 2-hr. cl.
Prereq.: Permission of instructor.
A critical analysis of research and emerging theories
in the field with emphasis on their social, economic,
and physical implications. Ritzman and Vitt.

931  G 3
Seminar In Production
and Operations Management
W.  1 2-hr. cl.
Prereq.: Permission of instructor.
A continuation of 930 including research methodology
and the development of a research proposal.
Krajewski and Ritzman.

950  G 3
Seminar in General Marketing
A.
Prereq.: 650 or equiv.
A critical study of fundamental principles of marketing;
special emphasis on the historical, macro, social, and
theoretical aspects of the subject. Davidsen.

951  G 3
Seminar in General Marketing
W.
Prereq.: 950 or equiv.
Continuation of 950. Cullman and Davis.

955  G 3
Seminar in Contemporary Marketing Problems
Sp.
Prereq.: 650 or equiv.
Repeatable to a maximum of 6 cr. hrs.
Review of current periodical literature and individual
investigation by each student of a selected marketing
problem of contemporary significance for seminar
discussion and written report. Davis and Stern.

959  G 3
History of Marketing Thought
A.
Prereq.: 650 or equiv. and permission of instructor.
Evolution of marketing, concepts, terminology,
principles, and theory; environmental and personal
influences; analysis of marketing literature; marketing
thought related to other social sciences. Bartels.

960  G 3
Seminar In Manpower
and Industrial Relations Thought
A.  1 2-hr. cl.
Prereq.: Permission of instructor.
A consideration of manpower and industrial relations
thought in terms of its historical and theoretical
evolution in private and public sectors. Miljus.

961  G 3
Seminar In Manpower
and Industrial Relations Research
W.  1 2-hr. cl.
Prereq.: Permission of instructor.
A consideration of relevant manpower research and
methodology, and individual development of research
projects in private and public sectors. Miljus.

998  G Arr.
Research in Business Administration: Thesis
Research for thesis purposes only.
Ceramic Engineering

Office: 177 Watts Hall, 2041 College Road

Professors Everhart (Chairman), Blau (Emeritus), R. King (Emeritus), Koenig, Metzer, and Russell;
Associate Professors Campbell, B. King (Emeritus), and Shook; Adjunct Associate Professor Alexander.

201 U 3
Introduction to Ceramic Engineering
A. 3 cl.
Introductory course for ceramic engineering students and a survey of ceramic products, their testing, and their uses for students in disciplines other than ceramic engineering.

423 U 3
Fundamentals of Ceramic Engineering I: Materials
W. 3 cl.
Ceramic raw materials, including their geology, processing, physical and thermal behaviors, and industrial applications; introduction to mineral concepts, and to the glassy and crystalline states. Russell.

424 U 3
Fundamentals of Ceramic Engineering II: Processing
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 201.
Preparation of ceramic materials and measurement and control of the principal process parameters, with emphasis on the relationship between structure, properties, and production economics. Shook.

425 U 3
Heat Processes I
A. 3 cl.
Prereq.: 424.
Fuel sources and economy in ceramic drying, firing, or melting; heat release and utilization, temperature measurements and control. Shook.

426 U 4
Heat Processes II
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 425; concur. 552.
Psychrometry in drying operations and drier calculations; reactions of ceramic products during drying and firing; melting and crystallization control. Shook.

508 U 3
Thermodynamics of Ceramic Materials
A. 3 cl.
Prereq.: Chem. 521 or 533.
Applications of thermodynamics to ceramic systems, including non-stoichiometry and interfacial relationships. Alexander.

511 U 3
Ceramic Rate Processes
W. 3 cl.
Prereq.: 510 or equiv., and Chem. 521.
Introduction to chemical kinetics and rate processes of ceramic materials with emphasis on interrelation of heat transfer and reaction rate. Campbell.

512 U 4
Ceramic Materials Science I
W. 4 cl.
Prereq.: Chem. 521 or 533.
Not open to students with credit for 611. Structure of crystals, crystal chemistry and physics, chemical bonds and atomic coordination in inorganic, non-metallic materials; silicate and defect structures emphasized.

513 U 4
Ceramic Materials Science II
A. 4 cl.
Prereq.: 512.
Not open to students with credit for 612 or 613. Structural imperfections and atomic mobility at high temperatures; development of ceramic microstructure; mechanical, optical, and electrical properties with heat treatment. Shook.

529 U 4
Ceramic Process and Product Control
W. 4 cl.
Prereq.: 4th yr. standing or permission of instructor.
The application of control methods for processes and products. Everhart.

531 U 4
Glass Science and Technology
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 512.
Not open to students with credit in 631. Structure and properties of glasses considered as undercooled liquids with emphasis on commercially important compositions. Hicks.

551 U 4
Ceramic Characterization I
W. 4 cl.
Prereq.: 510.
Application of analytical techniques and concepts including the analysis of structures, phases, and particulate matter by microscopic, diffractive, spectroscopic, chemical, and other approaches. Alexander.
552 UG 3
Ceramic Characterization II
Sp. 3 cl.
Concur.: 426.
Analytical measurements of ceramic material thermal responses, including adiabatic and dynamic calorimetry, thermogravimetric analysis, effluent gas measurements, and conventional DTA. Campbell.

589 UG 5
Industrial Experience
Repeatable to a maximum of 10 cr. hrs.
Ten weeks practical experience or its equivalent, including written report, in approved factory manufacturing ceramic wares.

612 UG 4
Advanced Ceramic Materials Science I
A. 4 cl.
Prereq. or concur.: 510 or equiv.
Materials science in the areas of crystal and surface chemistry, colloids, rheology of plastic and solid states, and thermal and optical properties.

613 UG 4
Advanced Ceramic Materials Science II
W. 4 cl.
Prereq.: 510 or equiv.
Materials science in areas of defect structures and atomic mobility, sintering and vitrification kinetics; development of ceramic microstructure, dielectric, ferroelectric, magnetic, and mechanical properties. Shook.

621† UG 5
Ceramic Plant Design
Sp. 4 cl., 1 2-hr. lab.
Prereq.: 529 or Engr. Mech. 420.
The concepts of ceramic plant layout with regard to processing equipment; project planning and updating techniques. Shook.

632 UG 4
Ceramic Technology
W. 2 cl., 2 3-hr. lab.
The technology of porcelain enamels and surface coatings for metals. Koenig.

633 UG 4
Ceramic Technology
Sp. 2 cl., 2 3-hr. lab.
The technology of refractories, structural clay products, and abrasives. Metzger.

634 UG 4
Ceramic Technology
A. 2 cl., 2 3-hr. lab.
The technology of fine grained ceramics, including traditional white wares, electronic and technical ceramic materials, and glazes. Russell.

671 UG 3
Bioceramics
Sp. 2 cl., 1 3-hr. lab.
Prereq.: Elect. 670 or permission of instructor.
Evaluation and characterization of ceramic materials for medical applications. Campbell.

693 UG 1-7
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Ceramic investigations in areas of advanced non-thesis research.

694 UG 1-6
Group Studies in Ceramic Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

711† UG 4
Ceramic Materials Science I
W. 4 cl.
Prereq.: 512.
Combinations of the glassy and crystalline states; heterogeneous crystal systems; interfacial conditions, internal stress states, interstate bonds, and micro and macro structure. Shook.

712† UG 4
Advanced Ceramic Materials Science I
A. 4 cl.
Prereq.: 711 or permission of instructor.
Materials science in the areas of crystal chemistry, colloids, surface phenomena, and rheology of plastic and solid states; thermal and optical properties.

713† UG 4
Advanced Ceramic Materials Science II
A. 4 cl.
Prereq.: 711.
Defect structures, diffusion, and electrical conductivity; solid state reactions, nucleation and growth in ceramic systems; ceramic microstructures. Shook.

715 UG 3
Thermoanalytical Techniques
A. 2 cl., 1 3-hr. lab.
Prereq.: Permission of instructor.
Differential thermal analysis, thermogravimetric analysis and dynamic differential calorimetry of changes of state and reactions including mathematical and graphical data reduction. Campbell.

741 UG 3
The Chemistry and Chemical Processes of Glass Technology
A. 3 cl.
Prereq.: 512 and 531.
The practical processes and equipment for producing commercial molten glasses, including the selection and handling of materials, charging, processes in the furnace, types of furnaces, furnace design, and operation. Koenig.

742 UG 4
Glass Technology
A. 4 cl.
Prereq.: 741 or permission of instructor.
Machine processes for forming pressed, blown, and float ware; annealing, tempering and decorating; plant visits to observe current commercial practice. Hicks.
785 U G 3
Ceramic Research Methods
A, 1 cl, 6 lab. hrs.
Prereq.: 711.
Introduction to research experience; organization and planning; initiating specific research, designed in combination with 786 to give experience in individual and group research. Campbell and Staff.

786 U G 3
Ceramic Research Methods
W, 9 lab. hrs.
Prereq.: 785.
Continuation of 785 with accent on the conduct of specific research problems.

790 U G 3
Ceramic Case Histories
Sp, 3 cl.
The study of selected case histories in ceramic technological and industrial problems; designed to give experience in individual and group thinking in problem solution. Everhart.

791 U G 3
Ceramic Case Histories
Sp, 3 cl.
Individual and group consideration of ceramic problems having technological, industrial, and/or professional significance. Russell.

852 G 3
Advanced Physics and Chemistry of Glasses
Sp, 2 cl.
Prereq.: 633, or permission of instructor.
Glass structure related to composition and liquid structure, equilibrium atomic configurations, energy relationships, kinetics of crystallization, and controlled devitrification in theory and in practice.

853 G 4
Advanced Ceramic Physics and Chemistry
W, 4 cl.
Prereq.: Permission of instructor.
Reactions between solid phases, including sintering; the application of phase equilibria to ceramic problems; oxide ceramics and thermodynamics. Alexander.

854 G 4
Advanced Ceramic Physics and Chemistry
Sp, 4 cl.
Prereq.: Permission of Instructor.
Special properties of crystals; organic chemistry, ultrasonics, and thermodynamics applied to ceramics; nonoxide ceramics. Alexander.

855 G 4
Advanced Ceramic Science
W, 4 cl. or conf.
Prereq.: 711 or equiv.
Study of fine-grained ceramic materials for electronic and technical use, with emphasis on electrical phenomena and structure-property relationships. Russell.

856 G 4
Advanced Ceramic Science
Sp, 4 cl. or conf.
Prereq.: 711 or equiv.
Modern engineering materials from the viewpoint of ceramic science; thermal behavior, ceramic-metal systems, sandwich and fiber composites, space material problems, plasma and vapor deposition technology.

889 G 1 or 2
Seminar in Ceramic Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
Conference and reports on problems in ceramic science, technology and engineering; topics chosen to cover the development of the ceramic industry.

993 G 1-6
Individual Studies
Repeatable to a maximum of 6 cr. hrs.

994 G 1-6
Group Studies
Repeatable to a maximum of 6 cr. hrs.

999 G Arr.
Research in Ceramic Engineering
Research for thesis or dissertation purposes only.

Chemical Engineering
Office: 121 Chemical Engineering Building, 140 West 19th Avenue

Professors: Syverson (Chairman), Brockey, Frech, Geankoplis, Kay, Koffolt, and Smith; Associate Professors: Hersh, Lynn (Alcoa), Shander, Shumate, Stider, and Sweeney; Adjunct Associate Professors: Bates, Eckert, Lemmon, and Martin; Assistant Professors: Haering, Heidel, and Swank.

200 U 3
Chemical Engineering and Process Calculations
A, W, 2 cl., 2 comp. lab. hrs.
Prereq. or concurs: Physics 131, Math 152, and Chem 122 or 205 cl. equiv.; or permission of instructor. Not open to students with credit for 400.
The application of physico-chemical principles to problems of the chemical industry; emphasis on graphical method, stoichiometry, heat, and material balances. Geankoplis, Heidel, Hersh, and Smith.
201 U 3
Chemical Engineering and Process Calculations
W, Sp. 2 cl., 2 comp. lab. hrs.
Prereq.: 200.
Not open to students with credit for 401.
Continuation of 200.

420 U 3
Elements of Chemical Engineering—
Transport Phenomena I
Sp. 2 cl., 2 comp. lab. hrs.
Prereq. or concur.: 201, Math. 255, and Physics 132;
or permission of instructor.
Introduction to momentum, mass, and heat transfer with emphasis on
the analogies between the transports; numerous computation problems illustrate
applications to chemical engineering practice. Brodkey.

442 U 3
Petroleum Geophysical and Drilling Methods
W. 3 cl.
Prereq.: Engr. 3rd yr. standing or Geol. 4th yr.
standing.
Not open to students with credit in Petr. E. 442.
Selected engineering problems associated with drilling
oil and gas wells; geophysical exploration concepts;
emphasis on drilling mud control and directional
drilling analysis. Slider.

485 U 2
Inspection Trip
Not open to students with more than 2 cr. hrs. for 685.
Repeatable to a maximum of 4 cr. hrs.
These trips will give some practical knowledge of the
magnitude of modern chemical engineering operations
from a selected variety of industry; the total cost will
average about $90. Syverson. Fee.

489 U 5
Chemical Engineering Practice Work
A. 10 weeks approved work experience.
Prereq.: Chem. E. 3rd yr. standing.
The equivalent of ten weeks spent in a factory, or the
engineering department of an industrial plant, or
organized industrial work between 3rd and 4th year in
chemical engineering. Syverson.

508 U 3
Chemical Engineering Thermodynamics
W. 2 cl., 2 comp. lab. hrs.
Prereq.: 201 and Math. 512.
Not open to students with credit for 608.
Application of the fundamental concepts and laws of
thermodynamics to problems of the chemical industry;
stress on computational problem work.

509 U 3
Chemical Engineering Thermodynamics
Sp. 2 cl., 2 comp. lab. hrs.
Prereq.: 508.
Not open to students with credit for 509.
Continuation of 508.

520 U G 3
Transport Phenomena
Sp. 2 cl., 2 comp. lab. hrs.
Prereq.: Math. 255.
Not open to students with credit for 420.
Momentum, mass, and heat transfer with emphasis on
the analogies between the transports; numerous
computation problems illustrate applications to
engineering practice. Brodkey.

521 U G 3
Elements of Chemical Engineering—Transport Phenomena II
A. 2 cl., 2 comp. lab. hrs.
Prereq.: 520, Math. 255, and concur. Math. 512; or
permission of instructor.
Continuation of transport theory and introduction to
radiation as applied to heat transfer; basic principles
developed and illustrated with problems from chemical
engineering practice. Hershey and Sweeney.

522 U G 3
Elements of Chemical Engineering—
Transport Phenomena III
W. 2 cl., 2 comp. lab. hrs.
Prereq.: 521 or equiv., or permission of instructor.
Not open to students with credit for 611.
Continuation of the study of transport theory;
emphasis on mass transfer and stagewise operations
with applied computational problems. Gearkoplis and
Hershey.

523 U G 4
Chemical Engineering Operations
W. 3 cl., 2 comp. lab. hrs.
Prereq. or concur.: 522, Chem. 532, or permission of
instructor.
Not open to students with credit for 612.
The application of the transport phenomena as fluids,
heat, and mass transfer to the chemical engineering
operations of evaporation, distillation, drying, etc.
Haering.

542 U G 3
Drilling Fluids
W. 1 cl., 2 3-hr. lab.
Prereq.: 442.
Not open to students with credit in Petr. E. 542.
Significance and control of drilling fluid qualities;
commercial drilling fluids analyzed in the laboratory
and the control of their properties demonstrated.
Slider.

543 U G 2
Physical Analysis of Petroleum Reservoirs
W. 1 cl., 1 4-hr. lab.
Prereq.: 442 or permission of instructor.
Not open to students with credit in Petr. E. 543.
Quantitative study of the physical nature of a
petroleum reservoir; includes laboratory analysis of
porosity, permeability, saturation, capillary pressure,
and multiphase characteristics of reservoir rocks.
Slider.
570 UG 3
Fundamentals of Mass Transport and Diffusion
Sp. 2 cl., 2 comp. lab. hrs.
Prereq.: 8 cr. hrs. of Chem., 10 cr. hrs. of Physics, and Math. 254 or 221 or equiv.; or permission of instructor.
Fundamental study of mass transport and diffusion in gases, liquids, and solids with applications in physical sciences; primarily for students in physical, biological, and engineering sciences. Geankoplis.

571 UG 3
Air Pollution
Sp. 3 cl.
Prereq.: Permission of instructor.
Intended for students not enrolled in College of Engineering.
Sources and dispersion of air pollutants, air pollution control, air quality criteria, emission standards and regulations. Sweeney.

610 UG 3
Chemical Engineering Kinetics
A. 2 cl., 2 comp. lab. hrs.
Prereq.: 509, 523, and Chem. 533.
Chemical and engineering principles for the design and operation of chemical reactors; kinetics of simple homogeneous systems and introduction to heterogeneous catalysis. Sywester.

625 UG 3
Chemical Process Dynamics and Control I
Sp. 2 cl., 4 lab. hrs.
Prereq.: 523 or equiv. or permission of instructor; for other than Chem. E. students, permission of instructor.
Not open to students with credit for 725.
Study of the dynamics and control of chemical processes; mathematical models of simple processes (including control) are derived and simulated using computers. Frech.

630 UG 4-8
Chemical Engineering Operations Laboratory
Su. 5 conf., 7-19 lab. hrs.
Prereq.: 523 and 625, or permission of instructor.
Not open to students with credit for 730.
The fundamental laboratory course in the chemical engineering operations laboratory; study of the operating characteristics and efficiency of chemical engineering equipment such as distillation, drying, filtration, etc. Haering. Fee.

640 UG 5
Determination of Reservoir Parameters and Material Balance
Sp. 5 cl.
Prereq.: Engr. 3rd yr. standing; Geol. 4th yr. standing and permission of instructor.
Not open to students with credit in Petr. E. 644 and 646, or Chem. E. 644 and 646.
Determination of petroleum subsurface reservoir thickness, porosity, and saturation from core analysis and logs; the prediction of reservoir behavior by material balance. Slider.

643 UG 5
Flow of Gas and Oil in Subsurface Reservoirs
A. 5 cl.
Prereq.: Engr. 4th yr. standing; Geol. 4th yr. standing and permission of instructor.
Not open to students with credit for Petr. E. 642 or Chem. E. 642.
Fundamentals of oil and gas flow in porous media under steady state and unsteady state conditions; application of these fundamentals to well problems. Smith.

693 UG 2-8
Individual Studies in Chemical Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

694 UG 2-6
Group Studies in Chemical Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

714 UG 5
Environmental Pollution Abatement
W. 5 cl.
Prereq.: Senior or grad. majors in engineering or sciences.
Not open to students with credit for Agr. E. 714, Civil E. 714, and Met. E. 714. (Cross-listed in the Depts. of Agr. E., Civil E., and Met. E.)
Problems, philosophies, principles, and methods of pollution abatement in the total environment; quantitative approaches to waste management in air, water, and land systems.

726 UG 3
Chemical Process Dynamics and Control II
A. 3 cl.
Prereq.: 625 or permission of instructor.
Further development of process dynamics and control topics begun in 625. Frech.

743 UG 1-10
Petroleum Production Investigations
A, W, Sp. Library, conf., and lab. work.
Prereq.: 643.
Not open to students with credit in Petr. E. 743.
Repeatable to a maximum of 10 cr. hrs. for the course; either subdivision repeatable to a maximum of 10 cr. hrs.
743.01 Engineering Problems of Petroleum and Natural Gas Exploration, Production and Transportation. Slider.
743.02 Design or Planning of Petroleum Field Development. Slider.

750 U 1
The Profession of Chemical Engineering
A. 1 cl.
Prereq.: Chem. E. senior standing.
Sources of air pollutants, properties of small particles, chemistry of air pollution, dispersion and deposition of air pollutants, and air pollution control. Sweeney.

772  
Introduction to High Polymer Engineering  
A.  3 cl.  
Prereq.: 610 and Organic Chem. or permission of instructor.  
Engineering of polymerization and polymer forming processes based upon thermodynamics, transport phenomena, and reaction kinetics; relationship of engineering properties of high polymers to molecular characteristics. Lynn.

775  
Rheology of Fluids  
W.  3 cl.  
Prereq.: 420; permission of instructor for students not majoring in Chem. E.  
Principles of rheology including the characteristics of non-Newtonian materials, measurements, rheological equations of state, viscometric flows, and applications to the flow of industrial materials. Brodkey.

776  
Principles of Polymer Conversion Operations  
Sp.  3 cl.  
Prereq.: 773 and 775; or permission of instructor.  
Principles of thermodynamics, transport phenomena, polymer chemistry and physics will be related to polymer processing (converting high polymers) through application of mathematical and analytical approaches. Lynn.

778  
Nuclear Chemical Engineering  
W.  3 cl.  
Prereq.: Nuclear E. 763 or permission of instructor.  
A study of physical, chemical, and economic principles applied to the processing of reactor fuels; examination of the separation requirements in relation to different fuel cycles. Smith.

779  
Chemical Engineering Experimental Design  
A.  3 cl.  
Prereq.: Engr. Gr. 200 or equiv., or permission of instructor.  
Industrial and research experiments designed with special emphasis on reducing the number of experiments, interpreting final results, and ensuring against unknown factors. Hershey.

781  
Chemical Engineering Optimization  
Sp.  3 cl.  
Prereq.: Engr. Gr. 200 or equiv., or permission of instructor.  
Description, analysis, and comparison of the techniques now in use in unimodel optimization; linear programming; geometric programming. Hershey.

785  
Special Project Problem Investigations  
Su, A, W.  15 hrs. conf. and lab.  
Prereq.: 763 or permission of instructor.  
Repeatable to a maximum of 12 cr. hrs.  
Solution of study problems, either new or continued from 763; extensive theoretical and/or experimental work followed by a comprehensive report. Fee.
790 G 3
Process Modeling and Simulation
Sp. 3 cl.
Prereq.: Lompus. and Intro. 3 cl., 541, or equiv.
Application of basic chemical engineering principles to
construct mathematical models of industrial processes
and the simulation thereof by digital and analog
techniques. Fresh.

796 G 2
Advanced Petroleum Engineering Technology
Sp. 2 cl.
Prereq.: 643.
Not open to students with credit in Petr. E. 796 (765).
Library research and seminar discussions of the most
recent technical developments in petroleum
engineering. Slider.

801 G 1-15
Advanced Special Problems
in Chemical Engineering
Prereq.: Satisfactory courses in field of problem
undertaken and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
A minor problems course covering the chemical
engineering operation, instrumentation,
thermodynamics, kinetics, the transport fields, and
chemical technology. Fee.

808 G 3
Advanced Chemical Engineering Thermodynamics
A. 3 cl.
Prereq.: 509 and 523; or permission of instructor.
Detailed discussion of the thermodynamic properties
of pure compounds and mixtures; computational
problem work emphasizes the application of
thermodynamics in industrial problems.

809 G 3
Advanced Chemical Engineering Thermodynamics
W. 3 cl.
Prereq.: 808.
Continuation of 808.

812 G 3
Advanced Chemical Engineering Kinetics
W. 3 cl.
Prereq.: 523 and 610; or permission of instructor.
Chemical engineering kinetics from the viewpoint of
industrial chemical processes. Haering.

813 G 3
Advanced Chemical Engineering Kinetics
Sp. 3 cl.
Prereq.: 812.
Continuation of 812. Haering.

815 G 3
Advanced Chemical Engineering
Science and Applications
A, W, Sp. 3 cl.
Prereq.: Chem. Engr. grad, standing or permission of
instructor.
Repeatable to a maximum of 45 cr. hrs.; subdivision
not repeatable.

This series of courses presents advanced concepts of
science and engineering as applied to the chemical
engineering field under various topics.
815.01 Advanced Mass Transfer—LI
815.02 Advanced Mass Transfer—II
815.03 Advanced Distillation and Stage Processes
815.04 Extraction, Azeotropic, and Extractive
Distillation
815.05 Advanced Heat Transfer—I
Conduction, radiation and convection.
815.06 Advanced Heat Transfer—II
Condensation, boiling, design applications.
815.07 Drying, Humidification, and Dehumidification
815.08 Advanced Momentum Transfer—I
Basic theory, laminar flow, and phenomenological
turbulence.
815.09 Advanced Momentum Transfer—II
Statistical turbulence and mixing.
815.10 Advanced Momentum Transfer—III
Two-phase phenomena.
815.11 Advanced Combustion Principles
815.12 Advanced Instrumentation and Process
Control of Chemical Plants
815.13 Design of Experiments
Data handling and analysis, quality control, linear
programming.
815.14 Advanced Process and Plant Design
815.15 New or Unusual Chemical Engineering
Operations
Examples: adsorption, atomization, dialysis exclusion,
sublimation.

830 G 2-6
Advanced Chemical Engineering
Operations Laboratory
Prereq.: 509 and 523; prereq. or concur. 630; or
permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Chemical engineering fundamentals and operations.
Haering. Fee.

842 G 3-10
Petroleum Production and Oil Field
Development and Operational Problems
Sp.
Prereq.: Permission of instructor.
Not open to students with credit in Petr. E. 842.
Examination and testing of petroleum and petroleum
bearing rocks; economic interpretation and application
to problems of primary and secondary recovery. Slider.

861 G 3
Advanced Chemical Engineering Processes
A. 2 cl., 2 comp. lab. hrs.
Prereq.: 523, 610, and 830; prereq. or concur. 760 or
equiv.
Study of selected chemical engineering processes
which involve the application of chemistry,
thermodynamics, reaction kinetics, heat and mass
transfer, oxidation, hydrogenation, polymerization,
esterification, and halogenation. Hershey and Sweeney.

862 G 5
Advanced Chemical Engineering
Process Development
W. 1 cl., 14 lab. hrs.
Prereq.: 610, 760, and 830.
Original work on development of a new process; basic
data for process design and preliminary cost estimate
required. Haering, Lynn, and Sweeney. Fee.
873  G 3
Advanced High Polymer Engineering
Sp. 3 cl.
Prereq.: 773 or permission of instructor.
Fundamental studies of polymer properties as related to and controlled by polymer structure; engineering of polymerization process to control polymer structure. Lynn.

881  G 2
Seminar in Chemical Engineering
Prereq.: Grad. standing in Chem. E.
Repeatable to a maximum of 12 cr. hrs.
Formal reports, lectures, and discussions of fundamentals and new developments in science and technology as related to chemical engineering.

999  G Arr.
Research in Chemical Engineering
Research for thesis or dissertation purposes only.

Chemistry
Office: 120 McPherson Chemical Laboratory, 140 West 18th Avenue; General Chemistry Office: 115 McPherson Chemical Laboratory, 140 West 18th Avenue.

Professors Dorfman (Chairman), Bowmar, (Administrative Vice Chairman), Busch, Caley (Emeritus), Calvert, Firestone, Frenkel, Garrett (Emeritus), Gassman, Harris (Emeritus), Haskins (Emeritus), Hine, Horton, Kuwana, Leussing, Levine (Battelle Professor), Lippincott, Meek, Newman (Regents Professor), Pasquette, Rubin, Shechter, Shore, Sweet, Taylor, Van Winkle, Verhoek, Walters, and Wojicki; Adjunct Professors Kerr and Shavitt; Associate Professors Gerkin, Kurbatov (Emeritus), MacWood, Ouellette, Pitzer, Schram, and Swenton; Assistant Professors Anderson (Academic Vice Chairman), Berliner, Corfield, Frey, Klapper, Mathews, Mayer, and Reichardt.

101  U 5
Elementary Chemistry
A, W, Sp. 4 cl., 3 lab. hrs.
Prereq.: Eligibility to enroll in Math. 116.
A course in the principles of chemistry; the chemistry of the more important elements and compounds, including the compounds of carbon. Fee.

102  U 5
Elementary Chemistry
A, W, Sp. 4 cl., 3 lab. hrs.
Prereq.: 101.
Not open to students with credit for 112 or 122.
Continuation of 101; a terminal sequence in chemistry for students requiring only two courses in chemistry. Fee.

121  U 5
General Chemistry
Su, A, W, Sp. 3 cl., 3 lab. hrs.
Prereq.: One unit of high school Chem., and eligibility to enroll in Math. 150.
Not open to students with credit for 111.
A general course in fundamental chemical principles. Fee.

122  U 5
General Chemistry
Su, A, W, Sp. 3 cl., 3 lab. hrs.
Prereq.: 121; or completion of 101 with a grade of A or B and eligibility to enroll in Math. 150.
Not open to students with credit for 112.
Continuation of 121; the chemistry of the most important non-metals and of chemical reactions in solutions. Fee.

123  U 5
General Chemistry
Su, A, W, Sp. 3 cl., 6 lab. hrs.
Prereq.: 121.
Not open to students with credit for 113.
Continuation of 122; the chemistry of the metals including introductory quantitative analysis. Fee.

194  U 3-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Designed to give students an opportunity to pursue special studies in chemistry.

H201  U 5
General Chemistry
A. 3 cl., 4 lab. hrs.
Prereq.: Superior performance on placement examination and Math. 151 or equiv.
Not open to students with credit for 101, 111 or 121.
The principles of chemical measurement for selected students. Fee.

H202  U 5
General Chemistry
W. 3 cl., 4 lab. hrs.
Prereq.: 201.
Continuation of 201; the properties of matter and quantitative analysis. Fee.

H203  U 5
General Chemistry
Sp. 3 cl., 4 lab. hrs.
Prereq.: 202.
Continuation of 202; systematic chemistry of the elements. Fee.

204  U 4
Principles of Chemistry
A, W, Sp. 3 cl., 1 3-hr. lab.
Prereq.: Engr. 1st or 2nd yr. curriculum; 1 unit of high school Chem.; prereq. or concur. Math. 153 and Physics 123.
Fundamental principles of chemistry for engineering students with at least two quarters of college physics and of college mathematics. Fee.
Principles of Chemistry
W, Sp. 3 cl., 1 3-hr. lab.
Prereq.: 204.
Continuation of 204. Fee.

Quantitative Analysis
Su, A, W, Sp. 2 cl., 5-8 lab. hrs.
Prereq.: 113, or 123, or equiv.
A general course in quantitative analysis; gravimetric, volumetric and instrumental analysis. Fee.

Quantitative Analysis
Su, W, Sp. 2 cl., 5-8 lab. hrs.
Prereq.: 211.
Continuation of 211. Fee.

Quantitative Analysis
A, Sp. 3 cl., 6 lab. hrs.
H221 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq.: 123 or equiv.
The fundamental course in quantitative chemical analysis for students majoring in chemistry. Fee.

Survey of Organic Chemistry
Sp. 4 cl., 1 4-hr. lab.
Prereq.: 102 or 122.
Not open to students with credit for 231, 241, 243, 245, or 251.
Terminal course covering the fundamental aspects of aliphatic and aromatic chemistry.

Organic Chemistry
A, W. 3 cl.
Prereq.: 123.
Not open to students with credit for 231, 235, or 251.
The first half of a two-quarter course in fundamental organic chemistry designed for non-majors in chemistry or in preparation for high school teaching.

Organic Chemistry
Su, W, Sp. 3 cl.
Prereq.: 241.
Not open to students with credit for 232, 235, or 252.
Continuation of 241.

Organic Chemistry Laboratory
Su, A, W, Sp. 9 lab. hrs.
Prereq. or concur.: 241.
Not open to students with credit for 231, 235, 245, or 254.
A preparation of a series of typical organic compounds, such as are studied in 241-242, their purification, and a study of their properties. Fee.

Organic Chemistry Laboratory
Su, W, Sp. 9 lab. hrs.
Prereq.: 243; prereq. or concur. 242.
Not open to students with credit for 232, 235, 246, or 255.
Continuation of 243. Fee.

Organic Chemistry Laboratory
A, W, Sp. 6 lab. hrs.
Prereq. or concur.: 241.
Not open to students with credit for 231, 235, 243, or 254.
A preparation of a series of typical compounds, such as those studied in 241 and 242, and a study of their properties.

Organic Chemistry Laboratory
Su, W, Sp. 6 lab. hrs.
Prereq.: 245; prereq. or concur. 242.
Not open to students with credit for 232, 235, 244, or 255.
Continuation of 245.

Organic Chemistry
A. 3 cl.
Prereq.: 123.
Not open to students with credit for 231 or 241.
A fundamental course in chemistry designed for chemistry majors and chemical engineers.

Organic Chemistry
W. 3 cl.
Prereq.: 251.
Not open to students with credit for 232 or 242.
Continuation of 251.

Organic Chemistry
Sp. 3 cl.
Prereq.: 252.
Continuation of 252.

Organic Chemistry Laboratory
W. 6 or 9 lab. hrs.
H254 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq. or concur.: 251.
Not open to students with credit for 234-236.
The preparation, purification, characterization, and study of the properties of typical organic compounds. Fee.

Organic Chemistry Laboratory
Sp. 6 or 9 lab. hrs.
H255 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq.: 254 or concur. 252.
Continuation of 254. Fee.
294U3-5
Group Studies
Prereq.: Permission of instructor.
Designed to give students an opportunity to pursue special studies in chemistry.

501U3-5
Recent Advances in Chemistry
Su, A. 5 cl.
Prereq.: Academic Year Science Institute students only; 30 cr. hrs. of Chem.
Not for graduate credit to students majoring in Chem.
Designed for high school science teachers; recent developments in the theory of valence, particle nature of matter, colloids, high polymers, nuclear chemistry, fuels and photosynthesis.

502U3-5
Radiochemistry
Su. Summer Institute only, 4 cl. each week.
Prereq.: Academic Year Science Institute students only; 1 yr. college Math., 1 yr. college Chem., and 1 yr. college Physics.
Not for graduate credit to students majoring in Chem.
The properties of the nucleus, selection, and preparation of isotopes for tracer work, the application of radioactive isotopes to chemical problems.

521U3-5
Physical Chemistry
Sp. 5 cl.
Prereq.: 242-244 or 252-255, or equiv., Math. 151, and Physics 113.
Not for graduate credit to students majoring in Chem.
A study of the fundamental principles of physical chemistry arranged for students in the biological sciences.

531U3-5
Physical Chemistry
A. 3 cl.
H531 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq.: 212 or 221 or equiv., Physics 113 or 132, 133 and Math. 254; prereq. or concur, Math. 255.
Not for graduate credit to students majoring in Chem.
The fundamental course in physical chemistry.

532U3-5
Physical Chemistry
W. 3 cl.
H532 (honors) may be available to student enrolled in a college honors program; others with permission of dept.
Prereq.: 531; 552 concur. recommended.
Not for graduate credit to students majoring in Chem.
Continuation of 531.

533U3-5
Physical Chemistry
Sp. 3 cl.
H533 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq.: 532.
Not for graduate credit to students majoring in Chem.
Continuation of 532.

541U3-5
Physical Chemistry Laboratory
A, Sp. 1 cl., 8 lab. hrs.
Prereq. or concur.: Chem E. 3rd yr. standing 521 or 533 or equiv. Fee.

551U3-5
Physical Chemistry Laboratory
A, W, Sp. 6 lab. hrs.
Prereq. or concur.: 531.
Quantitative measurements of phenomena of chemical interest and the application of chemical principles to their interpretation. Fee.

552U3-5
Physical Chemistry Laboratory
A, W, Sp. 6 lab. hrs.
Prereq.: 551; prereq. or concur. 532.
Continuation of 551. Fee.

587U3-5
Principles of Instrumental Analysis
Sp. 3 cl., 6 lab. hrs.
Prereq.: 532, 552, and prereq. or concur. 533.
Application of physical-chemical principles to problems of chemical analysis; laboratory practice in basic instrumental techniques. Fee.

594U3-5
Group Studies
A, W, Sp. 3 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Designed to give students an opportunity to pursue special studies in chemistry.

601U3-5
Chemical Information Science
A. 1 cl.
Prereq.: 212 or 242 or 255, or equiv.
Chemical library usage for information retrieval and introduction to modern methods of chemical information handling.

602U3-5
History of Chemistry
W. 2 cl.
Prereq.: 212 or 242 or 255, or equiv.
A general course in the history of chemistry with special reference to the development of the theories of the science.

616U3-5
Organic and Inorganic Micro Quantitative Analysis
Sp. 1 cl., 9 lab. hrs.
Prereq.: 221, 242-244, or 252-255, or equiv.
Application of various micro chemical techniques for solving problems in organic and inorganic chemistry. Fee.

621U3-5
Chemical Spectrophotometry
W. 2 cl., 6 lab. hrs.
Prereq. or concur.: 531.
Application of infrared, visible, ultraviolet spectrophotometers, atomic emission and absorption spectographs to problems involving inorganic and organic molecular structure, analysis, equilibria, and reaction rates. Fee.

631 U G 3
Structure Determination and Identification of Organic Compounds
A. 1 hr. lec., 9 lab. hrs.
Prereq.: 253 or equiv.
Application of chemical and physical methods in structure determination of organic compounds. Fee.

632 U G 3
Physical Methods in Organic Chemistry
Sp. 3 cl.
Prereq.: 253 and 533 or equiv.
Selected topics in bonding, molecular orientation, and reactivity of organic compounds and metabolate intermediates with emphasis on physical methods of approach.

635* U G 3
Chemistry of the Carbohydrates
A. 3 cl.
Prereq.: 242 or 252 or equiv.
Repeatable to a maximum of 6 cr. hrs., with permission of instructor.
(a) Monosaccharides
(b) Oligosaccharides and polysaccharides
(a) is given in even-numbered years and (b) in odd-numbered years.

651 U G 3
Advanced Inorganic Chemistry I
Su. A. 3 cl.
Prereq.: 523 or permission of instructor.
The concepts and chemical systems of inorganic chemistry, including atomic structure, the periodic table, molecular structure and bonding, ionic crystals, defect solid state and electron deficient compounds.

652 U G 3
Advanced Inorganic Chemistry II
W. 3 cl.
Prereq.: 651.
The chemistry of the transition elements; coordination compounds, organometallics, noble gases, representative elements and lower boron hydrides; acid-base theories.

653 U G 3
Advanced Inorganic Chemistry III
Sp. 3 cl.
Prereq.: 652.
A discussion of special topics in modern inorganic chemistry, correlating the group relationships among the non-metallic elements, polyenial conditions and carbonaceous structures.

655 U G 3
Inorganic Chemistry Laboratory
Sp. 9 lab. hrs.
Prereq.: 533 or equiv.
Preparative techniques of inorganic chemistry including the use of liquid gases, aqueous and non-aqueous solutions, anhydrous and oxygen-free systems, fusion reactions, etc. Fee.

661 U G 5
Biochemistry
Sp. 3 75-minute cl.
Prereq.: 251, 252, 253 or equiv. with grade of A or B; 531, 532, 533 or equiv. with grade of A or B.
A survey of biochemistry for the superior advanced undergraduate or the beginning graduate student who does not necessarily plan to do graduate research in biochemistry.

671 U G 3
Nuclear, Radio, and Radiation Chemistry
A. 3 cl.
Prereq.: 533 or equiv.
Nuclear properties, nature of radioactivity, radioactive decay and growth, interactions of radiation with matter, applications.

672 U G 2
Nuclear Chemistry Laboratory
W. 6 lab. hrs.
Prereq.: 671.
Techniques of handling radioactive tracer, the detection and measurement of different types of radiation, neutron activations, and other related laboratory techniques. Fee.

675 U G 4
X rays and Crystal Structure
A. 3 cl., 3 lab. hrs.
Prereq.: Math. 255, Physics 113 or 120, 133, or equiv.
An introduction to the methods of X-ray crystal analysis; theory of crystal structures and crystallography will be discussed and applied. Fee.

676 U G 3
Colloid Chemistry
W. 3 cl.
Prereq.: 533.
Modern theories of colloid behavior; absorption and surface phenomena; physical-chemical methods for the characterization of proteins, high polymers, and inorganic colloids.

678 U G 3
Chemistry of the Urban Atmosphere
Sp. 3 cl.
Prereq.: 532.
Study of the chemistry of urban atmospheres applying kinetic and thermodynamic principles; prediction of the rates and mechanisms of transformation, and the control of atmospheric pollutants.

693 U G 1-15
Individual Studies in Chemistry
Prereq.: Written course in field of the problem and permission of instructor.
Repeatable to a maximum of 60 cr. hrs.
A qualified student may conduct a minor investigation in chemistry.

694 U G 3-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Designed for students to pursue advanced special studies in chemistry.
733 U G 3
The Chemistry of Bio-Organic Catalysts
W. 3 cl.
Prereq.: 253 or 831; concur. 533.
Structure of organic catalysts and the mechanism of their reactions.

821 G 3
Advanced Analytical Chemistry
A. 3 cl.
Prereq.: 533, 631; or permission of instructor.
Advanced level discussion of electrochemical principles and mass transport processes; discussion of applications to organic and inorganic systems.

822 G 3
Advanced Analytical Chemistry
W. 3 cl.
Prereq.: 821 or permission of instructor.
Kinetic and thermodynamic processes of fundamental importance in the characterization of chemical species.

823 G 3
Advanced Analytical Chemistry
Sp. 3 cl.
Prereq.: 822 or permission of instructor.
Advanced course in the principles of measurement of the interaction of electromagnetic radiation with matter.

831 G 3
Advanced Organic Chemistry
A. 3 cl.
831-832-833 to be taken in sequence.
An advanced course in the fundamental principles of chemistry covering the aliphatic hydrocarbons and their derivatives.

832 G 3
Advanced Organic Chemistry
W. 3 cl.
Prereq.: 831.
An advanced course in the fundamental principles of chemistry covering alicyclic, hydroaromatic, and aromatic compounds.

833 G 3
Advanced Organic Chemistry
Sp. 3 cl.
Prereq.: 832.
An advanced course in the fundamental principles of chemistry covering heterocyclic compounds, carbohydrates, proteins, and enzymes.

835 G 3 or 5
Advanced Organic Chemistry Laboratory
Su, W. 9 lab. hrs.
Prereq.: Permission of student's graduate adviser.
An advanced course in fundamental reactions and procedures with emphasis on recent advances in technique. Fee.

836 G 3 or 5
Advanced Organic Chemistry Laboratory
Su, Sp. 9 lab. hrs.
Prereq.: Permission of student's graduate adviser.
Continuation of 835. Fee.

851 G 3
Advanced Inorganic Chemistry
A. 3 cl.
Prereq.: 533, 652, or permission of instructor.
A survey of modern theories of valence and their application to the problems of structural inorganic chemistry.

852 G 3
Advanced Inorganic Chemistry
W. 3 cl.
Prereq.: 851.
A detailed treatment of the chemistry of the transition elements from the standpoint of molecular and atomic structure, electronic spectra, magnetism, and ligand-field theory.

855 G 3
Advanced Inorganic Chemistry Laboratory
Su. 1 cl., 8 lab. hrs.
Prereq.: 551; 552; 651 or permission of instructor.
Advanced methods for the synthesis, purification, identification, and characterization of inorganic substances. Fee.

861 G 3
Quantum Chemistry I
A. 3 cl.
Prereq.: 533, Physics 133, Math. 255 or 415 or equiv.
Not open to students with credit for 971.
Basic quantum mechanics as a foundation for quantum chemistry; postulates, operators, eigenfunctions, eigenvalues, and Schrödinger wave equations; one-dimensional problems including the harmonic oscillator.

862 G 3
Quantum Chemistry II
W. 3 cl.
Prereq.: 861 or equiv.
Not open to students with credit for 972.
Angular momentum; matrix elements and representations; the hydrogenic atom; perturbation and variation methods, electron spin, and the helium atom; atomic structure and multiplet theory.

863 G 3
Quantum Chemistry III
Sp. 3 cl.
Prereq.: 862.
Not open to students with credit for 973.
Electronic structure of molecules: hydrogen molecule and ion, methane, ethylene, benzene, etc.; molecular orbital, valence bond, and self-consistent field methods.

871 G 3
Research Instrumentation
Sp. 9 lab. hrs.
Prereq.: 553; Physics 132, 133, Math. 255 or equiv.
Background theory and laboratory applications in the use of electrical and electronic instruments in chemical research. Fee.

872 G 3
High Polymers
Su, Sp.
Prereq.: 533.
A course in the physical chemistry of macromolecules and their solutions, including the kinetics of polymerization reactions.
873 G 3
X rays and Electron Diffraction
W. 3 cr.
Prereq.: 872.
An advanced consideration of the theory of X rays and electron diffraction and their applications including Fourier methods of parameter determination in crystals, etc.

875 G 3
Chemical Kinetics I
A. 3 cr.
Prereq.: 533.
Fundamentals of chemical kinetics in homogeneous liquid and gaseous systems.

876 G 3
Chemical Kinetics II
W. 3 cr.
Prereq.: 875.
Continuation of 875; elementary reactions; chain reactions; fast reaction methods; reaction rates in heterogeneous systems.

877 G 3
Radiation and Photochemical Kinetics
Sp. 3 cr.
Prereq.: 875.
The physical and chemical effects of the absorption of radiant energy, with emphasis on kinetics and mechanism.

881 G 3
Thermodynamics
W. 3 cr.
Prereq.: 875 or equiv.
Introduction to thermodynamics; emphasis on training in the use of thermodynamics as a tool for solving chemical problems.

882 G 3
Statistical Thermodynamics
Sp. 3 cr.
Prereq.: 881.
An introduction to statistical thermodynamics, including quantum statistics, entropy and the third law, statistical-spectroscopic calculation of thermodynamic functions of gases, chemical equilibria, and vapor pressure.

985 G 1
Colloquium in Chemistry
A, W, Sp. 1 cr.
Prereq.: Graduate standing in Chem.
Required every qtr. of all registered graduate students in Chem.
A discussion of current research in chemistry; all divisions.

941 G 3
Theoretical Organic Chemistry
A. 3 cr.
Prereq.: 2nd yr. graduate standing, 831-832, 941-942-943: sequence of courses in advanced theoretical organic chemistry.

942 G 3
Theoretical Organic Chemistry
W. 3 cr.
Prereq.: 941.
Continuation of 941.

943 G 3
Theoretical Organic Chemistry
Sp. 3 cr.
Prereq.: 942.
Continuation of 942.

970 G 3
Advanced Thermodynamics
A. 3 cr.
Prereq.: 881.
Continuation of 881 and 882.

981 G 3
Electronic Structure and Spectra of Molecules
W. 3 cr.
Prereq.: 863 or equiv.
An extension of molecular orbital and valence bond theory to larger molecules than those considered in Chemistry 862.

990 G 3
Seminar on Topics in Biochemistry
Su, A, W, Sp. 3 cr.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Advanced topics in the biological aspects of chemistry.

991 G 3
Seminar in Analytical Chemistry
A. 3 cr.
Prereq.: Permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Topic to be announced.

992 G 3
Seminar in Organic Chemistry
A, W, Sp. 3 cr.
Prereq.: Chem. 2nd yr. grad. standing and 831, 832 or equiv. and permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Topic to be announced.

994 G 3-4
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 8 cr. hrs.
Provides an opportunity for innovation and experimentation on new problems in chemistry.

995 G 2 or 3
Seminar in Inorganic Chemistry
A. 2 cr.
Prereq.: 651 and 652 or equiv. and permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Topic to be announced.
Seminar in Theoretical Chemistry
Su, A, W, Sp.  3 cl.
Prereq.: 861, 862, 863; or equiv.
Repeatable to a maximum of 9 cr. hrs.
Advanced topics in theoretical chemistry including
quantum mechanics of molecular wave functions,
energies, and rate processes, and quantum and
statistical mechanics of condensed phases.

Seminar in Physical Chemistry
Su, A, W, Sp.  3 cl.
Prereq.: At least a 2nd yr. grad. standing in Physical
Chem. Repeatable to a maximum of 9 cr. hrs. with permission
of instructor.
Topic to be announced.

Research in Chemistry
Research for thesis or dissertation purposes only.

101  U 5
Elementary Modern Chinese
A.  5 cl.
Basic elements of Modern Chinese (Mandarin); the
four tones, sentence structures, and Chinese characters
(of which 500 will be learned in three quarters).
Ching and Staff.

102  U 5
Elementary Modern Chinese
W.  5 cl.
Prereq.: 101.
Continuation of 101. Ching and Staff.

103  U 5
Elementary Modern Chinese
Sp.  5 cl.
Prereq.: 102 or 110.
Continuation of 102. Ching and Staff.

104  U 5
Intermediate Modern Chinese
W.  5 cl.
Prereq.: 103 or permission of instructor.
Four hundred additional characters, further
combination of characters in three quarters; complex
sentence structure; readings adapted from modern
Chinese literature. Ching and Staff.

105  U 5
Intermediate Modern Chinese
W.  5 cl.
Prereq.: 104 or permission of instructor.
Not open to students with credit for 405.
Continuation of 104. Ching and Staff.

106  U 5
Intermediate Modern Chinese
Sp.  5 cl.
Prereq.: 105 or permission of instructor.
Not open to students with credit for 406.
Continuation of 105. Ching and Staff.

110  U 5 or 10
Intensive Chinese
A.  10 cl.
Prereq.: Permission of dept.
Students with credit for 101 or the equiv. may not
register for more than 5 cr. hrs.; not open to students
with credit for 102.
Accelerated course covering what is done in 101-102;
for students desiring two quarters of language work in
one quarter.

111  U 5 or 10
Intensive Chinese
W.  10 cl.
Prereq.: 102, 110, or permission of instructor.
Students with credit for 103 or the equiv. may not
register for more than 5 cr. hrs.; not open to students
with credit for 104.
Accelerated course covering what is done in 103-104;
for students desiring two quarters of language work in
one quarter.

112  U 5, 10, 15
Intensive Chinese
Su. Prereq.: Permission of dept.
Full time of student and full fees required.
Students with credit for 101 or the equiv. may not
register for more than 10 cr. hrs. Students with credit
for 101 and 102 or equiv. may not register for more
than 5 cr. hrs.
Not open to students with credit for 103 or 111. No
audit.
Elementary modern Chinese (Mandarin) for students
desiring comprehensive knowledge and skills of
Chinese in shortest possible time.

113  U 5 or 10
Intensive Chinese
Sp.  10 cl.
Prereq.: 104, 111, or permission of instructor.
Students with credit for 105 or the equiv. may not
register for more than 5 cr. hrs.; not open to students
with credit for 106.
Accelerated course covering all the work done in
105-106; for students desiring two quarters of language
work in one quarter.
114 U 3
Elementary Chinese Conversation and Composition
Sp. 3 cl.
Prereq.: 102, 110, or permission of instructor.
Oral drills and sentence-making exercises based upon
the vocabulary and sentence patterns acquired in 101
and 102, and concurrently in 103; conducted
predominantly in Chinese.

214 U 3
Intermediate Chinese Conversation and Composition
Sp. 3 cl.
Prereq.: 105 and 114, or permission of instructor.
Exercises in conversation and composition based upon
materials used in 104 and 105, and concurrently in 106;
conducted predominantly in Chinese.

231 U 5
Elements of Chinese Culture
Su. A. 5 cl.
Taught in English.
Not open to students with credit for 271.
Survey of the major philosophical trends of
Confucianism and Taoism in China; discussion of
Chinese mythology, religion, art, and literature.
Lyell.

251 U 3
Chinese Literature in Translation: Early Period
Su. W. 3 cl.
Historical, philosophical, and poetical classics of
China. Lyell.

252 U 3
Chinese Literature in Translation: Middle and Modern Periods
Su. Sp. 3 cl.
Masterpieces of late classical poetry and the
vernacular novel; representative works of modern
fiction, poetry, and drama. Lyell.

501 U 5
Classical Chinese I
A. 5 cl.
Prereq.: 106 or permission of instructor.
Not open to students with credit for 601 or 651.
Selected readings from representative authors of
classical times. Lyell.

502 U 5
Classical Chinese II
W. 5 cl.
Prereq.: 501 or permission of instructor.
Not open to students with credit for 602 or 652.
Continuation of 501. Lyell.

503 U 5
Classical Chinese III
Sp. 5 cl.
Prereq.: 502 or permission of instructor.
Not open to students with credit for 603 or 653.
Continuation of 502. Lyell.

507 U G 5
Advanced Modern Chinese I
A. 5 cl.
Prereq.: 106 or permission of instructor.
Not open to students with credit for 609.
Reading of contemporary prose and verse, presentation
of oral and written reports, drill in tone and intonation,
practice in translation. Hsueh and Staff.

508 U G 5
Advanced Modern Chinese II
W. 5 cl.
Prereq.: 507 or permission of instructor.
Not open to students with credit for 610.
Continuation of 507. Hsueh and Staff.

509 U G 5
Advanced Modern Chinese III
Sp. 5 cl.
Prereq.: 508 or permission of instructor.
Not open to students with credit for 611.
Continuation of 508. Hsueh and Staff.

514 U 3
Advanced Chinese Conversation
and Composition
Sp. 3 cl.
Prereq.: 214 and 508, or permission of instructor.
Practice of conversation, discussion, oral report, and
short speech at an advanced level; use of various taped
materials; theme-writing exercises; conducted entirely
in Chinese.

641 U G 3
History of Chinese Thought
Sp. 3 cl.
Prereq.: 231 or permission of instructor.
Not open to students with credit for 641.
Detailed examination of the major Chinese
philosophies; readings from selected Chinese texts.
Chang.

654 U G 3
History of Chinese Literature I
A. 2 cl.
Prereq.: 503 and 509, or permission of instructor.
Not open to students with credit for 604.
Chinese literature from the earliest times to the end of
Han (early 3rd century); investigation of various
aspects of the classical tradition.

655 U G 3
History of Chinese Literature II
W. 2 cl.
Prereq.: 503 and 509, or permission of instructor.
Not open to students with credit for 605.
Chinese literature from Wei (3rd century) to the end of
Sung (12th century); literary trends and achievements
of the Six Dynasties and the T'ang-Sung period.
History of Chinese Literature III
Sp. 2 cl.
Prereq.: 603 and 609, or permission of instructor.
Not open to students with credit for 606.
Chinese literature from Yuan (13th century) to the present; rise of drama and the novel; modern writers from the Literary Revolution on.

Introduction to Chinese Linguistics
A. 3 cl.
Prereq.: 103 and Ling. 601, or permission of instructor.

History of The Chinese Language
Sp. 3 cl.
Prereq.: 103 and Ling. 601, or permission of instructor.
Not open to students with credit for 627.

Study of the Chinese Writing System
A. 3 cl.
Prereq.: 103 or permission of instructor.
Not open to students with credit for 620 or 684.
A critical study of the origin, classification, composition, and development of the Chinese writing system, including problems in simplification and alphabetization. Ching.

Chinese Translation Workshop
W. 2 cl.
Prereq.: 503 and 509, or permission of instructor.
Investigation of problems and techniques of translating Chinese into English and English into Chinese; practice of translation of selected passages; individual assignments and group discussion.

Individual Studies
Prereq.: 503 and 509, and permission of chairman.
Repeatable to a maximum of 15 cr. hrs.
Directed study to meet individual research needs of students in area studies and East Asian programs; not a substitute for regular language courses.

Group Studies
Prereq.: 503 and 509, or permission of chairman.
Repeatable to a maximum of 15 cr. hrs.
Investigation of minor problems in Chinese language and literature; not a substitute for regular language courses.

Study Tour of Taiwan
Sp. 15 cl., 2 wks. at OSU, 8 wks. in Taiwan.
Prereq.: 25 cr. hrs. of Chin. or permission of instructor.
Advanced work in conversation and reading in order to prepare for the tour; in Taiwan only Chinese will be spoken; some formal instruction given daily by the tour leaders.

Selected Readings in Scholarly Chinese Texts I
A. 3 cl.
Prereq.: 509 or permission of instructor.
Academic writings in the humanities and social sciences by modern Chinese scholars in both the wen-yen and pai-hua styles. Lao.

Selected Readings in Scholarly Chinese Texts II
W. 3 cl.
Prereq.: 751 or permission of instructor.
Continuation of 751. Lao.

Selected Readings in Scholarly Chinese Texts III
Sp. 3 cl.
Prereq.: 752 or permission of instructor.
Continuation of 752. Lao.

Modern Chinese Poetry
A. 3 cl.
Prereq.: 656 or permission of instructor.
Not open to students with credit for 704.
Lectures and readings covering major poets since 1919. Ch'nen.

Modern Chinese Prose
W. 3 cl.
Prereq.: 656 or permission of instructor.
Not open to students with credit for 705.
Studies of various types of prose literature of the May Fourth Movement and the Communist period. Lao.

Modern Chinese Fiction
W. 3 cl.
Prereq.: 656 or permission of instructor.
Not open to students with credit for 706.
Works by major authors before and after 1949. Li.

Modern Chinese Drama
Sp. 3 cl.
Prereq.: 654 and 655, or permission of instructor.
Lectures on and readings in works by major 20th century playwrights including Hung Shen and Ts'ao Yu. Ch'nen.
771* U G 3
Traditional Chinese Poetry
A. 3 cl.
Prereq.: 654 and 655, or permission of instructor.
Not open to students with credit for 703.
Lectures and readings from ancient odes and songs
and the later shih and ts'ao poetry. Ch'en.

772* U G 3
Traditional Chinese Prose
W. 3 cl.
Prereq.: 654 and 655, or permission of instructor.
Lectures on and readings in various types of
non-fiction prose in ki-wen and yi-tao*1 styles of early
times. Lao.

773* U G 3
Traditional Chinese Fiction
W. 3 cl.
Prereq.: 654 and 655, or permission of instructor.
Not open to students with credit for 701.
Lectures and readings in classical and vernacular
fiction. Li.

774* U G 3
Traditional Chinese Drama
Sp. 3 cl.
Prereq.: 654 and 655, or permission of instructor.
Not open to students with credit for 702.
A lecture and reading course in Yuan, Ming, and
Chi'ing drama. Ch'en.

782 U G 3
Chinese Phonology
W. 3 cl.
Prereq.: 660 or 681 or permission of instructor.
Not open to students with credit for 624.
A detailed analysis of the phonological structure
of Mandarin Chinese. Hsueh.

H783† U 3-5
Honors Course
Prereq.: 4th yr. standing; a record of A in at least half
of the Chinese courses taken and an average of B in
the remainder; permission of instructor under whose
supervision the work is to be completed and the
College Committee on Honors.
Failure to receive a grade of at least B in this course
is a disqualification for special honors.
Open only to candidates for B.A. in Chinese.
A program of reading arranged for each student, with
individual conferences, reports and honor thesis.

784 U G 3
Chinese Syntax
Sp. 3 cl.
Prereq.: 680 or 681 or permission of instructor.
Not open to students with credit for 626.
An investigation of the syntactic structure of
Mandarin Chinese. Ching.

785 U G 3
Chinese Dialectology
W. 3 cl.
Prereq.: 680 or permission of instructor.
A comparative study of Chinese dialects and a detailed
analysis of one or two particular dialects.

800 G 3
Chinese Bibliography and Research Methods
A. 3 cl.
Prereq.: 503 and 509 or permission of instructor.
Not open to students with credit for 707.
An introduction to bibliographies and reference
works; general and specific problems for research.
Lao.

804 G 3
Advanced Classical Chinese I
A. 3 cl.
Prereq.: 503 or permission of instructor.
Designed for further study of the syntax and
vocabulary of classical Chinese; texts are selected
from literature, history, and philosophy. Hsueh.

805 G 3
Advanced Classical Chinese II
W. 3 cl.
Prereq.: 804.
Continuation of 805. Hsueh.

806 G 3
Advanced Classical Chinese III
Sp. 3 cl.
Prereq.: 805.
Continuation of 805. Hsueh.

867† G 3-5
Topics and Problems
in Modern Chinese Literature
Prereq.: Permission of instructor.
Intensive exploration of a specific topic or a major
problem.

869 G 3-5
Seminar in Modern Chinese Literature
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
An intensive reading course in modern Chinese
literature with a selected topic for each offering and
research projects for individual students; topic to be
announced.

875* G 5
Chinese Literary Criticism
W. 2 cl.
Prereq.: 3 Chin. literature courses at the 700 level or
permission of instructor.
The historical development of critical theories, with
concentration on major critics. Ch'en.
Chinese Poetics
W. 2 cl.
Prereq.: 761 and 711, or permission of instructor.
An intensive study of Chinese poetic theories, traditional and modern, in relation to the creative process; consideration of several non-Chinese theories of poetry.

Topics and Problems in Traditional Chinese Literature
Prereq.: Permission of instructor.
Intensive exploration of a specific topic or a major problem.

Seminar in Traditional Chinese Literature
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
An intensive reading course in traditional Chinese literature with a selected topic for each offering and research projects for individual students; topic to be announced.

Studies in Chinese Historical Phonology
Sp. 3 cl.
Prereq.: 762 or permission of instructor.
Critical study of the rhyming dictionaries, the reconstruction of the phonology of old Chinese and its relations to modern Chinese dialects. Hsieh.

Chinese Paleography
W. 3 cl.
Prereq.: 683 or permission of instructor.
Study of oracle bone and bronze inscriptions and their development into the modern Chinese writing system. Ching.

Studies in Chinese Historical Syntax
W. 3 cl.
Prereq.: 784 or permission of instructor.
Problems of Chinese historical syntax; grammatical structures of classical Chinese; syntactic rules found in selected texts from various ancient writings. Ching.

Seminar in Chinese Linguistics
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Topics include the history of Chinese linguistics, Chinese linguistics and related areas, specific studies in Chinese dialects, etc.

Research in Chinese: Thesis
Research for thesis purposes only.

Research in Chinese: Dissertation
Research for dissertation purposes only.

Circulation Technology
(School of Allied Medical Professions)
Office: 443 School of Allied Medical Professions
Building, 1583 Perry Street
Associate Professor Vasko (Division Director);
Instructors Dearing (Associate Division Director) and Toth.

The Aseptic Environment
W. 2 cl., 2-3 hr. lab.
Prereq.: Permission of instructor.
An introduction to the aseptic environment with emphasis on the student's function within this environment as a member of the medical-surgical team. Dearing and Staff.

Applied Circulation Technology
Sp. 5 cl., 2 4-hr. lab., 2 2-hr. conf.
Prereq.: Permission of instructor.
The application of anatomic and physiological principles in the use of various perfusion devices. Dearing and Staff.

Circulation Technology Instrumentation
Sp. 3 cl., 2 2-hr. lab.
Prereq.: Permission of instructor.
The application of mechanical and electronic principles to the instrumentation unique to circulation technology with emphasis on design and selection of equipment. Toth.

Research Methodology
A, W, Sp. 5 2-hr. cl.
Prereq.: 410 and 420, or permission of instructor; concur. 550.
Lectures and demonstrations relating circulation technology to research methodology with emphasis on new developments in this area. Toth.

Research Methodology Laboratory
A, W, Sp. 5 4-hr. clinical experiences.
Prereq.: 410 and 420, or permission of instructor; concur. 550.
Application of circulation technology methods to the solution of research problems. Toth.
560 U 7
Life Support Systems
Su, A, W, Sp. 3 hr. cl.
Prereq.: 410 and 420, or permission of instructor; concur. 561.
Lectures and demonstrations relating circulation technology to various life support systems including dialysis and hyperbaric oxygenation. Dearing and Staff.

561 U 8
Life Support Systems Clinical Experience
Su, A, W, Sp. 20 hrs. clinical experience per wk.
Prereq.: 410 and 420, or permission of instructor; concur. 560.
Clinical experience in the application of circulation technology methods to dialysis and other support systems. Dearing and Staff.

570 U 7
Surgical Support Systems
Su, A, W, Sp. 3 hr. cl.
Prereq.: 410 and 420, or permission of instructor; concur. 571.
Lectures and demonstrations relating circulation technology to the clinical use of extracorporeal circulation devices and monitoring instrumentation in surgery. Dearing and Staff.

571 U 8
Surgical Support Systems Clinical Experience
Su, A, W, Sp. 20 hrs. clinical experience per wk.
Prereq.: 410 and 420, or permission of instructor; concur. 570.
Clinical experience in the preparation and operation of extracorporeal circulation devices and monitoring instrumentation in support of surgery. Dearing and Staff.

731 U G 3
Outlines of Urban Design
Sp. 3 cl.
Prereq.: Grad. standing in City Plan. or Arch., or senior standing in Arch. or Land, Arch., or permission of instructor.
Urban design as an area of specialization in urban planning: theories and processes in urban design; evaluation of criteria. Marzuki.

742 U G 3
History of City Planning to 1900
W. 2 cl.
Prereq.: 3rd yr. standing or permission of instructor.
History of city planning from the earliest discovered settlements to the beginning of contemporary planning. Gerckens.

743 U G 4
American City Planning Since 1900
Su, A, Sp. 3 cl.
Prereq.: 3rd yr. standing or permission of instructor.
Not open to students with credit for City-Reg. Plan. 300 or 811.
Evolution of American city planning practices since 1900; investigation of selected theoretical works in urban planning written since 1960. Gerckens.

751 U G 5
Metropolitan Transportation Studies for Urban Planners
A. 4 cr.
Prereq.: Grad. standing or permission of instructor.
Methods and models used in metropolitan transportation studies with emphasis on land-use forecasting, evaluation of alternative plans, and citizen reaction. Mills.

793 U G 1-5
Individual Studies in Urban Planning
Prereq.: Permission of instructor.
Each subdivision repeatable to a maximum of 20 cr. hrs.

793.13 Urban Planning Theory
793.14 Urban Planning Analysis
793.15 Urban Planning Design
793.16 Urban Planning Implementation Programs
793.17 Unclassified

794 U G 1-5
Group Studies in Urban Planning
Prereq.: Permission of instructor.
Each subdivision repeatable to a maximum of 20 cr. hrs.

794.13 Urban Planning Theory
794.14 Urban Planning Analysis
794.15 Urban Planning Design
794.16 Urban Planning Implementation Programs
794.17 Unclassified

812 G 3
Theory of City and Regional Planning
A. 3 cr.
Prereq.: Grad. standing in City Plan.
Planning processes; the general plan; formulating goals; land development policies and decisions; alternative urban and regional forms; role and scope of planning.

813 G 3
Outlines of Regional Planning
Sp. 3 cl.
Prereq.: Grad. standing in City Plan., or in a Conservation program, or 300, 743 or 811.
State, national, and regional planning; components of regional development; regional analysis and design.

832 G 5
Urban Planning Data and Forecasting
Su. W. 3 cl., 6 lab. hrs.
Prereq.: Grad. standing in City Plan.
Sources of information, data handling, forecasting, and basic studies used in urban planning. Mills.

833 G 3
Consequence Analysis in Urban Planning
Sp. 2 cl., 2 lab. hrs.
Prereq.: Grad. standing in City Plan., or permission of instructor.

845 G 5
Physical Elements of Urban Development
A, Sp. 3 cl., 3 lab. hrs.
Prereq.: Grad. standing in City Plan.
Physical components of urban areas; residential, commercial, industrial, pedestrian, and vehicular circulation; other community facilities; analysis of design criteria and standards.

851 G 5
Urban Precinct Planning
Su. W. 3 cl., 6 lab. hrs.
Prereq.: 832 and 845.
Preparation of detailed physical development plans for a small section of a city.

852 G 5
Urban Project and Policy Planning
A, Sp. 2 cl., 9 lab. hrs.
Prereq.: 832 and 845.
Identification of options among planning policies and projects; development of analyses to aid in making choices between options in urban development. Mills.

853 G 5
The Urban General Plan
Su. W. 3 cl., 6 lab. hrs.
Prereq.: 832, 845, 851, 852.
Current practice in preparation of the urban general plan; laboratory exercise in the preparation of a general plan for an urban community. Anderson.

861 G 4
Land-Use Controls
Sp. 3 cl.
Prereq.: Grad. standing in City Plan.
Legal basis of land-use controls in the United States, provisions, procedures and issues in zoning, subdivision regulation, urban renewal, building and housing codes, and acquisition of real property for public use. Simmons.

862 G 5
City Planning Administration
A, Sp. 4 cl.
Prereq.: Grad. standing in City Plan.
Administration of official urban planning agencies; zoning administration; subdivision review practices; capital improvement programming; budget and work program preparation. Anderson.

863 G 3
Urban Issues and the Professional Planner
A, Sp. 3 cl.
Prereq.: Grad. standing in City Plan.
Examination of alternative conceptions of the urban problems of American society; implications of each conception for the urban planning profession. Voss.

864 G 3
Urban Planning Theory Seminar
Su. W. 4 cl.
Prereq.: 761, 851, 852, and 862.
Review of contemporary urban planning programs; analyses of objectives and strategies. Voss.

899 G 1-5
Interdepartmental Seminar
Su. A, W. 5 cl.
(See under Interdepartmental Seminars.)

999 G Arr.
Research in City and Regional Planning
Su. A, W. 5 cl.
Research for thesis purposes only.

Civil Engineering

Office: N470 Hitchcock Hall, 2070 Neil Avenue
Professors Jones (Chairman), Chen, Gray, Karrer, Large (Emeritus), Majidzadeh, Moulton, Ojalvo, Smith, Treiterer, Vandegrift (Emeritus), Washington, Whitehurst, and Wu; Associate Professors B-shara, Bietzacker, Hawnn, Minzer, Purtz, Ricca, Robin, Sandhu, Shumate, and Stiefel; Assistant Professors Hooper, Hughes, Nemeth, and Spear.

202 U 4
Elements of Surveying
A, W. 3 cl., 3 3-hr. lab.
Prereq.: Physics 121.
402 Photogrammetry
W. 3 cl., 1 3-hr. lab.
Prereq.: 202 or 401.
Fundamental geometry and photogrammetric applications to engineering. Mintzer.

403 Surveying II
Sp. 3 cl., 2 3-hr. lab.
Prereq.: 202 or 401, and Engr. Gr. 200.
Topographic mapping, curves, and earthwork. Puritz.

404 City Surveying
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 403.
City control surveys, coordinates of lot and block corners; measurement of details, computation of areas; setting out city plans.

405 Observational Analysis
W. Sp. 4 cl., 1 3-hr. lab.
Prereq.: 202 and Math. 254.
Theory and application of observational analysis. Puritz.

410 Environmental Pollution Control
W. 3 cl.
Prereq.: Chem. 113 or equiv.; concur. Microbiol. 607 or equiv.
Not open to students majoring in Civil E.
A study of the human environment from a health engineering point of view, with emphasis on those facets of the health picture that are controllable by engineering developments. Rubin.

430 Structural Analysis I
A. 3 cl.
Stresses in statically determinate frames and trusses; influence lines, moving loads, and space frames. Chen, Ojaivo, and Bishara.

451 Civil Engineering Materials I
A. 3 cl., 1 3-hr. lab.
Composition and structure of civil engineering materials; elastic, plastic and viscous behavior under various environmental and loading conditions. Majidzadeh.

470 Transportation I
A. 3 cl., 1 3-hr. lab.
Elements of transportation systems; geometric design of transportation facilities, including highways, railways, waterways, and airways; route location and criteria, including aerial photogrammetry. Hawnn and Nemeth.

510 Principles of Hydraulics
A. 3 cl.
Prereq.: Math. 151 and Physics 111 or 113.
Not open to students majoring in Civil E.
Fluid properties; hydrostatics; flow concepts; continuity, energy, and momentum equations and applications; flow measurements, pipe and channel flow; selected topics in groundwater flow. Ricca.

514 Fluid Mechanics
A. 3 cl., 1 3-hr. lab.
Not open to students with credit for 511.
Fluid properties; fluid statics; flow concepts; continuity, energy, and momentum equations; ideal fluid flows; dimensional analysis and dynamic similarity; laboratory demonstrations and exercises. Ricca.

515 Applied Hydraulics
W. 3 cl.
Prereq.: 514.
Not open to students with credit for 511.
Civil engineering applications of fundamental fluid mechanics principles including: fluid drag, pipe and open channel flow, flow measuring devices, turbomachinery, and water hammer; laboratory demonstrations. Ricca.

517 Water Resources Engineering Principles I
Sp. 4 cl.
Prereq.: 512 or 515.
Not open to students with credit for 611.
Basic principles of Water Resources including hydrology, reservoirs, design of transmission, distribution, and collection systems; supply and demand rates; statistical methods. Stiefel.

530 Elementary Structural Engineering
Sp. 3 cl.
Not open to students majoring in Civil E.
Structural analysis of simple structures; introduction to reinforced concrete. Ojaivo.

531 Structural Analysis II
W. 4 cl.
Prereq.: 430 or 530, and Engr. Mech. 420.
Deflections in trusses, beams, and frames; solution of indeterminate structures by methods of consistent deformations, and moment distribution. Chen, Ojaivo, and Smith.

532 Structural Steel Design
Sp. 3 cl., 2 2-hr. lab.
Prereq.: 531.
Not open to students with credit for 631.
Design of steel structures. Ojaivo and Smith.
551  U  4
Soil Mechanics I
A.  3 cl., 1 3-hr. lab.
Prereq. or concur.: Engr. Mech. 420.
Basic and engineering soil properties; fluid flow through soils; compaction, effective stresses and compression. Gray.

552  U  3
Civil Engineering Materials II
W.  2 cl., 1 3-hr. lab.
Prereq.: 451.
Composition, properties, and production of portland cement concrete, bituminous materials, and bituminous mixtures. Majzdbadz.

553  UG  3
Soil and Structural Mechanics
W, Sp.  3 cl.
Properties of soils and structural materials and their application to analysis of stresses and displacements in soil masses and structural members. Wu, Ojalvo, and Sandhu.

570  UG  5
Transportation Planning
A.  4 cl., 2-hr. seminar.
Prereq.: Permission of instructor.
Not open for credit to students in Civil E.
An analysis of engineering factors affecting location, geometric design, operation, maintenance, and management of coordinated transportation systems. Karrer.

572  UG  4
Transportation II
W.  3 cl., 1 3-hr. lab.
Prereq.: 405, 451, and 470.
Design, construction, and maintenance of roadway, railway, and runway structures including earthwork and drainage, and flexible and rigid pavements. Hawnn and Nemeth.

574  UG  3
Transportation III
W, Sp.  3 cl.
Prereq.: 572.
Operations and control of transportation systems, and evaluation of their performance in efficiency and safety; economics of alternative transportation systems. Hawnn and Nemeth.

575  U  3
Economic Analysis of Civil Engineering Projects
A, W.  3 cl.
Prereq.: 4th yr. standing in Engineering.
Principles of engineering economic analysis with emphasis on public investment in civil engineering projects and alternative designs and construction methods. Nemeth.

582†  U  3
Mining Systems Engineering
A.  3 cl.
Prereq.: 552 and Geol. 100.
Fundamentals of mining systems for bedded, massive, vein, and surface deposits.

602  UG  4
Applications of Photo Interpretation in Land Use Planning
A.  3 cl., 1 3-hr. lab., 2 half-day field trips.
Not open for credit to students majoring in Civil E.
The nature, scope, principles, and methodology of, and techniques of photo interpretation and their applications in the analysis of land use. Mitzner.

613  UG  4
Applied Hydrology
A.  4 cl.
Prereq.: 512 or equiv.
Hydrologic cycle, meteorology, streamflow, evapotranspiration, hydrographs, run off relations, runoff, hydrographs, groundwater, unit hydrographs, flood routing, frequency and duration studies, and application of hydrologic techniques. Ricca.

617  UG  4
Water Resources Engineering Principles II
A.  4 cl.
Prereq.: 517 or 611.
Not open to students with credit for 612.
Not open for grad. credit for students majoring in Civil E.
Unit operations in wastewater supply and wastewater recovery including selection, treatment methods and equipment, and quality criteria. Rubin and Stiefel.

632  UG  5
Reinforced Concrete Design I
A.  5 cl.
Prereq.: 531 and 552.
Not open for grad. credit to students majoring in Civil E.

651  UG  5
Soil Mechanics
A.  4 cl., 1 3-hr. lab.
Prereq.: 553.
Not open for grad. credit to students majoring in Civil E.
Stress distribution; shear phenomena, lateral earth pressure, settlement, and soil stability. Hooper and Wu.

652  UG  4
Mechanical Properties of Engineering Materials
W.  4 cl.
Prereq.: 451.
Elasticity, plasticity, viscoelasticity, fatigue and fracture phenomena in Civil Engineering materials. Jones.

653  UG  4
Principles of Rock Mechanics
Sp.  4 cl.
Prereq.: 651.
Not open to students with credit for 581.
Fundamental rock properties and their measurement; analysis of rock masses; design and stabilization of underground openings and slopes. Hooper.
Fundamentals in Traffic Engineering
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 572.
An introduction to traffic characteristics, measurements, controls, and regulations; elements in traffic operation, design, and planning. Treiterer.

Highway Location and Design
W. 2 cl., 1 3-hr. lab.
Prereq.: 572.
Geometric design of roads and streets; determination of alignment, grade, intersections, and traffic capacity of rural roads. Nemeth.

Airport Design and Operation
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 572.
Airport configuration, design, and capacity; development of the terminal area; operational aspect of air traffic and the terminal area; design and operation of heliports. Treiterer.

Highway Engineering Projects
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 512 or 515, 572, 651.
Not open to students with credit for 776.
Integrated student projects involving the application of principles and methods used in the design and construction of multi-lane highways. Mintzer and Nemeth.

Individual Studies
Prereq.: Permission of instructor.
Individual conferences, assigned readings and reports on minor investigations.

Civil Engineering Applications of Photo-Interpretation
Sp. 2 cl., 2 2-hr. lab.
Prereq.: 402, 572, and 1 course in geol.
Principles of photo-interpretation, geology, and geomorphology applied to construction, transportation, and hydraulic problems; studies of air-photo indices of soils and aggregate sources; and construction problems. Mintzer. Fee.

Sanitary Engineering Laboratory
A. 2 3-hr. cl., and lab.
Prereq.: 612, Chem. 113 or equiv., and Microbiol. 607 or equiv.
A laboratory study of the sanitary engineering indices pertinent to the control of water, sewage, streams, and industrial waste quality. Rubin.

Environmental Engineering Measurements
W. 2 cl., 2 2-hr. lab.
Prereq.: 711, Chem. 221 or permission of instructor.

The application of advanced physical and chemical measurements to environmental engineering problems; instrumentation involving spectrophotometric, chromatographic, respirometry, and radiation measurement techniques. Rubin.

Environmental Pollution Abatement
W. 5 cl.
Prereq.: Senior or grad. majors in engineering or sciences.
Not open to students with credit for Agr. E. 714, Chem. E. 714, and Met. E. 714.
(Cross-listed in the Depts. of Agr. E., Chem. E., and Met. E.)
Problems, philosophies, principles, and methods of pollution abatement in the total environment; quantitative approaches to waste management in air, water, and land systems.

Water Resources Engineering Projects
A. 3 cl.
Prereq.: 612.
An integrated study of design principles and of methods used on engineering projects involving dams, reservoirs, and related facilities.

Design of Hydraulic Structures
W. 4 cl.
Prereq.: 517 or 611.
Basic engineering economic studies, water law, design concepts, reservoir engineering, river hydraulics, spillways and energy dissipators, and wave motion and forces. Ricca.

Open Channel Hydraulics
Sp. 4 cl.
Prereq.: 517 or 611.
Flow classifications, channel properties, energy and momentum principles, critical flow, uniform flow formulas, erodible and nonerodible channel design, and gradually varied flow profile computations. Ricca.

Pipe Line Engineering
A. 3 cl.
Prereq.: 612 or 617.
Hydraulic design for capacity of water, sewer, drain, and culvert pipe lines; load capacity design for bedding, backfill, and traffic loads; pipe line appurtenance and accessories.

Water Treatment Plant Design
W. 3 cl.
Prereq.: 612 or 617.
Preliminary and final plant designs, layout, and details involving hydraulic, structural, and process considerations; process fundamentals which affect design instrumentation.
727 U G 3
Wastewater Treatment Plant Design
Sp. 3 cl.
Prereq.: 612 or 617.
Preliminary and final plant design, layout and details involving hydraulic, structural, and process considerations, process fundamentals which affect design instrumentation.

731 U G 4
Reinforced Concrete Design II
W. 4 cl.
Prereq.: 632.
Analysis and design of reinforced concrete systems. Bishara and Chen.

732 U G 3
Timber Design
W. 3 cl.
Prereq.: 532.
Basic properties of and design practice for timber when used as a construction material in engineering structures. Smith.

734 U G 3
Design of Arch Structures
A. 3 cl.
Prereq.: 531, 532, and 632.
The analysis and design of arch structures. Smith.

735 U G 5
Matrix Structural Analysis
Sp. 5 cl.
Prereq.: 531 or equiv.; or permission of instructor.
Not open to students with credit for 635.
Analysis of skeletal structures by force and displacement methods using matrices. Chen.

736 U 4
Bridge Engineering Projects
W. 4 cl.
Prereq.: 731.
Integrated student projects involving applications of principles and methods used in the design and construction of bridge structures. Smith.

737 U G 3
Prestressed and Precast Concrete Structures
W. 3 cl.
Prereq.: 632.
Structural analysis and proportioning of prestressed concrete members and of precast structural concrete systems. Bishara.

738 U G 5
Plastic Analysis and Design
Sp. 5 cl.
Prereq.: 532.
Structural behavior in the inelastic range; prediction of collapse loads; structural design according to the plastic methods. Ojaio.

739 U G 5
Advanced Structural Engineering
A. 5 cl.
Prereq.: 532.
Not open to students with credit for 630.
Analysis and design of statically indeterminate beams, frames, and trusses, using classical methods of analysis. Smith.

751 U G 4
Principles of Foundation Analysis and Design
W. 4 cl.
Prereq.: 651.
Subsurface exploration; shallow foundations; piles and caissons; embankments and excavations. Hooper and Wu.

752 U G 4
Soil Stabilization and Earthwork Design
A. 3 cl., 1 3-hr. lab.
Prereq.: 551 or 651.
Properties of compacted soils; principle of soil stabilization and earthwork design. Gray.

753 U G 4
Pavement Design and Materials
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 552.
Not open to students with credit for 772.
Properties of paving mixtures, cementing binder and mixtures, and principles of pavement design and performance evaluation. Majidzadeh.

774 U G 5
Traffic Engineering I
A. 4 cl., 1 3-hr. lab.
Prereq.: 572; prereq. or concur. 405 or Statist. 520.
Not open to students with credit for 871.
Traffic characteristics and studies; theory of traffic flow, dynamics of traffic movement, intersection performance, capacity, parking, accidents, origin-destination. Treiterer.

781 U G 3
Construction Methods and Equipment
A. 2 cl., 1 3-hr. lab.
Prereq.: 572 or 671.
Not open to students with credit for 771.
Selection and management of construction equipment in building of highways, dams, airports, bridges, and structures. Karrer.

783 U G 4
Management of Engineering Construction
W, Sp. 2 cl., 2 2-hr. lab.
Prereq.: 781.
Not open to students with credit for 773.
Planning, scheduling, and supervision of engineering construction projects; use of Critical Path Method, bar charts, and other techniques. Karrer.
794  U G 3-5
Group Studies in Civil Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs., not more than 8 of which shall be in any one of the following fields.
The student must register for particular topics from fields of civil engineering listed below; the topics, cr. hrs., and instructors will be announced in quarter previous to the quarter offered.
a. Structural Engineering.
c. Sanitary Engineering.
d. Highway and Transportation Engineering.
e. Geodetic and Photogrammetric Engineering.
f. Construction.
g. Materials.
h. Hydraulics and Hydrology.

801†  G 3-5
Geodesy
A, Sp.
Prereq.: Math. 255; Civil E. Master's candidates.
Triangulation reconnaissance, use and computation of geographic coordinates, study of various systems of plane coordinates, the more common map projections, geodetic astronomy and other problems involving the figure of the earth.

810  G 5
Principles of Advanced Sanitary Engineering
A. 3 cl., 2 3-hr. lab.
Prereq.: 612; prereq. or concur. 711.
Advanced analysis and design theory pertinent to the field of sanitary engineering, including water supply, waste water disposal, stream and environmental sanitation, and atmospheric pollution. Shumate.

811  G 5
Principles of Advanced Sanitary Engineering
W. 3 cl., 2 3-hr. lab.
Prereq.: 810.
Continuation of 810.

812  G 5
Principles of Advanced Sanitary Engineering
Sp. 3 cl., 2 3-hr. lab.
Prereq.: 811.
Continuation of 811.

826  G 1
Seminar in Environmental Science and Engineering
A, Sp. 1-2- hr. cl.
Repeatable to a maximum of 3 cr. hrs.
Lectures and discussions by faculty and guest speakers of topics relating to environmental pollution and its control. Term paper required. Rubin.

833  G 5
Concrete Shell Structures
A. 5 cl.
Prereq.: 632 and Math. 512.
Analysis and design of folded plate, barrel, and other prismatic structures; domes, hyperbolic and elliptical paraboloids. Ojalvo.

834  G 5
Structural Analysis and Design for Dynamic Disturbances
W. 5 cl.
Prereq.: 532, 731, and Engr. Mech. 410; or equiv.; or permission of instructor.
Structural dynamics; principles and practice of dynamic design; numerical and graphical methods. Chen.

836  G 3
Advanced Matrix Analysis of Structures
A. 3 cl.
Prereq.: 735.
Comprehensive presentation of principles of structural analysis in matrix algebra; efficient methods of analysis of complex structures; finite element method in structural analysis. Sandhu.

837  G 4
Advanced Structural Dynamics
W. 4 cl.
Prereq.: 834 or Engr. Mech. 731.
Stresses and deflections in structures under dynamic loads; response of large structural systems to earthquake, wind, moving loads; approximate and exact solution techniques. Sandhu.

838  G 4
Two-Dimensional Problems in Linear Solids
Sp. 4 cl.
Prereq.: 856; and Engr. Mech. 740 and 754.
Formulation of two-dimensional boundary value and initial boundary value problems for linear solids; geometric nonlinearities; refined theories; variational principles; approximate and exact solution techniques. Sandhu.

850  G 5
Seepage in Permeable Materials
A. 5 cl.
Prereq.: 651.
Analysis of seepage and drainage in connection with excavation, dams, wells, slopes, and subsurface drainage; electro-osmosis. Gray and Wu.

851  G 5
Advanced Soil Properties
W. 3 cl., 6 lab. hrs.
Prereq.: 651.
Detailed study and analysis of the mechanical properties of soils, with applications to foundation behavior. Gray and Wu.
852 G 5 Structural Pavements and Earth Materials
Su. 5 cl.
Prereq.: 851 and 856.
Analysis and design of materials for pavements and
other civil engineering projects; properties considered
include fracture, fatigue, and physical-chemical
composition. Majidzadeh.

853* G 5 Soil-Structure Interaction I
Sp. 5 cl.
Prereq.: 851.
Beams and struts in elastic foundation; pavement
slabs; analysis and design of pile groups resisting
lateral loads; stress distribution in soils. Gray.

854* G 3 Theoretical Soil Mechanics
W. 3 cl.
Prereq.: 850 and 851.
Use of mathematical and numerical methods in
solution of soil mechanics problems; stress and
displacements in soil masses and slopes, earthquake
stresses, consolidation and frost penetration.
Gray, Sandhu, and Wu.

855* G 5 Soil-Structure Interaction II
Sp. 5 cl.
Prereq.: 851.
Plastic equilibrium of soil masses; bearing capacity
theories; slope stability analysis; earth pressure
theories; comparison between theoretical and
experimental results. Wu.

856 G 5 Viscoelasticity I
Sp. 5 cl.
Prereq.: 652 and Math. 512.
Viscoelastic materials and their characteristics,
discrete element models, spectral representation,
creep and relaxation functions, and dynamics of
viscoelastic behavior. Majidzadeh.

857 G 5 Theory of Viscoelasticity
A. 5 cl.
Prereq.: 856 and Math. 534.
Operational form of the stress-strain equation, stress
analysis in viscoelasticity, quasi-static problems, and
dynamic problems. Majidzadeh.

858* G 3 Soil Dynamics
A. 3 cl.
Prereq.: 851 and Engr. Mech. 731, or permission of
instructor.
Stress waves in soils and vibration in soil masses;
s soil behavior under impact and repeated loading;
design problems including vibrating foundations, blast
pressures, and seismic stability. Wu.

870 G 5 Highway Administration
Sp. 5 cl.
Prereq.: 672.
A study of organization for planning, constructing,
maintaining, and operating systems of roads and
streets. Hawnn and Karrer.

872 G 5 Traffic Engineering II
W. 4 cl., 1 3-hr. lab.
Prereq.: 871 or equiv.
Principles of traffic operations in rural and urban
areas; traffic laws, regulations, control and
administration; street lighting, bus operation, parking,
and terminal operations. Treiterer.

873 G 5 Traffic Engineering III
Sp. 4 cl., 1 3-hr. lab.
Prereq.: 872 or equiv.
Urban transportation: principles of trip generation,
forecasting distribution and assignment, network
analysis, mass transportation planning, terminal
location, evaluating alternative urban transportation
systems, and trends in urban technology. Treiterer
and Nemeth.

885 G 3-5 Advanced Civil Engineering
Prereq.: Permission of dept. chairman.
Repeatable to a maximum of 20 cr. hrs., not more than
10 of which shall be in any one of the fields listed
below.
This course is intended to give the advanced students
opportunity to pursue advanced study; work undertaken
may be elected in the following fields of civil
engineering.

a. Structural Engineering.
c. Sanitary Engineering.
d. Highway and Transportation Engineering.
e. Geodetic and Photogrammetric Engineering.
f. Construction.
g. Materials.
h. Hydraulics and Hydrology.

896 G 1-3 Interdepartmental Seminar
in Polar and Alpine Studies
Sp.
(See under Interdepartmental Seminars.)

999 G Arr.
Research in Civil Engineering
Research for thesis or dissertation purposes only.
Classics

Office: 217 Derby Hall, 154 North Oval Drive

Professors: Morrison (Chairman), Abbott, Belknap, Lenardon, Forbes (Emeritus), and Titchener (Emeritus); Associate Professors Davis, Hahn, and Schlam; Assistant Professors Shumaker, Snyder, and Tracy; Instructor: Sweet.

See also Greek and Latin and Medieval and Renaissance Studies.

120 U 3
Aspects of Greek Civilization
A.
Not open to students with credit for 124, 125, 220, 221, 222, 224, or 225.
Introductory studies concentrating on one area such as: The Bronze Age; Fifth Century Greece; The Age of Alexander. Snyder.

121 U 3
Aspects of Roman Civilization
W.
Not open to students with credit for 124, 125, 220, 221, 222, 224, or 225.
Introductory studies concentrating on one area such as: The Republic; The Augustan Age; The Empire. Babcock.

122 U 3
Aspects of Classical Religion and Mythology
Su, Sp.
Not open to students with credit for 124, 125, 220, 221, 222, 224, or 225.
Introductory studies concentrating on one area such as: Saga; the Gods—Myth and Ritual; Roman Religion and Mythology. Sweet.

H124 U 5
The Greeks
A. 2 2-hr. cl.
Prereq.: Open only to Freshman Honors Scholars and freshmen enrolled in the Honors Program of a college; permission of Dept.
Discussion of the Greek achievement in literature, history, art, and archaeology. Tracy.

H125 U 5
The Romans
Sp. 2 2-hr. cl.
Prereq.: Open only to Freshman Honors Scholars and freshmen enrolled in the Honors Program of a college; permission of Dept.
Discussion of the Roman achievement in politics, literature, architecture, law, and education. Shumaker.

210 U 3
Classical Background of Scientific Terminology
A, W, Sp. 3 cl.
Study of technical and scientific terms from Greek and Latin sources; roots, word elements, word formation, analysis; helpful in medical, biological, and kindred studies.

220 U 5
Greek Literature in Translation
A, W, Sp. 5 cl.

221 U 5
Latin Literature in Translation
A, W, Sp. 5 cl.

222 U 5
Classical Mythology
A, W, Sp. 5 cl.
Not open to students with credit for 222.

224 U 5
Classical Civilization: Greece
Su, A, Sp. 5 cl.
Not open to students with credit for 224.
A survey of ancient Greek civilization, concentrating upon important facets of literature, history, art, and archaeology. Tracy and Lenardon.

225 U 5
Classical Civilization: Rome
W. 5 cl.
Not open to students with credit for 225.
A survey of the civilization of ancient Rome, concentrating upon important facets of literature, history, art, and archaeology. Schlam.

501++ U G 3
Studies in Ancient Tragedy
A. 3 cl.
Prereq.: One of the following: 120, 121, 122, H124, H125, 220, 221, 222, 224, 225; Comp. Lit. 101, 112, 103; Engl. 220, 262; Hist. 501, 502, 503, 501; Thitre. 165.
Studies in the form, content, and subsequent literary influence of Greek and Latin tragedy, based on readings of English translations.

502++ U G 3
The Comic Spirit in Antiquity
W. 3 cl.
Prereq.: One of the following: 120, 121, 122, H124, H125, 220, 221, 222, 224, 225; Comp. Lit. 101, 112, 103; Engl. 220, 262; Hist. 601, 602, 603, 604; Thitre. 165.
Studies in the comic literature of the Greco-Roman world, to be drawn from epic, drama, satire, and the novel.

503++ U G 3
Studies in Greek and Roman Epic
Sp. 3 cl.
Prereq.: One of the following: 120, 121, 122, H124, H125, 220, 221, 222, 224, 225; Comp. Lit. 101, 112, 103; Engl. 220, 262; Hist. 601, 602, 603, 604; Thitre. 165.
Studies in the form, content, and subsequent literary influence of Greek and Latin epic, based on readings of English translations.

504++ U G 3
Religious Thought and Institutions in the Greco-Roman World
A. 3 cl.
Prereq.: One of the following: 120, 121, 122, H124, H125, 220, 221, 222, 224, 225; Anthro. 515; Hist. 601, 602, 603, 604; Philos. 210, 270, 511; Pol. Sci. 365.
Selected topics from the history of Greek and Roman religion, based on readings in ancient and secondary sources.
505*  U G 3
Political Thought and Institutions in the Greco-Roman World
Sp.  3 cl.
Prereq.: One of the following: 120, 121, 122, H125, H126, 220, 221, 222, 224, 225; Anthro. 515; Hist. 601, 602, 603, 604; Philos. 210, 270, 511; Pol. Sc. 365.
Selected topics concerning the development of ancient political theory. Babcock.

506*  U G 3
Greek and Roman Science and Technology
A.  3 cl.
Prereq.: One of the following: 120, 121 122, H124, H125, 220, 221, 222, 224, 225; Anthro. 515; Hist. 601, 602, 603, 604; Philos. 210, 270, 511; Pol. Sc. 365.
The origins and achievements of Greek and Roman science and technology. Haehn.

694  U G 1-5
Group Studies
Sp.
Prereq.: Permission of instructor.
Repeatability to a maximum of 15 cr. hrs.
Investigation of particular problems in various areas of classical studies.

Comparative Literature and Languages

Office: 227 Derby Hall, 104 North Oval Drive
Mr. Lawson (Chairman); Professors Haber (Emeritus) and Rodgers (Emeritus); Assistant Professors Burkman and Wehner; Instructor Rodriguez.

101  U 3
Man Views Himself Through Literature: Social and Individual Man
H101 (Honors) may be available to students enrolled in a college Honors Program.
1st or 2nd yr. standing only.
101, 102, and 103 provide a sequence but may be taken independently.
Literary examples of the conflict between man's existence as social being and the urge to maintain authenticity of his inner life; Iliad to Kafka.

102  U 3
Man Views Himself Through Literature: Religious and Secular Man
1st or 2nd yr. standing only.
H102 (Honors) may be available to students enrolled in a college Honors Program.
101, 102, and 103 provide a sequence but may be taken independently.
Man's attempt to cope with ultimate problems of existence lead to variety of responses; Divine Order (Dante) to universe without any discernible order (Beckett).

103  U 3
Man Views Himself Through Literature: Rational and Passionate Man
1st or 2nd yr. standing only.
H103 (Honors) may be available to students enrolled in a college Honors Program.
101, 102, and 103 provide a sequence but may be taken independently.
Development of rational and passionate in human nature; Lucretius to Heller show man's attempt to reconcile, ignore, or suppress one at expense of the other.

201  U 5
Absurdist Drama and Theory
A, W, Sp.  5 cr.
Prereq.: 3 cr. hrs. in literature.
Study of absurdist authors; several critical-theoretical works about contemporary comedy and the study of comic antecedents.

202  U 5
The Picaresque Tradition
A, W, Sp.  5 cr.
Prereq.: 3 cr. hrs. in literature.
Concentrating exclusively on the picaresco and picaresque tradition in European and American literature from origins in the 16th century to counterpart in present.

203  U 5
Shorter Prose Forms
A, W, Sp.  5 cr.
Prereq.: 3 cr. hrs. in literature.
Systematic study of the essay: its development as a genre; various forms and styles; broad selection for comparative purposes of famous essays.

301  U 5
Concepts of Love in European Literature
A.  5 cr.
Prereq.: 5 cr. hrs. in literature and jr. standing.
Study of various concepts of love as they appear in and influence European literature from ancient authors to Shaw.

302  U 5
Women Prose Writers of the 19th and 20th Centuries
W.  5 cr.
Prereq.: 5 cr. hrs. in literature and jr. standing.
An evaluation of women as creators and subjects of literature.

303  U 5
Confessional Literature of Continental Europe: The Self Revealed
Sp.  5 cr.
Prereq.: 5 cr. hrs. in literature and jr. standing.
Study of the individual as revealed in personal literature: memoirs, confessions, autobiographies, and novels containing substantial portions of autobiographical material.
Computer and Information Science

Office: 102 Caldwell Laboratory, 2210 Neil Avenue


240 U 3

Computer Programming and Data Processing I
Su, A, W, Sp. 3 cl.
Prereq.: Math. 116, 121, or 150.
Not open to students with credit for 241 or Engr. Gr. 200.
Introduction to programming language: laboratory experience with computers; emphasis on business and statistical applications.

241 U 5

Digital Computer Programming I
Su, A, W, Sp. 5 cl.
Prereq.: Math. 152.
Not open to students with credit for 240 or Engr. Gr. 200.
Introduction to programming language: laboratory experience with computers; emphasis on scientific applications.

294 U 1-5

Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Students are given an opportunity to pursue special studies not otherwise offered.

440 U 3

Computer Programming and Data Processing II
Su, A, W, Sp. 3 cl.
Prereq.: 240, 241, or Engr. Gr. 200.
Not open to students with credit for 543.
Good working knowledge of programming and programming languages, with emphasis on applications in business and the humanities; laboratory use of computers.
549 U G 3
Numerical Analysis for High School Teachers
Su. 3 cl.
Prereq.: Permission of instructor.
Open only to NSF Summer Institute participants.
Basic techniques of numerical analysis; finite
differences, interpolation, solution of equations,
integration; laboratory use of computers.

550 U G 5
Introduction to Information
Storage and Retrieval
A, W, Sp. 5 cl.
Prereq.: 246, 247, or Engr. Gr. 200.
Introduction to fundamental concepts of information
storage and retrieval; discussion of existing systems
and their shortcomings; emphasis on current
research and new developments.

555 U G 5
Survey of Programming Languages
Su, W, Sp. 5 cl.
Prereq.: 543.
Survey of programming languages for digital
computers, comparison of various procedure-oriented
languages; implementation techniques.

594 U G 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Designed to give the student an opportunity to pursue
studies not otherwise offered.

Human Performance
(See under Psych. 620.)

640 U G 5
Numerical Analysis
A, Sp. 5 cl.
Prereq.: 240, 241, or Engr. Gr. 200; Math. 255 or 556,
and Math. 550; or grad. standing and permission
of instructor.
Mathematical analysis of standard numerical methods
for interpolation, approximation, and quadrature;
umerical solution of nonlinear equations and
ordinary differential equations.

641 U G 5
Computer Systems Programming I
Su, A, W, Sp. 5 cl.
Prereq.: 543 or permission of instructor.
Usage of symbolic assembler language and macro
assembler programming; introduction to assemblers,
compilers, data structures, operating systems, and
machine architecture.

642 U G 5
Numerical Linear Algebra
W. 5 cl.
Prereq.: 541 or 646, and Math. 571 or 601.
Numerical treatment of systems of linear equations,
inversion of matrices, and characteristic roots and
vectors of matrices.

643 U G 5
Linear Optimization Techniques
in Information Processing
A. 5 cl.
Prereq.: 243, and Math. 571 or 603.
Theory of linear programming and duality methods;
design and use of computer solutions; post-optimal
analysis; computer economics; integer programming.

644 U G 5
Advanced Computer Programming
A, W. 5 cl.
Prereq.: Grad. standing in Compu. and Info. Sc. or
permission of instructor.
Not open to students with credit for 641.
Introduction to symbolic assembler language, data
structures, and macros; advanced computer
programming techniques and application.

652 U G 3
Modeling of Information Systems
A. 3 cl.
Prereq.: Statist. 426 or 521.
Construction of models of information systems;
information system components; waiting line models;
simulation models; applications of modeling and
simulation of information systems.

675 U G 5
Digital Computer Organization
Su, W. 5 cl.
Prereq.: 543 and Math. 577, or grad. standing in
Compu. and Info. Sc.
Not open to students with credit for Elec. E. 760.
Boolean algebra, simplification of switching circuits,
memory elements, design of arithmetic units and
control units, error-correcting codes.

680 U G 5
Data Structures
Sp. 5 cl.
Prereq.: 641 or 644, and Math. 577; or grad. standing.
Data structure configurations; stacks, linked lists, and
trees; dynamic storage allocation; searching and
sorting techniques.

693 U G 1-5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Students are given an opportunity to pursue special
studies not otherwise offered.

694 U G 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Students are given an opportunity to pursue special
studies not otherwise offered.
705 U G 5
Introduction to Computer and Information Science
A, Sp. 5 cl.
Prereq.: Grad. standing in Compu. and Info. Sc. or permission of instructor.
Introduction to the broader applications of information theory as concerned with computer and information science.

706 U G 3-5
Information Theory in Behavioral Science
A. 3 cl.
Prereq.: Permission of instructor.
Communication-theoretic models of human information processing; uncertainty and structure as unifying concepts in behavioral science; information-theoretic measures applied to variables affecting human performance.

710 U G 5
Man-Machine Interface
W. 5 cl.
Prereq.: Math. 254 and Psychol. 620.
Information continuity and system operation; information display and regulation; role and usage of operator in information acquisition and transmissions, automation, machine augmentation of operator function.

720 U G 5
Introduction to Linguistic Analysis
Su., W. 5 cl.
Prereq.: Permission of instructor.
Introduction to language structure; grammatical description of language; mathematical properties of language representative of information in sentences.

726 U G 3
Theory of Automata I
A. 3 cl.
Prereq.: Grad. standing or permission of instructor.
Introduction to the mathematical theory of automata; mathematical background, various types of abstract machines, and decomposition theory of finite automata.

727 U G 3
Theory of Automata II
W. 3 cl.
Prereq.: 726.
Continuation of 726; includes recursive and partial recursive functions, complexity of computation, regular expressions, and Turing machines.

728 U G 3
Theory of Automata III
Sp. 3 cl.
Prereq.: 727.
Continuation of 727; artificial languages, context-free and context-sensitive languages, stochastic automata, and random processes in sequential machines.

730 U G 5
Basic Concepts in Artificial Intelligence
W. 5 cl.
Prereq.: 705; prereq. or concurr.: Statist. 521.
Basic concepts of artificial learning and intelligent systems; theories, contemporary models; implementation by hardware and computer simulation.

735 U G 5
Statistical Methods in Pattern Recognition
Sp. 5 cl.
Prereq.: 705 and Statist. 520, or permission of instructor.
Decision theory models in pattern recognition; parametric and nonparametric methods; linear machines; supervised and unsupervised learning; interactive clustering methods; feature selection; applications.

740 U G 5
Computer Systems Programming II
Sp. 5 cl.
Prereq.: 641 or 644.
Introduction to job, task, and data management; memory management, and system macro-instructions; expert use of job control language.

(See Math. 741, 742, and 743.)

745 U G 5
Numerical Solution of Ordinary Differential Equations
Sp. 5 cl.
Prereq.: 640, or 541 and permission of instructor.
Not open to students with credit for 645.
Ordinary differential equations; Milne's method, Simpson's method, Runge-Kutta methods; two-point boundary value problems; experiments using computers.

746 U G 5
Advanced Numerical Analysis
Sp. 5 cl.
Prereq.: 642 and 745, or permission of instructor.
A careful treatment of some of the principal numerical algorithms; complete error analysis; emphasis on recent developments.

750 U G 5
Modern Methods of Information Storage and Retrieval
A, Sp. 5 cl.
Prereq.: 550, or grad. standing and permission of instructor.
Fundamental and modern concepts of storing and retrieving information; current problems and problem solutions.

751 U G 3
Fundamentals of Document-Handling Information Systems
W. 3 cl.
Prereq.: 750.
Fundamentals of information systems: types of systems, design principles, inputs, storage and maintenance; outputs; vocabulary control; monitoring and management; performance evaluation.

752 U G 3
Techniques for Simulation of Information Systems
W. 3 cl.
Prereq.: Statist. 426 or 521.
Introduction to the methodology and techniques of the design of computer simulation of information systems.
Introduction to the methodology and techniques of file design, and description of techniques that have been used to implement these designs in automated information systems.

780  U G 1-5
Intermediate Studies in Computer and Information Science
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.; subdivisions repeatable.
Intermediate work in one of the specialized areas of computer and information science is offered.

780.01 Theory of Information
780.02 Information Storage and Retrieval
780.03 Theory of Automata
780.04 Artificial Intelligence
780.05 Pattern Recognition
780.06 Computer Systems Programming
780.07 Programming Languages
780.08 Computer Organization
780.09 Numerical Analysis
780.10 Man-Machine Interaction
780.11 Formal Languages
780.12 Management Information Systems
780.13 Biological Information Processing
780.14 Socio-Psychological Aspects of Information Processing

793  U G 1-5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
The individual student is given an opportunity to pursue special studies not otherwise offered.

794  U G 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Students are given an opportunity to pursue special studies not otherwise offered.

797  U G 1-5
Interdepartmental Seminar
A, W, Sp.  1-5 cr.
Repeatable to a maximum of 6 cr. hrs.
(See under Interdepartmental Seminars, Academic Policies and Course Offerings Catalog.)

805  G 3-5
Information Theory in Physical Science
W.  3-5 cr.
Prereq.: 705 or permission of instructor.
Logical structure of measurement and communication, resulting common areas of information theory and physical science; informational nature of organization; informational generalization of physical entropy, applications.

806  G 3-5
Cellular Automata and Models of Complex Systems
Sp.  3-5 cr.
Prereq.: 705 or permission of instructor.
Cellular automata and formal languages applied to problems of modeling complex systems, possible physical and biological realizations; techniques.
812*  G 5
Computer and Information Science
Research Methods
Sp.  4 cl., 1 2-hr. lab.
Prereq.: Statist. 321 and 325.
Research strategy, statistical evaluation, design, analysis, and interpretation of data obtained from information systems experimentation.

Human Performance Theory
(See under Psych. 816.)

820  G 3
Computational Linguistics
Sp.  3 cl.
Prereq.: 720 or Ling. 601, and Math. 254.
Mathematical and computational techniques in the study of language; theoretical foundations and applications.

835  G 5
Special Topics in Pattern Recognition
A.  5 cl.
Prereq.: 735 and Statist. 521, or permission of instructor.
Image processing, scene analysis techniques, formal grammers and structural methods in pattern description, patterns and algorithms, character recognition, bio-medical, and other applications.

845  G 5
Numerical Solution of Partial Differential Equations
A.  5 cl.
Prereq.: 642 and 745.
Numerical solution of partial differential equations by finite-difference methods; treatment of parabolic, hyperbolic, and elliptic equations, consistency, convergence, and stability considerations.

850  G 5
Theory of Information Retrieval I
W.  5 cl.
Prereq.: 543 and 753.
Correlation of information retrieval theory and practice into a unified theory of information retrieval; existing and proposed retrieval systems will be examined and evaluated.

851  G 3
Theory of Information Retrieval II
Sp.  2 cl., 1 2-hr. lab.
Prereq.: 850.
Data processing techniques, modelling of retrieval systems, and feedback mechanisms; algorithms, system models, and computer programs will be prepared to demonstrate the information retrieval process.

852  G 3
Design and Analysis of Information Systems Simulations
Sp.  3 cl.
Prereq.: 652 or 752.
Consideration of the strategic and tactical problems of planning information systems simulation; analysis of the results of information systems simulation experiments; studies of significant information systems simulations.

855  G 5
Formal Languages
W.  5 cl.
Prereq.: 720 and 725.
Application of formal language theory to syntactic analysis of programming languages; tradeoffs between language and processor features; storage and time considerations in parsing, undecidability.

865  G 3
Seminar on Socio-Psychological Aspects of the Information Sciences
W.  3 cl
Prereq.: Permission of instructor.
Ecological, organization, interpersonal, and intrapersonal aspects of information, production, exchange, and use.

880  G 5
Theory of Computability
A.  5 cl.
Prereq.: 727, 761, or 855.
Turing machines and computability theory; relative uncomputability; restricted Turing machines and universal Turing machines; theory of recursive functions.

888  G 1-5
Advanced Studies in Computer and Information Science
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.; subdivisions repeatable.
Advanced work in one of the specialized areas of computer and information science is offered.

888.01 Theory of Information
888.02 Information Storage and Retrieval
888.03 Theory of Automata
888.04 Artificial Intelligence
888.05 Pattern Recognition
888.06 Computer Systems Programming
888.07 Programming Languages
888.08 Computer Organization
888.09 Numerical Analysis
888.10 Man-Machine Interaction
888.11 Formal Languages
888.12 Management Information Systems
888.13 Biological Information Processing
888.14 Socio-Psychological Aspects of Information Processing

889  G 2-5
Advanced Seminar in Computer and Information Science
Prereq.: 2nd qtr. grad. standing in Comp. and Info. Sc. or permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Consideration of selected topics in computer and information science and topics related to the theory and application of the information science.

899  G 1-5
Interdepartmental Seminar
Repeatable to a maximum of 25 cr. hrs.
(See under Interdepartmental Seminars.)
Dairy Science

Office: 116 Plumb Hall, 625 Stadium Drive

Professors VanDemark (Chairman), Barr, Brakel, Conrad, Fecheimer, Harvey, Hibbs (Associate Chairman, Wooster), Ludwig, Porter, Porterfield, and Staubus; Associate Professors Gomes, Hines, Kaiser, Rinewater, and Taylor; Assistant Professors Allaire, Palmquist, Pritchard, Schrabbacher, Smith, and Willett; Instructors Fuller, Jacquemin, Neuhardt, Rader, and Sechrist.

Domestic Animals in the Service of Man
(See Animal Sc. 100.)
(Offered in cooperation with Depts. of Dairy Sc. and Poul. Sc.)

GENERAL PREREQUISITES FOR COURSES NUMBERED 200
Unless otherwise indicated, the prerequisites for 400-level courses are 45 cr. hrs. in courses numbered 100-199.

201 U 5
Fundamentals of Dairy Science
A, W. 3 cl., 2 2-hr. lab.
Prereqs.: Biol. 130.
The production phases of the dairy industry and the physiological systems of dairy animals. Brakel.

207 U 3
Dairy Cattle Type Evaluation
Sp. 1 2-hr lab., 1 4-hr. lab.
Prereqs.: 201 and 15 cr. hrs. in Biological Sciences.

GENERAL PREREQUISITES FOR COURSES NUMBERED 300 AND 400
Unless otherwise indicated, the prerequisites for 300 and 400-level courses are 90 cr. hrs. in courses numbered 100-299, inclusive of ROTC and Phys. Ed.; or specified course(s) numbered 100-399.

340 U 5
Dairy Herd Management
W. 3 cl., 2 2-hr. lab.
Prereqs.: 201 and 430.
Problems and practices concerned with efficient production of milk and successful operation of a dairy herd. Kaiser.

420 U 5
Principles of Animal Improvement
A, W, Sp. 5 cl.
Prereq.: 100, Math. 150 or equiv., and Genetics 140 or 214.
Not open to students with credit for Animal Sc. 420 or Poul. Sc. 420.
(Cross-listed in the Depts. of Animal Sc. and Poul. Sc.)
An introduction to the methods available for bringing about genetic change in farm animals. Fecheimer, Jaap, and Swiger.

430 U 5
Principles of Animal Nutrition
Su (1st term), A, W, Sp. 4 cl., 1 2-hr. lab.
Prereqs.: Chem. 102 or 122 and Math. 150 or equiv.
Not open to students with credit for Animal Sc. 430 or Poul. Sc. 430.
(Cross-listed in the Depts. of Animal Sc. and Poul. Sc.)
A study of fundamental principles of nutrition in mammals and birds. Cline, Latshaw, and Tyniski. Fee.

GENERAL PREREQUISITES FOR COURSES NUMBERED 500
Unless otherwise indicated, the prerequisites for 500-level courses are 15 cr. hrs. in courses in the same discipline numbered 200 or higher, or 10 cr. hrs. in courses numbered 200 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 200 or higher in specified allied disciplines; or baccalaureate degree.

Marketing Dairy Products
(See Agr. Econ. 526.)
(Offered in cooperation with the Dept. of Dairy Sc.)

593 U 3 or 5
Individual Studies
HS93 (honors) may be available to students enrolled in a college honors program or eligible for enrollment.
Prereqs.: Permission of instructor.
Special assignments and elementary research; students elect problems after conference with the instructor in charge.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600
Unless otherwise indicated, the prerequisites for 600-level courses are 15 cr. hrs. in courses in the same discipline numbered 300 or higher, or 10 cr. hrs. in courses numbered 300 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 300 or higher in specified allied disciplines.

610 U G 3
Physiology of Lactation
A. 2 2-hr. cl.
Prereqs.: Vet. Physiol. 211 and 20 cr. hrs. of Dairy Sc., Animal Sc., or vertebrate biology.
Not open to students with credit for Animal Sc. 610.
(Cross-listed in the Dept. of Animal Sc.)
The physiological, endocrine, nutritional, and environmental factors influencing the synthesis and ejection of milk. Porter.
612 U G 3
Physiology of Reproduction and Growth
Sp. 3 1-hr. lec.
Prereq.: Vet. Physiol. 211 and 20 cr. hrs. of Dairy Sc., Animal Sc., or wheatgrass biology.
Not open to students with credit for Animal Sc. 612.
(Cross-listed in the Dept. of Animal Sc.)
Physiology of the reproductive system and of growth and development in farm animals; factors influencing reproductive performance. Ludwig.

613 U G 3
Laboratory in Reproductive Physiology
and Artificial Insemination
Sp. 2 2-hr. lab.
Prereq.: or concur.: 612.
Not open to students with credit for Animal Sc. 613.
(Cross-listed in the Dept. of Animal Sc.)
Comparative anatomy and physiology of reproduction of farm animals; physiological bases for the use of artificial insemination in the research laboratory and in the field. Ludwig. Fee.

631 U G 5
Nutrition and Feeding of Ruminant Animals
A, W, Sp. 4 cl., 1 2-hr. lab.
Prereq.: 430 or equiv.
Not open to students with credit for Animal Sc. 631.
(Cross-listed in the Dept. of Animal Sc.)
The nutrition of dairy cattle, beef cattle and sheep; principles and practices. Cline, Staubs, and Tynik.

640 U G 5
Evaluation and Integration of Research
for Dairy Operations
Sp. 5 cl.
Prereq.: 201, 340, 420, 430, Agr. Econ. 410, and 5 cr. hrs. Physiol.
The integration of scientific principles to maximize efficiency in dairy operations. Brakel.

684 U G 3-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Special assignments and advanced research for groups; problems assigned after consultation with the instructor in charge.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 700
Unless otherwise indicated, the prerequisites for 700-level courses are 15 cr. hrs. in courses in the same discipline numbered 400 or higher, plus additional specified course(s) numbered 600 or higher.

710 U G 3 or 5
Advanced Reproductive Physiology
Sp. 2 2-hr. cl.
Prereq.: 612 and acceptable courses in Physiol., Anat., and Biochem.
Not open to students with credit for Animal Sc. 710.
(Cross-listed in the Dept. of Animal Sc.)
Recent advances in research in mammalian reproduction; optional individual research experience in reproductive problems with small and large mammals for additional credit. Gomes and VanDemark.

720 U G 5
Genetics of Animal Populations
W. 5 cl.
Prereq.: 420 or Genetics 630 and 10 cr. hrs. in Math.
Not open to students with credit for Animal Sc. 720 or Pou! Sc. 720.
(Cross-listed in the Depts. of Animal Sc. and Pou! Sc.)
Theory and practice of analyzing and ascertaining the genetic composition of animal populations. Swiger.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 800 AND 900
Unless otherwise indicated, the prerequisites for 800 and 900-level courses are 30 cr. hrs. in courses in the same discipline, or 20 cr. hrs. in the same discipline, plus 25 cr. hrs. in specified allied disciplines.

800 G 1
Seminar

810 G 3
Advances in Physiology of Domestic Animals
A, W, Sp. 4-hr. cl.
Prereq.: Permission of instructor and acceptable courses in Physiol., Anat., and Biochem.
Not open to students with credit for Animal Sc. 810 or Pou! Sc. 810.
(Cross-listed in the Depts. of Animal Sc. and Pou! Sc.)
810.01* Adrenal Function
A, Brown and Gomes.
810.02* Endocrinology of Reproduction
W, Gomes.
810.03* Immunology and Immunogenetics
Sp, Hines.
810.04* Thyroid and Parathyroid Function
A, Hibbs.
810.05* Mammalian Germ Cells
W, VanDemark.
810.06* Biomechanics and Animal Performance
Sp, Ludwig.

820 G 3
Current Topics in Animal Genetics
3 cl.
Prereq.: Acceptable courses in Animal Genetics, Math., and Statistics.
Repeatable to a maximum of 12 cr. hrs.
Not open to students with credit for Animal Sc. 820 or Pou! Sc. 820.
(Cross-listed in the Depts. of Animal Sc. and Pou! Sc.)
820.01 Selection Index Theory
Sp, Allaire and Harvey.
820.02* Non-additive Genetic Variance
W, Harvey and Swiger.
820.03* Polygenic Systems
W, Fechheimer.
Dance

Office: 2043 Millikin Road
Professor Aikiro (Chairman); Associate Professors Blaine, Currier, Venable, and Wynne; Assistant Professors Bluem, Dally, Kvasnicka, Lilly, and Patton; Instructor Kimble.

111 U 3
Techniques and Materials of Dance
A. 11 lab. hrs.
Prereq.: Admission by qualifying audition and permission of Division Chairman.
Required of majors in Dance.
Technique: modern dance and ballet; improvisation.

112 U 3
Techniques and Materials of Dance
W. 11 lab. hrs.
Prereq.: 111 or equiv.
Required of majors in Dance.
Continuation of 111.

113 U 3
Techniques and Materials of Dance
Sp. 11 lab. hrs.
Prereq.: 112 or equiv.
Required of majors in Dance.
Continuation of 112.

138 U 3
Dance in the 20th Century
Sp. 4 cr.
Not open to students with credit for 659.
Dance as a performing art in Europe and America; a survey of major stylistic trends, principal artists and their works.

190 U 3
Ethnic Dance Forms
Sp. 2 1-hr. lec., 4 1-hr. lab.
Prereq.: 112.
Folk forms as practiced by ethnic groups in selected cultures.

198 U 1
Dance Workshop
A, W. Sp. 3 hrs. of scheduled workshops and/or rehearsals.
Required of all majors in Dance.
Repeatable to a maximum of 12 cr. hrs.
Provides experience in dance performance and production activities; scheduled workshops of students' choreography, lectures, and demonstrations.

214 U 4
Techniques and Beginning Composition
A. 12 lab. hrs.
Required of majors in Dance.
Technique: modern dance and ballet; composition.
215
Techniques and Beginning Composition
W. 12 lab. hrs.
Required of majors in Dance.
Continuation of 214.

216
Techniques and Beginning Composition
Sp. 12 lab. hrs.
Required of majors in Dance.
Continuation of 215.

248
Reconstruction, Analysis,
and Teaching of Folk Dance Forms
A, Sp. 1 cl., 2 2-hr. lab.
Prereq.: 2 qtrs. of modern dance or equiv.
Movement techniques and styles inherent in folk
dance forms with application to teaching.

293
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Individual studies of specified problems in the field of
dance.

294
Group Studies
Prereq.: Permission of chairman.
Repeatable to a maximum of 25 cr. hrs.

299
The University Dance Company
A, W, Sp. 3 or more hrs. of rehearsal.
Prereq.: Admission by audition to students enrolled in
Dance Major Curriculum.
Repeatable to a maximum of 12 cr. hrs.
Performance opportunities; repertory includes works by
resident and visiting choreographers and dances
mounted through the use of Labanotation scores.

438
Dance Notation I
A, W 2 cl., 2 1-hr. lab.
Basic principles of Labanotation; work in theory,
reading, and writing.

439
Dance Notation II
W, Sp. 2 cl., 2 1-hr. lab.
Prereq.: 438 or permission of instructor.
Continuation of 438.

532
Intermediate Dance Composition
A. 6 lab. hrs.
Prereq.: Permission of instructor.
Problems in extended solos; duets.

533
Dance Production
A, W. 2 1-hr. cl., 10 lab. hrs.
Prereq.: Permission of instructor.
A study of the production problems in staging dance
for the theatre; lectures, readings, and discussions.

534
Dance Techniques and Repertory I
A. 15 lab. hrs.
Prereq.: 216 or equiv.
Technique: modern dance and ballet; repertory;
learning a dance work scored in Labanotation. Fee.

535
Dance Techniques and Repertory II
W. 15 lab. hrs.
Prereq.: 534.
Continuation of 534. Fee.

536
Dance Techniques and Repertory III
Sp. 15 lab. hrs.
Prereq.: 439 and 535.
Technique: modern dance and ballet; repertory;
reading a dance work from a Labanotation score. Fee.

537
Music for Choreography
A. 3 1-hr. lec., 1 2-hr. lab.
Prereq.: 531 or equiv.
Study of music suitable for choreographic purposes
and the various approaches to the use of music in
dance composition.

589
Directed Teaching Experience in Dance
A, W, Sp. 1 4-hr. lab.
Prereq.: Permission of departmental adviser.
Repeatable to a maximum of 6 cr. hrs.

594
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Group studies of specified problems in the field of
dance.

600
Advanced Notation
A. 2 cl., 1 2-hr. lab.
Prereq.: 439 or equiv.
Repeatable to a maximum of 9 cr. hrs.
Advanced Labanotation.
DENTAL HYGIENE 121

650 U G 4
Advanced Dance Composition
A. 9 lab. hrs.
Prereq.: 429, 532 or equiv.
Choreographing a group dance; experience in casting
and directing.

657 U G 3
History of Dance I
A. 4 cl.
Survey of dance as a communal activity, functioning
as ritual, art, and play, with particular emphasis on
dance in tribal cultures and in the Greek theatre.
Wynne.

658 U G 3
History of Dance II
W. 4 cl.
Survey of dance from medieval times to the late
18th century, with particular emphasis on dance styles of
the 15th through the 18th centuries. Wynne.

659 U G 3
History of Dance III
Sp. 4 cl.
Survey of dance in Europe and the United States from
the end of the 18th century to the present with
emphasis on ballet and modern dance. Wynne.

660 U G 3
The Romantic Ballet
A. 3 cl.
Prereq.: Grad. or senior standing and permission of
advisor.
The ballet in France, Russia, and other influential
centers from Neo-Classicism to the end of the 19th
century.

693 U G 1-4
Individual Studies in Dance
Prereq.: Grad. or senior standing and permission of
advisor.
Investigation of selected professional problems.

694 U G 1-5
Group Studies
Prereq.: Permission of chairman.
Repeatable to a maximum of 25 cr. hrs.

801 G 1-5
Seminar in Dance
Prereq.: 657, 658, and 659.
Repeatable to a maximum of 15 cr. hrs.

802 G 3-5
Choreographic Projects
Prereq.: 650 or equiv.
Repeatable to a maximum of 25 cr. hrs.
Advanced choreographic projects.

994 G 3
Problems in Dance
Advanced problems in dance, individual or group
participation.

999 G Arr.
Research in Dance
Research for thesis purposes only.

Dental Hygiene

Office: 342 Dentistry Building, 305 West 12th Avenue
Nancy M. Reynolds, Chairman and Director

Professors: J. R. Wilson (Dean), App, Blovis, Brooks,
Bruce, Cavalhali, Clarke, Conroy, Cushman, Dew,
Heintz, King, Kuhn, Long, Marshall, Permar, W. Postle,
Reynolds, W. Wallace, S. Wallace, Williams, and
Woolf; Associate Professors Beckwith, Foeman, Hall,
Huffman, Porter, H. Postle, and Trippy; Assistant
Professors Herr, Hoppenstand, Mote, Murphy, Pappas,
Snyder, and Whitacre; Instructors Christian Heckman,
Hough, Jones, Kneives, Kramer, Kumlert, Lucks,
Monteith, Nordstrom, Penland, Rosenbusch Saunier,
and Spicer.

201 U 3
Dental Anatomy
A. 1 cl., 6 lab. hrs.
Prereq.: Dent. Hyg. 1st yr. standing.
The morphology of human teeth and surrounding
structures. Permar.

203 U 2
Dental Anatomy
W. 1 cl., 2 lab. hrs.
Prereq.: Dent. Hyg. 1st yr. standing.
A continuation of 201; the physiology of human teeth
and surrounding structures. Permar.

223 U 3
Dental Prophylaxis
W. 1 cl., 6 lab. hrs.
Prereq.: Dent. Hyg. 1st yr. standing.
The demonstration of and the application of technical
procedures for the removal of hard and soft deposits
from the surfaces of the teeth. Reynolds.

224 U 2
Dental Prophylaxis
Sp. 1 cl., 3 clinic hrs.
Prereq.: Dent. Hyg. 1st yr. standing.
Clinical application of the principles and technical
procedures taught in Dental Prophylaxis 223. Reynolds.
233 Oral Histology and Embryology
W. 2 cl.
Prereq.: Dent. Hyg. 1st yr. standing.
A study of the microscopic anatomy of the teeth and surrounding structures; the development of the teeth, oral cavity, and face. Perman.

236 Chemistry for Dental Hygienists
Sp. 3 cl.
Prereq.: Dent. Hyg. 1st year standing.
Not open to students with credit for 335.
A survey of general chemical principles and an introduction to fundamental physiological applications of organic chemistry for dental hygiene students. Foreman.

243 General Pathology
A. 2 cl.
Prereq.: Dent. Hyg. 2nd yr. standing.
An introduction to general pathology including degenerative changes, inflammation, and repair; a discussion of the more common diseases affecting the human body. Cavaliris.

263 Oral Radiography
Sp. 2 cl., or 6 lab. hrs.
Prereq.: Dent. Hyg. 1st yr. standing.
Not open to students with credit for 361.
The theory and technical procedures of oral radiography. Pappas.

273 Dental Materials
Sp. 1 cl., 6 lab. hrs.
Prereq.: Dent. Hyg. 1st yr. standing.
Not open to students with credit for 372.
A study of the composition, chemical and physical properties, manipulation, and uses of various materials employed in the practice of dentistry. Woelfel.

283 Periodontology
Sp. 1 cl.
Prereq.: Dent. Hyg. 1st yr. standing.
A study of the formation of deposits on teeth, the maintenance of good oral hygiene, and the prevention of periodontal disease. App.

295 Survey of Dental Hygiene
A. 1 cl.
Prereq.: Dent. Hyg. 1st yr. standing.
The historical, professional, legal, ethical and preventive aspects of dental hygiene. Reynolds.

301 Pain Control
W. 1 cl. or 3 lab. hrs.
Prereq.: Dent. Hyg. 2nd yr. standing.
The role of the dental hygienist as an assistant in anesthesia; premedication; physiological responses to and pharmacological actions of anesthetic agents; emergency treatment. Snyder.

311 Dental Nursing
A. 2 cl.
Prereq.: Dent. Hyg. 2nd yr. standing.
A discussion of ways in which the dental hygienist may assist the general practitioner of dentistry or one specializing in any field of dentistry. Reynolds.

312 Dental Nursing
W. 2 cl.
Prereq.: Dent. Hyg. 2nd yr. standing.
Problems which students encounter in the dental hygiene clinic; practical experience in dental assisting. Reynolds.

313 Dental Nursing
Sp. 1 cl.
Prereq.: Dent. Hyg. 2nd yr. standing.
A continuation of 312. The dental hygienist's responsibilities to her profession. Reynolds.

321 Clinical Dental Prophylaxis
A. 9 clinic hrs.
Prereq.: Dent. Hyg. 2nd yr. standing.
Clinical application of principles taught in 223. Reynolds.

322 Clinical Dental Prophylaxis
W. 15 clinic hrs.
Prereq.: Dent. Hyg. 2nd yr. standing.
A continuation of 321. Reynolds.

331 Pharmacology
A. 1 cl.
Prereq.: Dent. Hyg. 2nd yr. standing.
A study of drugs commonly used in dental practice and correct methods for their use. Reynolds.

334 Chemistry for Dental Hygienists
A. 2 cl.
Prereq.: 236.
Not open to students with credit for 335.
Application of the principles of biological chemistry to the practice of dental hygiene. Foreman.

341 Oral Pathology
A. 1 cl.
Prereq.: Dent. Hyg. 2nd yr. standing.
A study of the clinical manifestations of the common diseases affecting the teeth and their supporting structures. Bruce.
Dentistry

Office: 120 Dentistry Building, 305 West 12th Avenue


301 P 2
Dental Anatomy
A. 1 cl., 3 lab. hrs.
Prereq.: Dent. 1st yr. standing.
The morphology of human teeth and surrounding structures. Trippy.

302 P 4
Dental Anatomy
W. 1 cl., 8 lab. hrs.
Prereq.: Dent. 1st yr. standing.
The physiology of human teeth and surrounding structures. Trippy.

303 P 2
Principles of Occlusion
Sp. 1 cl., 3 lab. hrs.
Prereq.: Dent. 1st yr. standing.
The anatomy, physiology, actions, and functions of the human masticatory apparatus. Trippy.

305 P 1
Dental Materials
W. 1 cl.
Prereq.: Dent. 1st yr. standing.
A review of physical properties of materials; a study of dental impression materials, cast materials, and denture base resins. Woelfel and Dew.

306 P 1
Dental Materials
Sp. 1 cl.
Prereq.: Dent. 1st yr. standing.
Materials used in the restoration of carious teeth, including dental cements, waxes, plastics, amalgams, gold foil, and casting gold alloys. Chandler.

320 P 1
Orientation and History of Dentistry
A. 1 cl.
Prereq.: Dent. 1st yr. standing.
The evaluation of dentistry from the ancient period through the medieval, colonial, early American, and modern periods. Wilson.

325 P 1
Dental Epidemiology I
W. 1 cl.
Prereq.: Dent. 1st yr. standing.

381 P 4
Complete Prosthodontics
A. 1 cl., 6 lab. hrs.
Prereq.: Dent. 1st yr. standing.
The elemental principles of impressions and jaw relations and procedures used in the construction of complete dentures. Shannon.

382 P 4
Complete Prosthodontics
W. 1 cl., 8 lab. hrs.
Prereq.: Dent. 1st yr. standing.
The principles and practices of arranging artificial teeth and processing and finishing complete dentures. Shannon.

386 P 1
Fixed Partial Prosthodontics
Sp. 1 cl.
Prereq.: Dent. 1st yr. standing.
Aims of service; terminology and definitions; correlation with other curriculum areas; indications, contraindications, and factors relating to bridge construction; description of technic laboratory procedures. Cummins.
389
Removable Partial Prosthodontics
Sp. 1 cl., 8 lab. hrs.
Prereq.: Dent. 1st yr. standing.
An introduction to the principles of design and construction of removable partial dentures. Heintz.

403
Local Anesthesia
Sp. 1 cl.
Prereq.: Dent. 2nd yr. standing.
The theory, chemistry, and technique of local anesthesia for dental procedures. Hlatt.

404
Dental Materials
A. 1 cl.
Prereq.: Dent. 2nd yr. standing.

413
Endodontics
Sp. 1 cl.
Prereq.: Dent. 2nd yr. standing.

431
Operative Dentistry
A. 1 cl., 3 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
The theory and techniques of operative dentistry; the theory and techniques for simple cavity preparations. H. Postle and Huffman.

432
Operative Dentistry
W. 1 cl., 6 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
The theory and technical procedures for the preparation of compound and complex cavities and the use of amalgams and silicate as restorative materials. H. Postle and Huffman.

433
Operative Dentistry
Sp. 1 cl., 6 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
The theory and technical procedures for the use of gold inlays and gold as restorative materials; preparation for the clinical aspects of operative dentistry. H. Postle and Huffman.

452
Pedodontics
W. 2 cl., 2 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
Orientation in pedodontics preparatory for clinical assignments; patient management, modified operative procedures in cavity preparation, pulp management, the manipulation of prefabricated materials, and methods of prevention and control of dental caries. Hall.

453
Pedodontics and Interceptive Orthodontics
Sp. 1 cl., 3 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
Preparation of study casts; construction of orthodontic bands, using different materials and techniques; designing appliances for prevention, interception, or correction of incipient malocclusion. Hall and Williams.

462
Periodontics
W. 1 cl.
Prereq.: Dent. 2nd yr. standing.
The etiology, pathology, and diagnosis of periodontal disease. App.

463
Periodontics
Sp. 1 cl.
Prereq.: Dent. 2nd yr. standing.

482
Complete Prosthodontics
W. 1 cl., 3 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
The principles and practices of the construction of immediate dentures, and of making esthetic denture restorations. Larrimer.

483
Complete Prosthodontics
Sp. 1 cl., 6 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
The principles and practices of impression making as related to the anatomic, histologic, and physiologic considerations. Larrimer.

484
Fixed Partial Prosthodontics
A. 1 cl., 3 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
Principles and technical procedures; complete and partial crowns; preparation, fabrication, and casting in gold. Downes.

485
Fixed Partial Prosthodontics
W. 1 cl., 6 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
Construction of fixed partial restorations utilizing basic types of retainers, fixed and semi-movable connectors, gold and acrylic pontics. Downes.

486
Fixed Partial Prosthodontics
Sp. 1 cl., 6 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
Construction of fixed partial restoration with basic retainers and connectors and glazed porcelain pontic; fabrication of acrylic jacket crown. Downes.
Removable Partial Prosthodontics
A. 1 cl., 6 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
The relation of the diagnostic aspects of removable partial dentures to their design and construction. Heintz.

Removable Partial Prosthodontics
Sp. 1 cl.
Prereq.: Dent. 2nd yr. standing.
The advanced principles and design of removable partial dentures and their clinical applications. Heintz.

Local Anesthesia and Oral Surgery
A. 1 cl.
Prereq.: Dent. 3rd yr. standing.
The chemistry and pharmacology of local anesthesia and an introduction to the basic principles of oral surgery. Hiatt and Snyder.

Oral Surgery
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.
Theory and technique of basic exodontia and minor oral surgery; postoperative complications and treatment. Hiatt and Snyder.

Endodontics
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.
The rationale and prognosis for endodontic procedures; application of clinical treatment techniques peculiar to endodontics including radiography, intra canal preparations, and root fillings. Marshall.

Endodontics
Sp. 1 cl.-2 clinic hrs.
Prereq.: Dent. 3rd yr. standing.

Community Dentistry
Sp. 1 cl.
Prereq.: Dent. 3rd yr. standing.
An introduction to philosophy of, equipment for, and problems encountered in the treatment of dental needs of the handicapped homebound patient. Lotz.

Operative Dentistry
A. 1 cl., 6 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Clinical diagnosis of pulp disease; protection and conservative treatment of the vital pulp; factors influencing the success or failure of restorative materials in clinical practice. Beckwith.

Operative Dentistry
Sp. 1 cl., 6 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Detailed study of restorative materials, indications and contraindications for each, their manipulation and individual requirements in cavity preparation. Beckwith.

Clinical application of the theories and techniques of restoring carious and defective teeth. Beckwith.

Oral Histology and Embryology
A. 2 cl., 6 lab. hrs.
Prereq.: Anat. 640; Dent. 2nd yr. standing.
Embryology and histology of teeth and surrounding structures and their correlation to the practice of dentistry. Melfi.

Oral Pathology
A. 3 cl., 2 lab. hrs.
Prereq.: Dent. 3rd yr. standing. 540 and Path. 655.
The histopathologic and clinical study of oral disease processes that are chiefly of local origin. Cavalaris.

Oral Pathology
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.
The histopathologic and clinical study of oral disease processes that are associated with systemic disease or diseases of specific organ systems. Cavalaris.

Oral Diagnosis and Treatment Planning
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.
The principles and methods of oral diagnosis, with emphasis on the medical and dental history of the patient. Blozis.

Oral Diagnosis and Treatment Planning
Sp. 1 cl.
Prereq.: Dent. 3rd yr. standing.
The interpretation of signs and symptoms, medical laboratory tests, and treatment planning for the patient. Blozis.

Oral Radiography
A. 1 cl.
Prereq.: Dent. 3rd yr. standing.
The theory and operation of radiographic equipment; darkroom procedures; discussion of anatomical landmarks as seen radiographically; introduction of intraoral radiographic techniques. O’Brien.
548 P 1
Oral Radiography
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.
Biomechanics of the angle and long cone technics used in
intraoral radiography; extraoral radiographic technics.
O'Brien.

549 P 1
Oral Radiography
Sp. 1 cl.
Prereq.: Dent. 3rd yr. standing.
Interpretation of radiographic evidence of pathosis;

551 P 1
Pedodontics
A. 1 cl.
Prereq.: Dent. 3rd yr. standing.
Detailed study of materials presented in 452; restorative
materials used in pedodontics; the use of X ray in
pedodontic practice. Hall.

552 P 1
Clinical Pedodontics
W. 2 clinic hrs.
Prereq.: Dent. 3rd yr. standing.

553 P 1
Clinical Pedodontics
Sp. 2 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Continuation of 552.

555 P 1
Orthodontics
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.
The etiology and classification of malocclusion;
physiology of tooth movement, character of tissues
involved. Williams.

556 P 2
Orthodontics
Sp. 2 cl.
Prereq.: Dent. 3rd yr. standing.
Methods and appliances for the correction of malposed
teeth. Williams.

560 P 1
Periodontics
A. 1 cl.
Prereq.: Dent. 3rd yr. standing.
Clinical procedures used in the treatment of periodontal

561 P 1
Clinical Periodontics
A. 3 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
App.

562 P 1
Clinical Periodontics
W. 3 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Continuation of 561. App.

563 P 1
Clinical Periodontics
Sp. 3 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Continuation of 562. App.

572 P 1
Pharmacology
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.
General pharmacology including the origin and methods
of development of drugs; basic pharmacy involving
prescription writing, the metric and apothecary
systems, drug standards, and federal drug legislation
and regulation. Hiatt.

573 P 1
Pharmacology
Sp. 1 cl.
Prereq.: Dent. 3rd yr. standing.
The pharmacology of drugs with possible applications
to dentistry, including premedications,
postmedications, and drugs affecting the autonomic
nervous system. Hiatt.

581 P 2
Complete Prosthodontics
A. 1 cl, 2 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
The principles and practices of maxillomandibular
relation records, articulating instruments and occlusion.
Porter.

582 P 3
Complete Prosthodontics
W. 1 cl, 4 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
The principles and clinical practice in the restoration
of esthetics and facial expression by artificial dentures.
Porter.

583 P 3
Complete Prosthodontics
Sp. 1 cl, 4 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
The clinical practice of the complete denture
service, including the care of patients after dentures
have been inserted. Porter.

584 P 1
Fixed Partial Prosthodontics
A. 1 cl.
Prereq.: Dent. 3rd yr. standing.
Veneer crowns, dowel and core, temporary coverage;
diagnosis and treatment planning; electroplating;
clinical applications and practice. Long.
585 P 2
Fixed Partial Prosthodontics
W. 1 cl, 3 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Elastic impression materials and related technics
including use of gypsum products, waxes, tissue
retraction, and sectioning methods; clinical applications
and practice. Long.

586 P 3
Fixed Partial Prosthodontics
Sp. 1 cl, 6 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Selection of abutments and retainers, connectors and
ointments; additional types of pontic procedures;
clinical applications and practice. Long.

587 P 1
Removable Partial Prosthodontics
A. 1 cl.
Prereq.: Dent. 3rd yr. standing.
Complex problems of removable partial dentures and
their clinical application. Heintz.

593 P 1-6
Individual Studies
Individual studies in any of the recognized fields of
dentistry or summer clinic.

594 P 1-6
Group Studies in Dentistry
Prereq.: Dent. 1st or 2nd yr. standing.
Repeatable.
Group studies in special dental topics.

601 P 2
Physical Diagnosis
A. 1 cl, 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
History taking; physical evaluation technics; common
laboratory analyses; nose, throat, and mouth
examinations; physiology of normal and pathologic
respiration, heart functions and circulation of blood.
Allison, Gaston, and Wallace.

602 P 2
Physical Diagnosis and Anesthesia
W. 1 cl, 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Oxygen and carbon dioxide transport; electrolyte and
fluid balance; pharmacologic action of sedatives,
alcoholics, analgesics, narcotics, intravenous
barbiturates, muscle relaxants, inhalation anesthetic

603 P 2
Anesthesia
Sp. 1 cl, 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Laryngoscopy, endotracheal intubation, maintenance
of anesthesia and management during recovery;
management of emergencies; use of fluids, drugs,
open and closed cardiac massage technics, and
analectics. Allison, Gaston, and Wallace.

604 P 2
Oral Surgery
A. 1 cl, 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Wound healing, inflammation, infection, their
mechanism, diagnosis, and treatment; surgical
management of exostosis, hyperplasias, and surgical
preparation of the mouth for prosthodontics.
Allison, Gaston, and Wallace.

605 P 2
Oral Surgery
W. 1 cl, 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Diagnosis and surgical treatment plan for unerupted
teeth; incisions, methods for removal of bone,
protection for adjacent teeth, hemostatic agents,
antiobiotics, sutures and suturing. Allison, Gaston, and
Wallace.

606 P 2
Clinical Endodontics
Sp. 1 cl, 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 605. Diagnosis, surgical treatment, and
prognosis for pathologic conditions of the mouth and
jaws, of the salivary glands and their ducts, and
biopsy for lesions. Allison, Gaston, Wallace, Ford,
Russell, and Snyder.

612 P 2
Clinical Endodontics
W. 4 clinic hrs.
Prereq.: Dent. 4th yr. standing.

613 P 1
Clinical Endodontics
Sp. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.

621 P 1
Dental Practice Administration
A. 1 cl.
Prereq.: Dent. 4th yr. standing.
Dental jurisprudence; ethics and legal aspects of the

622 P 1
Dental Practice Administration
W. 1 cl.
Prereq.: Dent. 4th yr. standing.
Dental economics, records, tax liability. Trippy, W.
Postle, and Wilson.

623 P 1
Dental Practice Administration
Sp. 1 cl.
Prereq.: Dent. 4th yr. standing.
The social aspects of the practice of dentistry.
Trippy, W. Postle, and Wilson.
Clinical Operative Dentistry
A. 6 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Review of the basic principles of operative dentistry and their clinical application to special problems. Beckwith and Huffman.

Clinical Operative Dentistry
W. 6 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Introduction of special technical applications in operative dentistry and their clinical applications. Beckwith and Huffman.

Clinical Operative Dentistry
Sp. 6 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 632. Advanced theories, technical procedures, and materials in Operative Dentistry; their value, limitations, and clinical application. Beckwith and Huffman.

Advanced Oncology
A. 1 cl.
Prereq.: Dent. 4th yr. standing.
Dental aspects of oncology including the oral surgical, periodontic, and prosthodontic management of patients with oral neoplastic disease and post-treatment morbidity. Cavalaris.

Advanced Oncology
W. 1 cl.
Prereq.: Dent. 4th yr. standing.
Medical aspects of oncology including the diagnosis, treatment and prognosis of cancerous problems and discussion of recent advances in cancer research and etiology. Cavalaris.

Advanced Oncology
Sp. 1 cl.
Prereq.: Dent. 4th yr. standing.
Clinico-pathologic conference pertaining chiefly to neoplastic disease, particularly in the head and neck regions. Cavalaris.

Clinical Oral Diagnosis and Treatment Planning
W. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Biozis.

Clinical Oral Diagnosis and Treatment Planning
Sp. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 645. Biozis.

Clinical Oral Radiography
A. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
O'Brien.

Clinical Oral Radiography
W. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 647. O'Brien.

Clinical Oral Radiography
Sp. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 648. O'Brien.

Pedodontics
A. 1 cl., 3 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Diagnosis of pulp conditions of primary and young permanent teeth; technics for treatment; growth and development pertaining to pedodontics; care of handicapped patients. Hall.

Clinical Pedodontics
W. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Hall.

Clinical Pedodontics
Sp. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Hall.

Clinical Periodontics
A. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 651. Hall.

Clinical Periodontics
W. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 661. App.

Clinical Periodontics
Sp. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 662. App.

Clinical Periodontics
Sp. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
The chemistry, indications, actions, and effects of antibiotics and analgesics. Wallace.
673  P  2  Pharmacology  
W.  1 cl., 2 clinic hrs.  
Prereq.: Dent. 4th yr. standing.  
The chemistry of tranquilizers; indications for their use and their actions; a review of prescription writing. Wallace.

681  P  3  Complete Prosthodontics  
Sp.  1 cl., 4 clinic hrs.  
Prereq.: Dent. 4th yr. standing.  
The clinical practice of special occlusal problems, temporomandibular joint disturbances, cleft palate and surgical prosthesis. Porter.

682  P  2  Clinical Removable Prosthodontics  
A.  4 clinic hrs.  
Prereq.: Dent. 4th yr. standing.  
Porter, Heintz.

683  P  2  Clinical Removable Prosthodontics  
W.  4 clinic hrs.  
Prereq.: Dent. 4th yr. standing.  
Continuation of 682. Porter, Heintz.

684  P  2  Clinical Fixed Partial Prosthodontics  
A.  4 clinic hrs.  
Prereq.: Dent. 4th yr. standing.  
Long.

685  P  2  Clinical Fixed Partial Prosthodontics  
W.  4 clinic hrs.  
Prereq.: Dent. 4th yr. standing.  
Continuation of 684. Long.

686  P  2  Clinical Fixed Partial Prosthodontics  
Sp.  4 clinic hrs.  
Prereq.: Dent. 4th yr. standing.  
Continuation of 685. Long.

693  P G 1-6  Individual Studies in Dentistry  
Prereq.: Dent. 3rd yr. standing.  
Repeatable.  
Advanced studies in any of the recognized fields of dentistry.

694  P G 1-6  Group Studies in Dentistry  
Prereq.: Dent. 3rd or 4th yr. standing.  
Repeatable.  
Group studies in special dental topics.

700  P G 1-15  Special Problems  
Su, A.W, Sp.  
Prereq.: Dent. postgrad. or grad. standing.  
Repeatable.

700.01  Advanced Oral Surgery and Anesthesia  
Diagnosis and treatment of surgical conditions of the teeth and contiguous structures; advanced techniques in surgery and local and general anesthesia. Allison and Wallace.

700.02  Advanced Orthodontics  
Applied osteology and myology in cephalometric roentgenographic interpretations; review of cephalic growth and development factors in normal occlusion; correction of malocclusions and dento-facial malformations. Williams and Wade.

700.03  Advanced Periodontics  
Diagnosis and treatment of periodontal disease; correlation between the disease of the periodontium and probable systemic diseases, and management of diseases of a purely dental origin. App, Solt.

700.04  Advanced Prosthodontics  
The diagnosis, treatment, and replacement of missing or lost teeth and parts of the mouth by prosthetic appliances; complete removable partial, or fixed restorations. Boucher, Heintz, Long, and Woelfel.

700.05  Advanced Oral Pathology and Diagnosis  
The interrelationships of gross microscopic, and clinical pathology; current advances in the field of oral pathology and diagnosis. Cavalaris, Blazis.

700.06  Advanced Endodontics  

700.07  Advanced Pedodontics  
Lectures, seminars and clinical practice encompassing all phases of pedodontics and interceptive orthodontics. Pettit and Rule.

700.08  Advanced Dental Materials  
The science of dental materials. McConnell.

700.09  Advanced Oral Histology and Embryology  
The principles of histology and embryology applied to the structures in the oral region—their development, morphology, functions, and clinical relationships. Neiff.

700.10  Advanced Operative Dentistry  
Clinical problems in operative dentistry and their correlation with problems in related fields of dentistry; special emphasis on preventive dentistry. Wilson.

765  P G 1-5  Histologic Laboratory Technique  
Su, A.W, Sp.  
Prereq.: Permission of instructor.  
The preparation of oral and dental tissues for microscopic study. Permar.

785  P G 3-5  Research Methods in Dentistry  
Su, A.W, Sp.  
Prereq.: Permission of instructor.  
Repeatable.  
A discussion on conceptual, methodological, and technical problems encountered in development of dental research projects.
Special Lectures in Dentistry
Prereq.: Permission of instructor.
Repeatable.
Lectures in special phases in dentistry.

792.01 Oral Pathology
General principles and concepts of pathology associated with the oral cavity.

792.02 Oral Pathology
Local disturbances of the oral cavity.

792.03 Oral Pathology
Systemic disturbances and their oral manifestations.

792.04 Dental Radiology
Radiologic methods and diagnosis.

792.05 Oral Diagnosis
Examination and diagnosis of oral disease.

792.06 Dental Therapeutics
Principals of pharmacology in relation to patient care.

792.07 Physical Diagnosis
Physical evaluation of the dental patient and its correlation with the required treatment.

792.08 Dental Epidemiology
The principles of epidemiology in relation to dental health and disease.

Individual Studies
Prereq.: Permission of instructor.
Repeatable.
Individual assignments in each specialty of dentistry; students will elect to work in desired subjects after a conference with the instructor in charge.

793.01 Oral Surgery and Anesthesia
793.02 Orthodontics
793.03 Periodontics
793.04 Prosthodontics
793.05 Oral Pathology
793.06 Endodontics
793.07 Pedodontics
793.08 Operative Dentistry
793.09 Oral Diagnosis
793.10 Fixed Partial Prosthodontics
793.11 Oral Radiography

Group Studies
Prereq.: Permission of instructor.
Repeatable.
Group studies on special problems in each specialty of dentistry.

794.01 Oral Surgery and Anesthesia
794.02 Orthodontics
794.03 Periodontics
794.04 Prosthodontics
794.05 Oral Pathology
794.06 Endodontics
794.07 Pedodontics
794.08 Operative Dentistry
794.09 Oral Diagnosis
794.10 Fixed Partial Prosthodontics
794.11 Oral Radiography

Seminar in Dentistry
A, W, Sp. 1 cr.
Prereq.: Dent. grad. standing.
A discussion of recent advances in all branches of dental science; review of original literature. Conway, Foreman, and Meli.

Specialty Seminars in Dentistry
Prereq.: Permission of instructor.
Repeatable.
Seminars in each of the specialty areas of dentistry for discussion of pertinent literature, presentation, and discussion of research work, and demonstration of advanced techniques.

796.01 Oral Surgery and Anesthesia
796.02 Orthodontics
796.03 Periodontics
796.04 Prosthodontics
796.05 Oral Pathology
796.06 Endodontics
796.07 Pedodontics
796.08 Operative Dentistry
796.09 Oral Diagnosis
796.10 Fixed Partial Prosthodontics
796.11 Oral Radiography

Advanced Clinical Practice in Dentistry
Prereq.: Permission of instructor.
Repeatable to maximum of 120 cr. hrs.
Broad exposure to advanced principals and practices in each specialty of dentistry.

798.01 Oral Surgery and Anesthesia
798.02 Orthodontics
798.03 Periodontics
798.04 Prosthodontics
798.05 Oral Pathology
798.06 Endodontics
798.07 Pedodontics
798.08 Operative Dentistry
798.09 Oral Diagnosis
798.10 Fixed Partial Prosthodontics
798.11 Oral Radiography

Individual Studies
Prereq.: Permission of instructor.
Repeatable.
Advanced individual studies in dentistry.

Group Studies
Prereq.: Permission of instructor.
Repeatable.
Advanced group studies in dentistry.

Research in Dentistry
Research for thesis purposes only.
Design

Office: 374 Hopkins Hall, 128 North Oval Drive
Professors Wallischaeger (Chairman), Wood, and Zimmer; Associate Professors Burden and Butter; Assistant Professors Bonner, Castile, Gysler, Jones, Lineback, and Megert.

160 U 3
Introduction to Industrial Design
A, W, Sp. 3 cr.
Prereq.: Permission of Chairman.
Not open to juniors or seniors in industrial design.
Introduction to the rationale of design and systematic design processes; an overview of the profession of industrial design; an introduction to the Division's educational program. Fee.

250† U 3
Studies in Industrial Design
A. 3 2-hr. labs.
Prereq.: Permission of instructor.
Studies in specified areas in the field of industrial design, with emphasis on particular aspects of product, visual communication, and space and enclosure design problems.

251 U 5
Industrial Design I
A. 5 3-hr. labs.
Prereq.: Design majors.
Introduction to the theories, methods, and practices of industrial design with primary emphasis on basic visual language and visual encoding practices. Fee.

252 U 5
Industrial Design II
W. 5 3-hr. labs.
Prereq.: 251.
A continuation of 251; primary emphasis on the planning practices of problem delineation and preliminary designing; secondary emphasis on researching and encoding. Fee.

253 U 3
Industrial Design I
253.01 Industrial Design Theory
Sp. 9 lab. hrs.
Prereq.: 252; concur. 253.03.
Not open to students with credit for 253.
A history of industrial design and a survey of manufacturing practices as they influence the industrial design profession. Fee.
253.03 Industrial Design Practices
Sp. 6 lab. hrs.
Prereq.: 252; concur. 253.01.
Not open to students with credit for 253.
Application of photographic knowledge, skills, and techniques as utilized by the industrial designer in various stages of design. Fee.

258 U 3
Typography
A, W, Sp. 3 2-hr. labs.
Open only to majors in industrial design and art education or by permission of instructor.
Introduction to the knowledge and skills of typographical design and its corresponding aesthetic, functional, and technological applications and utilizations. Fee.

294 U 1-5
Group Studies
A, W, Sp. Lec./Lab.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Group studies for special topics in industrial design.

450 U 5
Industrial Design II
A. 5 2-hr. labs.
Fee.
458.02 Visual Communication Design
Prereq.: 253.01, 253.03 or permission of instructor; concur. 460.02.
Not open to students with credit for 450.
Visual communication practices with primary emphasis on problem delineation, information and data collection, analysis, synthesis, and evaluation.
458.04 Product Design
Prereq.: 253.01, 253.03 or permission of instructor; concur. 460.04.
Not open to students with credit for 450.
Factors influencing product design, including materials and human factors; primary emphasis on structuring an investigatory plan and collecting information and data.
458.08 Space and Enclosure Design
Prereq.: 253.01, 253.03 or permission of instructor; concur. 460.08.
Not open to students with credit for 450.
Introduction to advanced methods of design inquiry organization, information analysis, and decision-making techniques, including general systems theory as utilized to design enclosed spatial systems.

451 U 5
Industrial Design II
W. 5 2-hr. labs.
Fee.
451.02 Visual Communication Design
Prereq.: 450.02, 460.02; concur. 461.02.
Not open to students with credit for 451.
Study and practice of processing information and data with primary emphasis on encoding, detail designing, and specifying the design production.
451.04 Product Design
Prereq.: 450.04, 460.04; concur. 461.04.
Not open to students with credit for 451.
Study of the materials and production processes of product design; primary emphasis on information and data analysis and performance specification; secondary emphasis on preliminary design.
451.08 Space and Enclosure Design
Prereq.: 450.08, 460.08; concur. 461.08.
Not open to students with credit for 451.
Study of material manufacturing processes, and material technology as utilized in the fabrication of mass-produced spatial enclosures.
Introduction to the fundamental principles of designing interior environments and equipment: lighting, power distribution, heating and cooling systems, interior transport, acoustics, and sound systems.

462 U 5
Industrial Design II
Sp. 5 2-hr. labs.
Fee.
462.02 Visual Communication
Prereq.: 451.02, 461.02; concur. 462.02.
Not open to students with credit for 452.
Study of visual communication practices with primary emphasis on decoding, production methods, techniques, and their applications.

462.04 Product Design
Prereq.: 451.04, 461.04; concur. 462.04.
Not open to students with credit for 452.
Study of human factors involved in product design and evaluation; continued study of design processes, with secondary emphasis on detail design and production specification.

462.08 Space and Enclosure Design
Prereq.: 451.08, 461.08; concur. 462.08.
Not open to students with credit for 452.
Introduction to the principles of structural design and analysis as applicable to the forms and shapes utilized to create spatial compartments and aggregations of compartments.

460 U 5
Industrial Design II
A. 5 2-hr. labs.
Fee.
460.02 Visual Communication Design
Prereq.: 253.01, 253.04; concur. 450.02.
Not open to students with credit for 460.
Application of, and experimentation with, a variety of materials, processes, and techniques (as directed in 450.02) available for use by the visual communicator.

460.04 Product Design
Prereq.: 253.01, 253.03; concur. 450.04.
Not open to students with credit for 460.
Application of product design planning and information and data processing techniques; primary emphasis on visualization, communication techniques, problem delineation, and encoding.

460.08 Space and Enclosure Design
Prereq.: 253.01, 253.03; concur. 450.08.
Not open to students with credit for 461.
Application of research, planning, and decision-making techniques for the design of space enclosure systems; primary emphasis on computer applications available to the designer.

461 U 5
Industrial Design II
W. 5 2-hr. labs.
Fee.
461.02 Visual Communication Design
Prereq.: 450.02, 460.02; concur. 451.02.
Not open to students with credit for 461.
Study of selected practices in encoding and transmitting the communicative act or product (as directed in 451.02).

461.04 Product Design
Prereq.: 450.04, 460.04; concur. 451.04.
Not open to students with credit for 461.
Application of the knowledge of materials and production processes to product design, with primary emphasis on performance specifications and preliminary design techniques.

461.08 Space and Enclosure Design
Prereq.: 450.08, 460.08; concur. 451.08.
Not open to students with credit for 461.

Group Studies
A, W, Sp. Lec./lab.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Group studies for special topics in industrial design.

650 U G 1-5
Industrial Design III:
Space and Enclosure Design
A. 5 2-hr. labs.
Prereq.: 452.08 and 465; concur. 694.08 for 5 cr. hrs., or permission of instructor.
Application of space organization planning and advanced decision-making techniques to the design of enclosed spaces and mass-produced enclosure systems.

651 U G 5
Industrial Design III:
Space and Enclosure Design
W. 5 2-hr. labs.
Prereq.: 650; concur. 694.08 for 4 cr. hrs., or permission of instructor.
Study of advanced manufacturing and environmental principles utilized in mass-produced enclosure systems and system interfaces.

652 U G 5
Industrial Design III:
Space and Enclosure Design
Sp. 5 2-hr. labs.
Prereq.: 651; concur. 694.08 for 4 cr. hrs., or permission of instructor.
An investigation of advanced design analysis techniques and enclosure system planning related to production, marketing, space enclosure relationships to the user, society, and environment.
653 U G 4
Space Enclosure Systems
W. 1 cl., 3 lab. hrs.
Prereq.: Senior or grad. standing, permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Studies in space lattice development and variables of form and proportion of packing cells directed toward application in packaging, space frames, partitioning, and compartment design.

660 U G 5
Industrial Design III: Product Design
A. 5 2-hr. labs.
Prereq.: 452.04 and 452.04; concur. 694.04 for 4 cr. hrs.
Application of advanced decision-making techniques to complex product systems with consideration of factor areas in technology and human engineering. Fee.

661 U G 5
Industrial Design III: Product Design
W. 5 2-hr. labs.
Prereq.: 660; concur. 694.04 for 4 cr. hrs.
The extended application of product system design concepts, emphasizing detail design, managed production systems, and design solution diffusion. Fee.

662 U G 5
Industrial Design III: Product Design
Sp. 5 2-hr. labs.
Prereq.: 661; concur. 694.04 for 4 cr. hrs.
A continuation of applied practice in professional product design problems, emphasizing communication, systematic planning, and manufacturing. Fee.

665 U G 5
Industrial Design III:
Visual Communication Design
A. 5 2-hr. labs.
Prereq.: 452.02 and 462.02; concur. 694.02 for 5 cr. hrs.
Advanced study of the encoding, decoding, transmitting, production, and diffusion practices of visual communication design. Fee.

666 U G 5
Industrial Design III:
Visual Communication Design
W. 5 2-hr. labs.
Prereq.: 665; concur. 694.04 for 5 cr. hrs.
An in-depth study of selected visual communication design concepts and practices as applied to the development of communication products and product systems. Fee.

667 U G 5
Industrial Design III:
Visual Communication Design
Sp. 5 2-hr. labs.
Prereq.: 666; concur. 694.04 for 5 cr. hrs.
A continuation of applied practice in professional visual communication emphasizing communication, systematic planning, and manufacturing. Fee.

693 U G 2-5
Individual Studies
Prereq.: Permission of instructor.
Each decimal subdivision repeatable to a maximum of 45 cr. hrs.
Advanced study for students in specialized programs.

693.02 Visual Communication Design
A. W. Sp.

693.04 Design

693.08 Space and Enclosure Design

694 U G 2-5
Group Studies
Prereq.: Permission of instructor.
Each decimal subdivision repeatable to a maximum of 15 cr. hrs.
Group studies for students in specialized programs.

694.02 Visual Communication Design
694.04 Design
694.08 Space and Enclosure Design

699 U G 5-15
Study Tour in Design
Sp.
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
First-hand knowledge of design practice, designers and cultural environment abroad with meetings, discussion, observations, documentation concerning aspects of international product and visual communication design.

794 U G 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
Group studies for special topics in industrial design.

797 U G 1-5
Interdepartmental Seminar
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Interdisciplinary knowledge and problems examined and discussed in the context of shared concerns.

899 G 1-5
Interdepartmental Seminar
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Interdisciplinary knowledge and problems examined and discussed in the context of shared concerns.

950 G 3-5
Research Problems in Design
Repeatable to maximum of 45 cr. hrs.
Fee.
984 G 1-5
Group Studies
Prereq: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Group studies for students in specialized programs.

998 G Arr.
Research in Design: Thesis
Research for thesis purposes only.

201 U 5
The Economic System
Su, A, W, Sp. 5 cl.
Not recommended for students who plan to take more than one course in economics.
Not open to students with credit for 200 or 400.
Study of basic characteristics, processes, and institutions of the economic system; significant problems arising in its operations; proposed solutions.

400 U 5
Principles of Economics II
Su, A, W, Sp. 5 cl.
H400 (honors) may be available to students enrolled in a college honors program or by permission of dept.
Prereq: 200.
Not open to students with credit for 201 or 402.
Continuation of 200; theory of national income determination; economic fluctuations; money; government policy; international economics.

402 U 5
Introduction to Economic Theory
A, W, Sp. 5 cl.
Prereq: 201 or equiv.
Not open to students with credit for 200 or 400.
Introduction to economic analysis, including the theory of the market; supply, demand, and price determination; income distribution; aggregate income and employment determination.

442 U 5
Elementary Economic Statistics
Su, A, W, Sp. 4 cl., 2 1-hr. lab.
Prereq.: Completion of Math. requirement in college of student's registration, or Math. 116 and 117 where there is no college Math. requirement.
Discrete frequency distributions; probability and probability distributions; statistical inference including the Bayesian approach; estimation; one-way analysis of variance; simple linear regression and correlation; index numbers.

490 U 4
Economics of the Ghetto
W. 4 cl.
Prereq.: 200 or 201.
Interaction between economic problems and race problems in urban areas. Weicher.

500 U 4
Evolution of Economic Thought
Sp. 4 cl.
Prereq.: Either 400, 402 or equiv.
Critical analysis of ideas of great economists, factors which influenced those ideas; their impact upon social and economic development of the modern world. Michael.

501 U 4
Intermediate Micro-Economic Theory
Su, A, W, Sp. 4 cl.
Prereq.: Either 400, 402 or equiv.
Theory of consumer behavior; theory of the firm; costs and production; factor price determination; general equilibrium.

Economics
Office: 239 Hagerty Hall, 1775 College Road
Professors Cunnyingham (Chairman), Dewald, Eason, Fiesher, Harrisen (Emeritus), James, Kelley, L'Esperance, Lynn, Miller (Emeritus), Oster, Parnes, Patton (Emeritus), Quenst, Sandberg, Sherman, Stocker, and Tybout; Assistant Professors Boyd, Cameron, Hovey (On Leave), McCalmont, Michael, Swamy, and Tuttle (Emeritus); Assistant Professors Basack, Baltensperger, Botte (Emeritus), Brada, Darby, Koizumi, Kopecky, Lindsey (On Leave), Matala, Parsons, Porter (On Leave), Ray, Shapiro (Visiting), Singh, Stevens (Emeritus), Stillson, Tarr, Weicher, and Wipf;
Adjunct Assistant Professors Caswell, Finn, and Young.

The Department of Economics offers opportunities for special study in the following fields:
Economic Theory and History of Thought
Economic History
Money, Banking, and Monetary Policy
Government Finance and Expenditure
Econometrics
Economic Development and Development Planning
International Economics
Structure and Regulation of Industry
Labor Economics
National Security Economics
Soviet Economy
Mathematical Economics

200 U 5
Principles of Economics I
Su, A, W, Sp. 5 cl.
H200 (honors) may be available to students enrolled in a college honors program or by permission of dept.
Recommended first course for students who plan to take more than one course in economics.
Not open to students with credit for 201 or 402.
Introduction to economic theory: supply and demand for goods and services; market structure; the distribution of income.
502  U G 4
Intermediate Macro-Economic Theory
Su, A, W, Sp.  4 cl.
Prereq.: Either 400, 402 or equiv.; 501 recommended.
Analysis of the determinants of national output, income
and employment levels; theory of economic growth
and progressive equilibrium in an economy.

506  U G 3
Current Economic Problems
Su, W.  3 cl.
Prereq.: Either 400, 402 or equiv.
Not open to undergrad. and grad. students majoring in
Econ.
Examination of current problems; optimum levels of
employment; conditions underlying consumer
expenditures; savings, investments; inflation, deflation;
agriculture, public works, housing; regional
development.

508  U G 4
Comparative Economic Systems
W.  4 cl.
Prereq.: Either 400, 402 or equiv.
Not recommended for students who plan to take 607
and not open to students with credit for 690.
Principles and institutions for economic decision
making under capitalism, socialism, communism,
and "mixed" systems; comparison of selected
countries. Brada and Eason.

512  U G 4
General Economic History
Su, A, Sp.  4 cl.
Prereq.: Either 400, 402 or equiv.
Evolution of economic thought fundamental to Western
development; analysis of the rise of nation-state,
commercial and industrial development, and evolution
of a market economy. Bauck and Sandberg.

520  U G 4
Money and Banking
Su, A, W, Sp.  4 cl.
H520 (honors) may be available to students enrolled
in a college honors program or by permission of dept.
Prereq.: Either 400, 402 or equiv.
Organization, operation, and economic significance of
our monetary and banking system are discussed with
special reference to current conditions and problems.

530  U G 4
Government Finance in the American Economy
Su, A, W, Sp.  4 cl.
H530 (honors) may be available to students enrolled in
a college honors program or by permission of dept.
Prereq.: Either 400, 402 or equiv.
Not open to graduate students in Econ.
Analysis of fiscal institutions and decision making in
the public sector of the American economy; budget
planning and execution; taxation, debt, fiscal policy.

550  U G 4
Economic Development
A.  4 cl.
Prereq.: Either 400, 402 or equiv.
Not open to students with credit for 610 or 650.

Empirical and theoretical consideration of long-term
economic changes, including changes in industrial
structure, technology, and level of national product;
emphasis on developing economics. Michael, Kelley,
and Sinha.

553  U G 3
Population
Sp.  3 cl.
Prereq.: Either 400, 402 or equiv.
Impact of world population growth upon resources,
productive capacities, scales of living, national defense,
and international economic relations; critical
consideration of population theories and policies.
Eason.

558  U G 4
Economic Development of Latin America
W.  4 cl.
Prereq.: Either 400, 402, or equiv.
Regional analysis of economic conditions in Latin
America and prospects for accelerated economic
growth; evaluation of national development strategies
and current programs of inter-regional cooperation.
Finn and Kelley.

559  U G 4
Economic Development of the Soviet Union
and Eastern Europe
Sp.  4 cl.
Prereq.: 400 or 402; 508 or 550 recommended.
Not recommended for students planning to take 608.
Measurement and interpretation of economic
performance in the Soviet Union and Eastern
Europe; resource development and utilization;
international economic relations; strategy for
economic growth. Brada and Eason.

560  U G 4
International Economic Relations
W, Sp.  4 cl.
Prereq.: Either 400, 402 or equiv.
Not recommended for students who plan to take 665
and 666.
Survey of international economic relations: the basis
of world trade; commercial and financial policy,
particularly of the United States; and recent
international economic organization. James, Michael,
and Wipf.

563†  U G 4
Economic Problems of Western Europe
A.  4 cl.
Prereq.: Either 400, 402 or equiv.
Not open to students with credit for 663.
European reconstruction; European Economic
Community and the Free Trade Area; implications.

570  U G 4
Government and Business
A, Sp.  4 cl.
Prereq.: Either 400, 402 or equiv.
Economics and legal aspects of Government regulation
of business in the United States; philosophies and
concepts of public control; contemporary problems.
Barnekov.
576 U G 4
Transportation Economics
W. 4 cl.
Prereq.: Either 400, 402 or equiv.
Not open to students with credit for 676.
Study of general economic characteristics and
government regulation of rail, motor, water, air, and
pipeline carriers; consideration of competitive relations
between modes of transportation. Boyd and Tybout.

577 U G 4
Transportation Planning and Coordination
Sp. 4 cl.
Prereq.: 576 or permission of instructor.
Not open to students with credit for 677.
Transportation, local development and industrial
location; criteria for public investment in highway,
airport, and other transportation facilities.
Boyd and Tybout.

580 U G 4
Labor Economics and Industrial Relations
Su, A, W. Sp. 4 cl.
HS80 (honors) may be available to students enrolled
in a college honors program or by permission of dept.
Prereq.: Either 400, 402 or equiv.
Not open to graduate students in Econ.
Survey of the field of labor economics; trade unionism,
collective bargaining; wage determination, employment,
unemployment; labor legislation.

581 U G 4
Economics of the Labor Market
Sp. 4 cl.
Prereq.: 580 or equiv.
Materials and methods of labor market analysis; the
measurement and behavior of unemployment; employers'
and employees' labor market behavior; wage
determination and labor allocation. Fleisher and
Parnes.

H599 U 1-15
Honors Course
Open only to students enrolled in the Honors Program
of the Colleges of the Arts and Sciences or the College
of Administrative Science.
Repeatable to a maximum of 15 cr. hrs., but must be
taken for at least 2 qtrs.
Program of readings, conferences, and reports arranged
for the student who is a candidate for "Degree with
Distinction" in Economics, Fleisher and Staff.

600 U G 5
Applications of Mathematics in
Economic Analysis
A, W, Sp. 5 cl.
Prereq.: Math. 152 or equiv.
Coverage of the most common applications of
mathematics to economic analysis and econometrics;
the necessary tools from matrix algebra and calculus
are provided.

607 U G 4
Economics of Socialism
A. 4 cl.
Prereq.: 501 and 502 or equiv.
Survey of socialist thought and movements; relations of
socialist thought to the theory and practice of socialist
economics; planning, allocation, pricing, controls.
Eason.

608 U G 4
Economic Analysis of the Soviet Union
and Eastern Europe
Sp. 4 cl.
Prereq.: 501 and 502 or equiv.
Not open to students with credit for 698.
Analysis of the pattern of economic growth and
theory, and practice of economic planning in the
Soviet Union and Eastern Europe; comparison with
Communist China. Eason.

613 U G 4
Economic History of the United States
W. 4 cl.
Prereq.: 501, 502, and 512.
General survey from discovery of America to present;
European economic background; westward movement
and its effects; development of economic institutions
in the U. S. Saack.

614 U G 4
Economic History of Western Europe
A. 4 cl.
Prereq.: 501 and 502.
Survey from 1750 through the post-World War II period;
coverage will go from Britain in the West to Russia in
the East. Sandburg.

625 U G 4
National and International Money Markets
A. 4 cl.
Prereq.: 501 and 520.
Organization, functions, and control of money markets
and their submarkets; flow of funds in these markets
and investment policies of market participants.
Baltensperger and Quintus.

631 U G 4
Federal Finance and Fiscal Policy
A. 4 cl.
Prereq.: 501, 502, and 530; or grad. standing in Econ.
Not open to students with credit for 630.
The economics of government spending and taxation;
analysis of the fiscal role and instruments of
government and their effects on the economy. Lynn.

632 U G 4
Government Budgeting and Expenditure Criteria
W. 4 cl.
Prereq.: 501, 502, and 530; or grad. standing in Econ.
Analyses of various economic criteria for efficient
decision making in the budgeting process; the various
types of budgets and their relationship to efficient
expenditure policy. Hovey.

633 U G 4
State-Local Government Finance
Sp. 4 cl.
Prereq.: 501, 502, and 530; or grad. standing in Econ.
Economic analysis of revenues and expenditures of
state and local governments; vertical and horizontal
relationships between agencies and units; specific
problems in these areas. Cameron and Stocker.
640 U G 4
Probability and Statistical Decision Theory
Su, W. 4 cl.
Prereq.: 400 or 402, and 442 or equiv.
Theory of probability and stochastic processes; statistical inference, tests of significance and analysis of variance; statistical decision theory. Cunyngham, L’Esperance, and Swamy.

641 U G 4
Applied Regression and Correlation Analysis
The general linear regression model; matrix algebra; multiple correlation, analysis of variance and tests of significance; specification errors. Cunyngham, L’Esperance, Mattila, Porter, and Swamy.
641.01 Regression Analysis I
A, Sp. 4 cl.
Prereq.: 400 or 402, and 442 or equiv.
Not open to students with credit for 641 or 641.02.
641.02 Regression Analysis II
Sp. 4 cl.
Prereq.: 660 and 641.
Not open to students with credit for 641 or 641.01.

6451* U G 4
Linear Programming and Economic Analysis
W. 4 cl.
Prereq.: 501 and 660.
Techniques of linear programming and input-output analysis applied to economic problems of allocation and valuation within the firm and the economy.

652 U G 4
Development Planning
W. 4 cl.
Prereq.: 502 and 550.
Analysis of the economics of planning and its major applications to private and public planning; procedures and techniques of development planning. Kelley, Michael, and Singh.

655 U G 5
International Trade and Finance
W. 5 cl.
Prereq.: 501 or 502, and 520.
Specialized production, comparative cost and advantages, and the gains from trade; international payments and receipts, possible equilibrium; balance-of-payments adjustments under different monetary systems; reforms. James and Wipf.

668 U G 3
International Commercial Policy
Sp. 3 cl.
Prereq.: 665.
Tariffs and other trade restrictions, economic effects of protective tariffs; regional economic integration; U. S. commercial policies; multilateral tariff reductions of America and Common Market. James and Wipf.

670 U G 4
Competition and Public Policy
W. 4 cl.
Prereq.: 501 and 570.
Nature, role, and regulation of competition; market structure and social performance; antitrust laws; current economic, legal, and policy problems in the antitrust area. Parsons.

683 U G 4
Unions and Collective Bargaining
A. 4 cl.
Prereq.: 580 plus 1 other 500-level course in Econ.
Development of unionism in the United States; structure and government of contemporary labor organizations; collective bargaining; settlement of labor-management disputes. Parnes.

684 U G 4
Labor and the Government
W. 4 cl.
Prereq.: 580 plus 1 other 500-level course in Econ.
Public policy with respect to labor problems and industrial relations; role of legislative, judicial, and executive branches of state and federal governments. Mattila and Parnes.

692 U G 4
Urban Economics
Sp. 4 cl.
Prereq.: 501 and 530.
Application of economic theory to urban problems; topics include slums, residential segregation, intracity location of economic activity, urban renewal, urban sprawl, transportation, and governmental organization. Weicher.

693 U G 1-5
Individual Studies
Advanced readings in Econ. and related fields. Juniors registered for 693 must have an average of B or better in all Econ. courses; and a cumulative point-hour ratio of 3.0 or better. Repeatable to a maximum of 15 cr. hrs. in any combination of decimal subdivisions.

693.01 Economic Theory and History of Thought
693.02 Economic History
693.03 Money, Banking, and Monetary Policy
693.04 Government Finance and Expenditure
693.05 Econometrics
693.06 Economic Development and Development Planning
693.07 International Economics
693.08 Structure and Regulation of Industry
693.09 Labor Economics
693.10 National Security Economics
693.11 Soviet Economy
693.12 Mathematical Economics

694 U G 3-5
Group Studies
Each decimal subdivision repeatable to a maximum of 15 cr. hrs.
Advanced courses in economics and related fields.

694.01 Economic Theory and History of Thought
694.02 Economic History
694.03 Money, Banking, and Monetary Policy
694.04 Government Finance and Expenditure
694.05 Econometrics
694.06 Economic Development and Development Planning
694.07 International Economics
694.08 Structure and Regulation of Industry
694.09 Labor Economics
694.10 National Security Economics
694.11 Soviet Economy
694.12 Mathematical Economics
695  U G 4  Economics of National Security
A.  4 cl.
Not open to students with credit for 679.
Analysis of economics problems arising from defense and war; emphasis on implication of defense and war economy and on economic theory and institutions. Sherman.

Introduction to National Security
(See Nat. Sec. Pol. S. 702.)

705  U G 4  Micro-Economic Theory Survey
A.  4 cl.
Prereq.: Grad. standing or permission of instructor.
May be available to students enrolled in a College Honors Program.
Not open to students with credit for 501.
Theory of consumer behavior; theory of the firm; costs and production; factor price determination; general equilibrium. Ray.

706  U G 4  Macro-Economic Theory Survey
W.  4 cl.
Prereq.: Grad. standing or permission of instructor.
May be available to students enrolled in a College Honors Program.
Not open to students with credit for 502.
Analysis of the determinants of the national output; income and employment levels; theory of economic growth and progressive equilibrium in an economy. Singh.

742  U G 4  Econometrics
A.  4 cl.
Prereq.: 641 or equiv.
Review of the general linear model; identification; estimating criteria; single and simultaneous equation estimation; econometric application. Cunyngham, L'Esperance, Porter, and Smamy.

Research Principles and Techniques in National Security
(See Nat. Sec. Pol. S. 785.)

800  G 3  Research Methods in Economics
A.
Methods of economic research, choice of research topics, and presentation and evaluation of results obtained. Cunyngham.

Seminar in National Security Research
(See Nat. Sec. Pol. S. 801.)

802  G 4  History of Economic Thought
Sp.
A survey of economic thought with emphasis on the period from Adam Smith to the present. Lynn.

805  G 5  Micro-Economic Theory
Prereq.: 501; prereq. or concur. 600.
Nature of economic analysis; theory of demand, costs, and prices; factor price determination and functional income distribution; competition, oligopoly, monopoly, and monopsony. Boyd, Brada, Darby, and Koizumi.

806  G 5  Macro-Economic Theory
Prereq.: 502; prereq. or concur. 600.
Theory of income and employment; Keynesian aggregate supply and demand; consumption, saving, and the multiplier; determinants of investment and the accelerator; government's role. Baltensperger, Dewald, and Kopeczky.

808  G 5  Advanced Micro-Economic Theory
Sp.
Prereq.: 600, 805, and 806.
Koizumi

809  G 5  Advanced Macro-Economic Theory
W.
Prereq.: 600, 805, and 806.
Baltensperger.

815  G 4  Mathematical Economics I
A.
Prereq.: 645, 808, and permission of instructor.
Mathematical analysis of microeconomic problems including consumer and production theory and general equilibrium. Koizumi.

816  G 4  Mathematical Economics II
W.
Prereq.: 645, 809, and permission of instructor.
Mathematical analysis of macro-economic problems including static and dynamic systems and optimal control. Tarr.

820  G 4  Monetary Theory
W.
Prereq.: 520, 805, and 806 or equiv.
Role of money in theoretical analysis of forces determining and influencing level of income, employment, and prices. Dewald.

821  G 4  Bank Structure and Regulation
Sp.
Prereq.: 520, 805, and 806 or equiv.
Relation of bank regulation and supervision to composition of banking industry; impact of differing banking structures on economic growth and stability; proposals for structural changes. Baltensperger.
Legal and Economic Problems in Taxation
Sp.
Legal, economic, and administrative problems in taxation. Lynne.

Advanced Econometrics
W.
Prereq.: 422.
Theory and application of advanced quantitative research methods; computerized application of econometric methods developed in 422. Cunyngham, L'Esperance, Porter, and Swamy.

General Business Conditions Analysis
Prereq.: 402 and enrollment in the MBA program.
Theoretical and applied analysis of general economic conditions and their relation to decisions of the firm. Brada, Hogan, Kopecky, and L'Esperance.

Managerial Economics
A, W, Sp., 2 1/2- hr. cl.
Prereq.: 402, Math. 122, and enrollment in the MBA program.
MBA core course in micro-economics; production and consumer theory, market forms, welfare, distribution, general equilibrium, and capital theory. Brada, Hogan, and Terr.

Advanced Economic Development I
W.
Prereq. or concur.: 405 and 406.
Not open to students with 6 cr. hrs. in 403.
A survey of the problems of economic development with emphasis on theoretical understanding of underdevelopment and its causes. Singh.

Advanced Economic Development II
Sp.
Prereq.: 405, 406, and 450.
The problems of measurement and estimation in underdeveloped economies with special reference to policy issues and development planning. Michael.

Advanced Micro-Economic Trade Theory
A. 4 cl.
Prereq.: 805.
Advanced nonmonetary international trade theory; analysis of the effect of trade and commercial policies on the allocation of resources, income distribution, and growth. Ray and Wipf.

Advanced Macroeconomic Trade Theory
W.
Prereq.: 405 and 406; 461 recommended.
Advanced monetary international trade theory; analysis of payments adjustments under alternative international monetary institutions. Stillson.

Industrial Organization
Sp.
Prereq.: 470 and 480.

Advanced Economics of the Labor Market
Sp.
Prereq.: 405 and 406.
Economic theory and empirical evidence relating to labor allocation and wage determination. Fleisher and Parnes.

Interdepartmental Seminars
(See under Interdepartmental Seminars.)

Seminar in Teaching Methods
Prereq.: 405 and 406.
Open only to departmental teaching associates. Repeatable to a maximum of 25 cr. hrs. Seminar in teaching methods and contents of undergraduate courses in economics for students pursuing the Doctor of Arts degree.

Seminar in Economic History, American and European
Sp.
Prereq.: 413 and 414 or equiv. or permission of instructor.
Repeatable to a maximum of 8 cr. hrs. Selected research topics in economic history. Sandberg.

Seminar in Price Theory
Su, W.
Prereq.: 408 and 409.
Repeatable to a maximum of 8 cr. hrs. Special topics in economic theory. Koizumi.

Seminar in Economic Problems of the Soviet Union and Eastern Europe
A.
Prereq.: 407 and 408.
Repeatable to a maximum of 8 cr. hrs. Selected research topics. Brada and Eason.

Seminar in Monetary Policy
Sp.
Prereq.: 420 and 421.
Repeatable to a maximum of 8 cr. hrs. Application of monetary theory to issues of public policy in banking and monetary affairs; examination of public hearings and policy literature. Baltensperger, Darby, and Dewald.
930  (830)  G 4
Seminar in Government Finance
W.
Prereq.: 631 and 632.
Repeatable to a maximum of 8 cr. hrs.
Analysis of theoretical and applied aspects of fiscal economics in the American and foreign economies; selected topics of current and important importance. Lynn and Stocker.

940  G 4
Seminar in Econometrics
Sp.
Prereq.: 742 and 842 or equiv. or permission of instructor.
Repeatable to a maximum of 8 cr. hrs.
Examination of economic problems whose solutions may advantageously be sought by use of the methods of mathematics and mathematical statistics. Cunningham, L’Esperance, and Swamy.

950  G 4
Seminar in Economic Development and Planning
Sp.
Prereq.: 652 and 850, or permission of instructor.
Repeatable to a maximum of 8 cr. hrs.
Selected topics in the process of economic development and in planning for development; analysis and evaluation of planning methodologies, strategies, and systems. Kelley, Michael, and Singh.

960  G 4
Seminar in International Economic Problems
Su.
Prereq.: 861.
Repeatable to a maximum of 8 cr. hrs.
Seminar in analytical problems, theoretical and applied, of international economic adjustments; development of techniques for implementation of policies. James and Wipf.

970  G 4
Seminar in Structure and Regulation of Industry
W.
Prereq.: 872.
Repeatable to a maximum of 8 cr. hrs.

980† G 4
Seminar in Industrial Relations
W.
Prereq.: 683 or equiv. or permission of instructor.
Repeatable to a maximum of 8 cr. hrs.
Selected topics and issues in contemporary trade unionism and collective bargaining.

981  G 4
Seminar in the Economics of the Labor Market
Sp.
Prereq.: 882.
Repeatable to a maximum of 8 cr. hrs.
Selected topics and issues in wage determination, employment and unemployment. Kelley, Fleisher, and Partes.

991  G 4
Problems in National Security Economics
W.
Prereq.: 695 or equiv. or permission of instructor.
Repeatable to a maximum of 8 cr. hrs.
Seminar designed to analyze in depth selected economic problems of national defense and defense-related activities. Sherman.

994  G 3-5
Group Studies
Each decimal subdivision repeatable to a maximum of 15 cr. hrs.
Advanced courses in Economics and related fields.
994.01 Economic Theory and History of Thought
994.02 Economic History
994.03 Money, Banking, and Monetary Policy
994.04 Government Finance and Expenditure
994.05 Econometrics
994.06 Economic Development and Development Planning
994.07 International Economics
994.08 Structure and Regulation of Industry
994.09 Labor Economics
994.10 National Security Economics
994.11 Soviet Economy
994.12 Mathematical Economics

995  G 3-5
Research Seminars
Prereq.: 75 hrs. of grad. cr.; completion of core courses in decimal subdivision or permission of seminar director.
Each decimal subdivision repeatable to a maximum of 30 cr. hrs.
Intensive study of problems in the graduate fields of specialization.
995.01 Economic Theory and History of Thought
995.02 Economic History
995.03 Money, Banking, and Monetary Policy
995.04 Government Finance and Expenditure
995.05 Quantitative Methods in Economics
995.06 Economic Development and Development Planning
995.07 International Economics
995.08 Structure and Regulation of Industry
995.09 Labor Economics
995.10 National Security Economics
995.11 Soviet Economy
995.12 Mathematical Economics

998  G Arr.
Research in Economics: Thesis
Research for thesis purposes only.

999  G Arr.
Research in Economics: Dissertation
Research for dissertation purposes only.

SCIENCE AND MATHEMATICS EDUCATION
Office: 241 Arps Hall, 1945 North High Street

Professors Howe (Chairman), Coon, Crosswhite, Schlessinger, and Trimble; Associate Professors Helgeson, Mayer, and Osborne; Assistant Professors Blosser, Disinger, Higgins, Roth, Shumway, Steiner, Thomson, and White.


Science Education: 294.27, 551, 587.27, 594.27, 625, 626, 627, 693.27, 694.27, 849, 850, 851, 925.27, 994.27, 999.27.

SPECIAL SERVICES
Office: 353 Arps Hall, 1945 North High Street

Professors Dowling (Chairman), Kemp, MacMinn, Peters, Quaranta, Riccio, and Tripp; Associate Professors Ohliger and Wight; Assistant Professors Johnson, Kelsey, Silverman, and Tosi.

Adult Education: 294.33, 672, 673, 692.33, 693.33, 694.33, 925.33, 931, 932, 933, 934, 994.33, 999.33.

Guidance: 692.34, 693.34, 694.34, 874, 875, 876, 877, 878, 879, 880, 925.34, 954, 973, 974, 975, 976, 977, 978, 994.34, 999.34.

Student Personnel Work: 692.32, 693.32, 694.32, 780, 781, 782, 887, 888, 925.32, 926, 930, 938, 943, 945, 994.32, 999.32.

VOCATIONAL-TECHNICAL EDUCATION
Office: 122 Townsend Hall, 1885 Neil Avenue

Professors Reese (Chairman), Dalrymple, Dirks, Hanna, Jennings, Vivian, and Wells; Assistant Professor Orr; Instructors Densmore, Hephner, Provost, and Riley.


Distributive Education: 294.29, 529, 587.29, 594.29, 605, 606, 608, 646, 692.29, 693.29, 694.29, 925.29, 994.29, 999.29.


108† U 3
Introduction to the Study of Education
3 cl.
An introductory study of cultural factors that affect education, with students helped to understand through an examination of their own lives.

120 U 4
Industrial Practices and the School
A, W, Sp. 5 2-hr. cl. and lab.
A study of the history and role of industrial technology, and its relation to the school through experiences in planning, organizing, and controlling a managed production system. Fee.

1981 U 3
The Student and University Policy Development
2 1/2-hr. cl.
Prereq.: Permission of instructor.
A study of social, political, legal, and financial factors operating in the development of policy at The Ohio State University, emphasis on role of students in the process.

220 U 3
Design of Constructed and Manufactured Goods
A, W, Sp. 2 2-hr. cl. and lab.
Prereq.: Engr. Gr. 100, or 102.
A study of historical and contemporary design technology as it is applied in the construction and manufacturing industries.

221 U 4
Manufacturing Practices I
A, W, Sp. 5 2-hr. cl. and lab.
Prereq.: 120, 220, and Engr. Gr. 100.
A study of basic concepts of manufacturing technology through experiences in forming, separating, combining, and assembling materials used in the production of manufactured goods. Fee.

222 U 4
Manufacturing Practices II
W. 5 2-hr. cl. and lab.
Prereq.: 233.
A study of manufacturing management technology, manufacturing production technology, and manufacturing personnel technology through experiences in planning, engineering, and production of selected manufactured goods. Fee.

224 U 4
Mechanical Systems and Servicing
W, Sp. 5 2-hr. cl. and lab.
Prereq.: 120; Math. 150 or equiv.; and Physics 101 and 102, or equiv.
A study of the fundamental knowledge of techniques necessary for the application of mechanical power systems to industrial activities and the practices of servicing mechanical power systems. Fee.

225 U 4
Transmitting and Utilizing Mechanical Power
Su, A. 5 2-hr. cl. and lab.
Prereq.: 224.
A study of the selection, installation, operation, and maintenance of mechanical power transmission systems for industrial and transportation activity. Fee.

227 U 4
Electrical Systems and Servicing
A, Sp. 5 2-hr. cl. and lab.
Prereq.: 120; Math. 150 or equiv.; Physics 101 and 102, or equiv.
A study of the fundamental knowledge of techniques necessary for the application of electricity to industrial activities and the practices utilized in fabricating and servicing of electrical systems. Fee.
Electronic Systems and Servicing
Su, W. 5 2-hr. cl. and lab.
Prereq.: 227.
Not open to students with credit for 430.
A study of the fundamental knowledge of techniques necessary for the application of electronics to industrial activities and the practices utilized in fabricating and servicing electronic systems. Fee.

Construction Practices I
A, W, Sp. 5 2-hr. cl. and lab.
Prereq.: 221.
A study of basic concepts of construction technology through experiences in forming, separating, and combining materials used in the production of constructed goods.

Construction Practices II
A, Sp. 5 2-hr. cl. and lab.
Prereq.: 231.
A study of construction management, production, and personnel technologies through real and simulated experiences in the production of constructed goods.

Graphic Reproduction Practices
A, Sp. 5 2-hr. cl. and lab.
Prereq.: 120, 220, and Engr. Gr. 100.
An examination of graphic reproduction processes, manipulative skills necessary to teach graphic reproduction processes, and administrative procedures required to operate a graphic arts program.

Printing and Publishing Practices
W. 5 2-hr. cl. and lab.
Prereq.: 220, and Photog. and Cinma. 201.
Not open to students with credit for 246.
An examination of the managed production system utilized in the printing and publishing industry.

Elementary School Industrial Arts Activities
Su, A, W, Sp. 5 2-hr. cl. and lab.
Prereq.: Major standing in Elementary or Special Ed. Laboratory experiences involving the use of tools, materials, processes, and products through which society supplies its need for food, clothing, shelter, tools, machines, records, utensils, and transportation. Fee.

Work Experience in Industry
Prereq.: Major standing in the area chosen, and permission of instructor.
Repeatable to a maximum of 18 cr. hrs.

Industrial Arts Education
A firsthand study of working conditions, methods, and processes of industry, and their implication for the teaching of industrial arts.

Vocational Trade and Industrial Education
Occupational competency credit in subject matter field established by comprehensive examination.

The Handicrafts
A, W, Sp. 5 2-hr. cl. and lab.
Open only to Occupational Therapy, Physical Education, and Public Recreation majors.
Repeatable to a maximum of 12 cr. hrs.
Designed to develop skills and knowledge in the use of the common areas of handicrafts such as leather, metals, plastics, wood, and the graphic arts. Fee.

Typing I
A. 4 1-hr. lab.
Open only to business education majors and minors, or by permission of the instructor; not open to students with credit for 206.
Required in the 2nd yr. of students majoring in business education who lack proficiency required for admission to 266.
(Placement tests for students having had previous training in typewriting will be given during the first class meeting of 260, 261, and 262; students reporting for placement tests need not be registered in this course.)
Development of skill in the operation of the typewriter, in producing copy, and in concomitant learning: the place of typewriting in business.

Typing II
W. 4 1-hr. lab.
Prereq.: 260.
Not open to students with credit for 207.
Continuation of 260.

Typing III
Sp. 4 1-hr. lab.
Prereq.: 261.
Continuation of 261.

Shorthand I
A. 4 1-hr. lab.
Not open to students with credit for 208.
Required in the 2nd yr. of students majoring in business education who lack proficiency required for admission to 266.
(Placement tests for students having had previous training in shorthand will be given during first class meeting of 263, 264, and 265; students reporting for placement tests need not be registered in this course.)
The theory of Gregg shorthand, development of good shorthand penmanship, the ability to take dictation at increasing rates of speed, and the ability to transcribe shorthand using correct punctuation and spelling.

Shorthand II
W. 4 1-hr. lab.
Not open to students with credit for 209.
Prereq.: 263, or equiv.
Continuation of 263.
265 U 2
Shorthand III
Sp. 4 1-hr. lab.
Prereq.: 264.
Continuation of 264.

266 U 4
Advanced Stenography I
A. 4 2-hr. lab.
Prereq.: 262 and 265, or equiv.
Not open to students with credit for 210.
(For placement tests in typewriting and shorthand, see 260 and 263).
Continued development of speed and accuracy in shorthand and typewriting, development of skill in transcribing; transcribing voice-recorded dictation; duplicating.

267 U 4
Advanced Stenography II
W. 4 3 hr. lab.
Prereq.: 266.
Not open to students with credit for 211.
Continuation of 266.

268 U 4
Advanced Stenography III
Sp. 4 2-hr. lab.
Prereq.: 267.
Not open to students with credit for 212.
Continuation of 267.

289 Field Service Experiences
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Professional service with children or youth in some school or community agency.

289.01 Introductory Experience in a School System

289.02 Experience in a Community Agency

289.03 Art Education
For students in the curriculum in Art Education.

289.04 Speech and Hearing Therapy
For students in the Speech and Hearing Therapy Curriculum.

289.06 Public Recreation
For students in the curriculum in Public Recreation.

289.07 Physical Education (Men)
For students in the curriculum in Physical Education for Men.

289.08 Physical Education (Women)
For students in the curriculum in Physical Education for Women.

289.09 Speech and Radio-Speech
For students in the curricula in Speech and Radio-Speech.

289.13 Experience in Urban Schools
For students in all curricula in teacher education.

289.15 Music Education
A, W.

289.37 Tutoring

289.70 Early Childhood Education

294 U 3 or 5
Special Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Group studies for students in specialized programs.

294.01 Evaluation of Field Experiences
294.09 Speech Education
294.10 Elementary Education
294.13 Experience in Urban Schools
294.21 Industrial Arts Education
294.22 Trade and Industrial Education
294.23 Business Education
294.25 Teaching of English
294.26 Teaching of Mathematics
294.27 Teaching of Science
294.28 Teaching of Social Studies
294.29 Distributive Education
294.30 Vocational-Technical Education
294.32 Adult Education
294.40 History of Education and Comparative Education
294.41 Philosophy of Education
294.43 Radio and Television Education
294.45 Teaching of Foreign Languages
294.46 Audio-Visual Materials of Instruction
294.48 Educational Development
294.49 Curriculum and Instruction
294.50 Educational Change
294.55 Reading
294.70 Early Childhood Education

H299 U 3 or 5
Education Honors Colloquium
Prereq.: Participation in the College of Education Honors Program, or permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Discussion of the rationale of specific fields of educational inquiry; topics vary quarterly.

355 U 4
Custom Production of Industrial Goods
A, W, Sp. 5 2-hr. cl. and lab.
Prereq.: 231.
Not open to students with credit for 255
A study of custom production planning and custom production processing of industrial goods through experiences in the custom production of selected manufactured goods. Fee.
435 U 5
Theory and Practice in Secondary Education
Su, A, W, Sp. 4 2-hr. cl.
A laboratory field experience course introducing topics, problems, and skills common to prospective secondary school teachers.

436 U 3
The Teaching of Driver Education
Su, A, W, Sp. 1 2-hr. cl., 1 2-hr. lab.
Prereq.: 435, 3rd yr. standing, and valid driver's license.
Graduates of the College of Education who have completed this course will be eligible for certification to teach driver training courses in the secondary schools of Ohio.
Designed to prepare teachers to organize and conduct driver training classes in the secondary schools, including methods of teaching, scheduling, and other pertinent details. Fee.

437 U 3
Advanced Course in the Teaching of Driver Education
Su, A, Sp. 3 cl.
Prereq.: 435.
Organization and administrative aspects of driver and traffic safety education plus orientation in the use of driving simulators and driving ranges. Hoffman.

438 U 3
Personality and Behavioral Factors in Driver and Traffic Safety Education
Su, A, W. 3 cl.
Prereq.: 436; can be taken concur. with 437.
Study of human behavior with emphasis on attitudes, motivation, and adjustment, and their relationship to safe driving. Buffer.

442 U 3
Creative Dramatics
Su, A, W, Sp. 3 cl. and lab.
Prereq.: Psychol. 230, or equiv.
Philosophy, materials, methods, and evaluation of dramatic improvisation in developing creative artistic expression and problem solving.

460 U 4
Elementary Education: Child Guidance
Su, A, W, Sp. 4 cl., 1 lab.
Prereq.: Psychol. 230; concur. 461.
Not open in Su. to elementary majors who lack teaching experience.
Lab. time is spent in observation-participation in an elementary school classroom.
To develop an understanding of child growth and development principles in relation to instruction.

461 U 3
Elementary Education: Conceptions of Teaching
Su, A, W, Sp. 2 1 1/2-hr. cl.
Prereq. or concur.: 460.
Not open in Su. to elementary education majors who lack teaching experience.
The lab. for 460 also serves 461. (Students who enroll only in 461 because of previous credit for 460 will be assigned to an elementary classroom for observation and participation at the same time as the 460 lab.)
Designed to acquaint students with certain aspects of elementary school programs which cut across separate subject areas, and to acquaint students with certain teaching behaviors.

467 U 3
Introduction to Children's Literature
Su, A, W, Sp. 3 cl.
Prereq. or concur.: 461.
Study of literature for children with emphasis on standards for selecting materials with reference to the interests, needs, and abilities at different age levels. Fee.

501 U 3
Kindergarten and Pre-School Teaching
Su, A, W, Sp. 2 1 1/2-hr. cl.
Prereq.: 460; permission of instructor required for home economics majors.
Recent development in the education of young children and its influence on the selection and guidance of appropriate activities.

502 U 3
Elementary Education: Arithmetic
Prereq.: 461, and Math. 105.
A study of the methods and materials used in arithmetic instruction; includes development of functional relationships with other curriculum areas, diagnostic procedures, and remedial work.

507 U 3
Elementary Education: The Language Arts
Su, A, W, Sp. 2 2-hr. cl.
Prereq.: 461.
Consideration given to the teaching of language arts, including listening, oral, and written communications.

508 U 4
Elementary Education: The Social Studies
Su, A, W, Sp. 2 2-hr. cl. and 1 lab.
Prereq.: 461; concur. 513 should be scheduled on the same day of the week and at consecutive A.M. or P.M. hours just prior to student teaching.
Not open in Su. to elementary majors who lack teaching experience.
Lab. time is spent in participation in an elementary school.
Students may not schedule more than 20 cr. hrs. while taking this course.
Sequential arrangement of the elementary education curriculum. Particular emphasis is placed on social studies in the elementary school program.

511 U 4
Elementary Education: Science
Su, A, W, Sp. 2 2-hr. cl., and 2 lab. hrs. arr.
Prereq.: 461, and 15 cr. hrs. of science. (The University Basic Education Requirement in science may be used.)
Consideration is given to the role of science in childhood education and to the study of content, methods, materials, and equipment appropriate for this program. Fee.
513 U 4
Elementary Education: Reading
Su, A, W, Sp. 2 hr-cl., and 1 lab.
Prereq.: 461; concr. SIB should be scheduled on the
same day of the week and at the same hour; A.M. or P.M.
hours just prior to student teaching.
Not open in Su. to elementary majors who lack
Teaching experience.
Lab time is spent in participation in an elementary
school.
Students may not schedule more than 20 cr. hrs.
while taking this course.
A study of various methods and materials used in the
teaching of reading in the elementary school today.
Fee.

520 U 2
Teaching Typewriting and Office Practice
W. 2 cl.
Prereq.: 262 or equv., 435, and 4th yr. standing.
Objectives, methods, classroom procedures, and
materials for teaching typewriting and clerical
practice.

521 U 2
Teaching Shorthand and Transcription
W. 2 cl.
Prereq.: 265 or equv., 435, and 4th yr. standing.
Objectives, methods, classroom procedures, materials,
and evaluation for teaching shorthand, transcription,
and business English.

523 U 3
Teaching Bookkeeping and Office Machines
A. 3 cl.
Prereq.: Acc. 221 and senior standing.
The objectives, methods, classroom procedures, and
materials for teaching bookkeeping and accounting,
ofice machines, and business arithmetic.

524 U 3
Methods of Teaching Basic Business Subjects
W. 1 cl.
Prereq.: 435, 4th yr. standing, and 25 cr. hrs. in Geog.,
Econ., and Bus. Admin.
Objectives, methods, classroom procedures, materials
for teaching general business, business law,
consumer economics, and business organization in
the high school.

526 U 4
Teaching of Social Studies
Su, A, W, Sp. 2 hr-cl.
Prereq.: 435, and Hist. 104 or 133.
This course will be taught primarily from
history with some attention to other social studies;
consideration of teaching methodology and recent
trends in social studies education.

529 U 3
Methods of Teaching Distributive Education
Su, A, W. 3 cl.
Prereq.: 435.
The organization and preparation of teaching plans for
distributive education classes; analysis of current
on-the-job training methods in business establishments.

532 U 3
The Teaching of Industrial Arts I
A. 1 cl.
Prereq.: 435, and 3rd yr. standing.
A critical study of objectives, methods of presentation,
evaluation class and laboratory procedures, and
professional problems.

533 U 3
The Teaching of Industrial Arts II
W. 1 hr-cl.
Prereq.: 532 and 3rd yr. standing.
Examinations and evaluation textbooks, industrial
publications, and audio-visual materials suitable for the
various grade levels; research and development; and
special consideration for exceptional pupils.

534 U 3
The Teaching of Industrial Arts III
Sp. 1 1/2-hr. cl.
Prereq.: 532, and 3rd yr. standing.
Problem design and presentation; planning secondary
school courses in drawing and the graphic arts;
methods of student evaluation; and correlation with
other subject fields; industrial practice.

540 U 4
The Teaching of Modern Foreign Language I
2 hr-cl.
Prereq. or concur.: 435, and permission of instructor.
Repeatable to a maximum of 8 cr. hrs.; subdivisions
not repeatable.
A study of preparation and use of new instructional
materials for beginning foreign language classes;
the teaching of audio-lingual skills; evaluation and
testing.
a. A, Sp. French
c. A, German

541 U 3
Empirical Methods in Educational Development
A, W, Sp. 1 1/2-hr. cl., 1 1/2-hr. lab.
Prereq.: Permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
A study of empirical methods as they apply in
educational research, development, and evaluation
settings. Bargar.

544 U 3
Seminar in Empirical Methods
A, W, Sp. 1 1/2-hr. cl., 1 hr. arr.
Prereq.: Permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Seminar in empirical methods in educational research,
development, and evaluation; emphasis on application
of techniques to educational problems. Bargar.

546 U 4
Teaching Mathematics in Secondary Schools I
A, W. 4 cl.
Prereq.: 435, and 20 cr. hrs. in Math.
Mathematical concepts, objectives, and classroom
procedures appropriate for secondary schools; selection,
preparation, and use of teaching materials including
lesson plans, study guides, textbooks and multisensory
aids.
551 U 4 Science in Secondary Schools
A, W, Sp. 4 cl.
Prereq.: 435, Psychol. 230, and a major or minor in Phys., Biol., or Earth Science; admission to professional standing.
Objectives, problems and procedures, preparing teaching plans, use of demonstrations, experiments, and projects, science curriculum and evaluation, instruments and procedures, texts and reference materials. Fee.

556 U 4 The Teaching of Speech in Secondary Schools
Su, A, W, Sp. 4 cl.
Prereq.: 435 and Speech 205, 280, 305.
The relationship of speech to the total school program with special emphasis on fundamental processes and forensic activities.

560 U 4 The Reading of Literature
Su, A, W, Sp. 4 cl.
Prereq.: 561. (Both 560 and 561 are prereq. to 587.25.)
The objectives of the literature program and techniques for developing appreciation and improving skills in the reading of various types of prose and poetry.

561 U 4 Teaching Language and Composition in Secondary Schools
Su, A, W, Sp. 4 cl.
Prereq.: 435.
The role of grammar and linguistics in the English program and techniques for the teaching of oral and written expression in high school.

575 U 3-6 Vocational Trade Industrial and Technical Teaching
Prereq.: Temporary vocational teaching certificate in a trade or industrial subject, or eligibility for such certificate, and permission of instructor.
Repetable to a maximum of 24 cr. hrs.
Provides teaching methods, techniques, and vocational course organization.

585 Elementary Education: Student Teaching
Prereq.: Ed. 4th yr. standing.
For additional information, see College of Education catalog.
Observation, participation, and responsible teaching in a public school in the greater Columbus area; individual and group conference or seminars. Fee.
(Maximum transfer credit accepted is 6 hrs.)

585.12 Post Degree Elementary Student Teaching
U 12-15
For students in the program for graduates with Bachelor of Arts or comparable degrees.

586 U 3-7 Elementary School Student Teaching in Special Fields
Prereq.: Ed. 3rd yr. standing.
Fee.

586.03 Art Education
586.07 Physical Education (Men)
586.08 Physical Education (Women)
586.14 Instrumental Music
586.15 Vocal Music
586.45 Foreign Languages

587 Student Teaching in Secondary Schools
Prereq.: Ed. 4th yr. standing.
A minimum of 12 cr. hrs. is required.
For additional information, see College of Education catalog.
Observation, participation, and responsible teaching in a public school in the greater Columbus area; individual and group conferences or seminars.
Students desiring teaching in more than one area should indicate accurately both section numbers and hours in each. Fee.

587.03 Art Education
587.07 Physical Education (Men)
587.08 Physical Education (Women)
587.09 Speech Education
587.14 Instrumental Music
587.15 Vocal Music
587.21 Industrial Arts
587.22 Trade and Industrial Education
587.23 Business Education
587.24 Health Education
587.25 English
587.26 Mathematics
587.27 Science
587.28 Social Studies
587.29 Distributive Education
587.45 Foreign Languages

587.53 Dance Education

588 U 3-15 Student Teaching in Special Fields
Prereq.: Ed. 4th yr. standing.
A minimum of 12 cr. hrs. in student teaching is required.
For additional information, see College of Education catalog. Fee.

588.04 Speech and Hearing Therapy
588.09 Radio-Speech Education
588.47 Exceptional Children
588.51 Dental Hygiene Education
588.52 Blind and Partially Seeing
588.54 Educable Mentally Retarded
588.60 Physically Handicapped

594 U 3 or 5
Group Studies
Prereq.: Permission of instructor
Repeatable to a maximum of 15 cr. hrs.
Group studies for students in specialized programs.
594.09 Speech Education
594.10 Elementary Education
594.11 Experience in Urban Schools
594.21 Industrial Arts Education
594.22 Trade and Industrial Education
594.23 Business Education
594.25 Teaching of English
594.26 Teaching of Mathematics
594.27 Teaching of Science
594.28 Teaching of Social Studies
594.29 Distributive Education
594.30 Vocational-Technical Education
594.40 History of Education and Comparative Education
594.41 Philosophy of Education
594.43 Radio and Television Education
594.45 Teaching of Foreign Languages
594.46 Audiovisual Materials of instruction
594.47 Exceptional Children
594.48 Educational Development
594.49 Curriculum and Instruction
594.50 Educational Change
594.53 Reading
594.70 Early Childhood Education

H599 U 3 or 5
Honors Course
Prereq.: 3rd yr. standing, enrollment in the College Honors Programs, and permission of adviser.
Repeatable to a maximum of 15 cr. hrs.
A program of independent study to allow full scope to the initiative of the student with special aptitudes.

601 U G 2
Business and Office Education Programs
A. 2 cl.
Prereq. or concur.: 520, or 521, or 523, or equiv.
Organization, implementation, evaluation, and improvement of vocational office education programs on the secondary school level; required of all business education majors. Hanna.

602 U G 3
Cooperative Office Education
Su, W. 3 cl.
Prereq.: 520, or 521, or 523, or equiv.
A study of new approaches to organization, operation, and supervision of the Cooperative Office Education Program and the understanding and evaluation of the recent thrust in vocational education and work-study programs. Jennings.

605 U G 3
Curriculum Content for Distributive Occupational Subjects
Sp. 3 cl.
Prereq.: 529.
Securing, evaluating, and organizing instructional material and experiences for distributive cooperative education and adult extension courses. Vivian.

606 U G 3
Operation of Distributive Education Programs
Su, W. 1 2½-hr. cl.
Prereq.: 435.
A practical study of the development and operation of a distributive education program. Vivian.

608 U G 2-3
Practicum in Distributive Education
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
Direct employment in a retail, wholesale, or service business previously approved by the student's adviser. Vivian.

610 U G 3
History of Practical Arts and Vocational Education
Su, W. 3 cl.
Prereq.: Ed. or Agr. 3rd yr. standing.
History of those vocational and non-vocational phases of agriculture, business, industry, and homemaking which concern education. Lux.

612 U G 3
Linguistic Materials for High School Teachers
Su, A, W, Sp. 1 2½-hr. cl.
Prereq.: 56.
A study of traditional and modern linguistic systems of grammar and their bearing on the work of the English teacher. Bateman and Zidonis.

613 U G 3
Literature for Adolescents
Su, A, W, Sp. 2 1½-hr. cl.
Literature for individual, group, and whole-class reading in junior and senior high schools; interest factors, readability, and literary value as criteria for selection; bibliographic aids. Gallagher and Gnezd.

614 U G 3
The Supervision of Journalism in Secondary Schools
W. 1 cl.
Prereq.: 435 or equiv., and jour. 204.
For journalism teachers in secondary schools and advisers; covers editorial, advertising, circulation, mechanical production, and publishing phases of school newspapers, magazines, and annuals.

616 U G 4
The Teaching of Modern Foreign Language II
4 cl.
Prereq.: 435, 540, and permission of instructor.
Repeatable to a maximum of 8 cr. hrs.; subdivisions not repeatable.
Study of the use of new instructional materials for intermediate and advanced foreign language classes; teaching of reading, writing, literature; evaluation and testing.

617  U G 4  The Teaching of Foreign Languages in the Elementary School
A. W.
Pre req.: 15 cr. hrs. of Ed. and permission of instructor.
Skill development in teaching of spoken and written foreign lan.
guages on the elementary school level; construction and use of suitable materials. Otto.

618  U G 4  The Teaching of Latin
A. 3 cl., lab. arr.
Pre req. or concur.: 435, Latin 201, 202, and an addi.
tional 6 cr. hrs. in Latin.
Content of this course includes: values, teachers’ equi., objectives, and methods; classroom procedures; lectures, and assigned readings. Cleary.

621  U G 4  Teaching Mathematics in Secondary Schools II
Su, A. W.  4 cl.
Pre req.: 546, and 25 cr. hrs. in Math.
Selected problems in curriculum; evaluation, materials of in.
struction, and the teaching of specific topics in arithmetic, algebra, and geometry.

622  U G 3  Laboratory Methods and Materials in School Mathematics
Su.  1 2½-hr. cl.
Pre req.: 621 or equiv., and a major or minor in Math.
The laboratory teaching of mathematics; experience in the preparation and use of teaching materials.

624  U G 3  Social Education
Su, A. W.  1 2½-hr. cl.
Pre req.: 3rd yr. standing and 435 or 461 or permission of instructor.
Analyses of social structures and processes in classroom grouping arrangements; teacher social roles, school traditions, ceremonies, clubs, and athletics. Jewett.

625  U G 3  Practicum in Biological Science for Teachers
Su, A. W.  3 2-hr. cl.
Pre req.: 551, 30 cr. hrs. in Biol. Sc., and 15 cr. hrs. in Chem.
Use and design of apparatus, demonstrations, and experiments; collection and preservation of biological materials; the role of the living organism in the classroom. Fee.

626†  U G 3  Practicum in the Earth Sciences for Teachers
Su, Sp.  3 2-hr. labs.
Pre req.: 551 and 30 cr. hrs. in Earth Science courses.
Use of the laboratory and local field environment in teaching earth science; materials, demonstrations, and experimental methods.

627  U G 3  Practicum in General and Physical Science for Teachers
A. W.  3 2-hr. cl.
Pre req.: 551, and 30 cr. hrs. in major of General or Physical Science.
Use and design of apparatus, demonstrations, and experiments for general science, chemistry, and physics, with special emphasis on modern secondary school instructional materials in the sciences. Fee.

631  U G 4  Teaching Dramatics and Oral Interpretation in Secondary Schools
Su, W.  4 cl.
Pre req.: 435, and Speech 205, 221, 270.
The organization and conduct of dramatic classes and extra dramatic activities; resource planning for oral readings, choral speaking, radio-television programming, and theatrical productions. Lewis.

640  U G 3  Foundations of Education I
Pre req.: 3rd yr. standing.

640.71  Social Criticism in American Education
1 2½-hr. cl.
Not open to students with credit for 636.
An analysis of the major critical stances taken in the history of American education. Mehl.

640.72  History of Modern Education
3 cl.
Not open to students with credit for 632.
Education and schools as factors in the development of the modern world: theories, practice, relations with other social institutions and forces, especially in Europe and America. Sutton.

640.73  Introduction to Philosophy of Education
3 cl.
Not open to students with credit for 637.
Application of the methods and techniques of philosophical analysis to educational problems. Pratte and Reagan.

641  U G 3  Foundations of Education II

641.71  People, Politics, and Schools
1 2½-hr. cl.
Pre req.: 3rd yr. standing.
An analysis of the political forces and ideological positions in American life since the Civil War and their effects on American education. Mehl.

641.72  Education in Earlier Times
3 cl.
Pre req.: 3rd yr. standing.
Not open to students with credit for 632.
Schools and educational ideals in ancient and medieval societies; education before the rise of modern nation states; influence on contemporary practice and thinking. Sutton.

641.75  Logic in Teaching
2 1½-hr. cl.
Pre req.: 640.73, and 4th yr. standing.
Study of the logical aspects of teaching; includes attention to definitions, arguments, explanations, questions, and value judgments. Reagan.
641.76 Educational Theory
3 cl.
Prereq.: 640.71 or 640.72 or 640.73, and 4th yr. standing.
To assist pre-service teachers in achieving perspective with reference to the various movements and practices that are embodied in contemporary theories of education. Pratte and Reagan.

641.77 Comparative Education
1 2½-hr. cl.
Prereq.: 640.71 or 640.72 or 640.73, and 4th yr. standing.
Not open to students with credit for 723.
Social and cultural factors influencing the differential development of educational institutions and organization. Sutton.

641.78 History of Black Education in America
3 cl.
Not open to students with credit for 638.
Traces the historical development of the black American's experience and response to schools and other social institutions which exert educational influence. Simmons.

642 U G 3 Foundations of Education III
Sp. 3 cl.
642.72 Special Topics in History of Education
Prereq.: 640.71 or 640.72, and permission of instructor. Develops and examines a selected topic in history of education.
642.73 Special Topics in Philosophy of Education
Prereq.: 640.73, and permission of instructor. Develops and examines a selected topic in philosophy of education; among possible topics are ethics and education; aesthetics and education; and existentialism and education.

646 U G 3 Coordination of Cooperative Vocational-Technical Education Programs
Su, Sp. 1 2½-hr. cl.
Prereq.: 635, or equiv.
Designed to develop the knowledge, attitudes, and competencies to operate effectively a cooperative vocational-technical education program. Vivian.

649 U G 3 Vocational Trade, Industrial and Technical Education for Out-of-School Youth and Adults
A. 1 2½-hr. cl.
Prereq.: 575 or equiv., and permission of instructor. Teaching or supervising experience required for graduate credit.
Philosophy; facilities, subject matter, instructional methods, teacher education, supervision, coordination; records and reports, types of programs and relationships. Reese.

651 U G 3 Introduction to Exceptional Children
Su, A, W, Sp. 3 cl.
Not open to students with credit for Psych. 570.
Exceptional children and their problems, including the intellectual deviant, visually handicapped, deaf and hard of hearing, children with speech problems, physically handicapped, and emotionally disturbed. Beaver and Johnson.

652 U G 3 The Educable Mentally Retarded: Introduction
Su, A, W, Sp. 1 2½-hr. cl.
Prereq.: 651 or Psychol. 570.
Study of causal factors, evaluations, learning potential, and general characteristics of the retarded child. Beaver and Lema.

653 U G 3 Educational Planning for Mentally Retarded Children and Youth
W, Sp.
Prereq.: 652.
A basic course for teachers and administrators which deals with curriculum goals and related educational planning for mentally retarded children and youth. Lema.

654 U G 3 Practicum in Educational Planning for Mentally Retarded Children: Communicative Arts
Su, Sp. 1 2½-hr. cl.
Prereq.: 652 and 653.
A practicum on content, educational techniques, and methodology of teaching the communicative arts to the mentally retarded. Beaver and Perry.

655 U G 3 Practicum in Education Planning for Mentally Retarded Children: Arithmetic
Sp. 1 2½ hr. cl.
Prereq.: 653.
A practicum on content, educational techniques, and methodology of teaching arithmetic to the mentally retarded. Beaver.

656 U G 3 Practicum in Educational Planning for Mentally Retarded Children: Natural and Social Science
Su, W. 1 2½-hr. cl.
Prereq.: 653.
A practicum on content, educational techniques, and methodology of teaching the natural and social sciences for the mentally retarded. Lema.

657 U G 3 Curriculum Planning for Occupational Training of the Mentally Retarded
Su, W. 3 cl.
Prereq.: 653.
A curriculum planning course studying the purpose, organization and administration of sheltered workshops and other work experience programs for the mentally retarded. Cavin and Perry.

658 U G 3 Education for the Slow Learner
W. 3 cl.
Prereq.: 15 hrs. in elementary or secondary education.
A critical examination of the educational problems of the slow learner with recommendations for organization of curriculum and programs to meet their needs. G. Johnson.
659 U G 3
Techniques of Teaching Speech to the Deaf
1 2½-hr. cl.
Study and practice in developing speech in the deaf.

660 U G 3
Techniques of Developing Language in the Deaf
1 2½-hr. cl.
Prereq.: 651 or Psychol. 570.
A study of the techniques and procedures for developing elementary vocabulary and syntax for deaf children. Hott.

661 U G 3
Techniques of Developing Advanced Language in the Deaf
1 2½-hr. cl.
Prereq.: 660.
Study of techniques and procedures for developing advanced vocabulary and syntax with deaf students.

662 U G 3
Methods in School Speech and Hearing Therapy
A, Sp. 1 3-hr. cl.
Prereq.: 289.04.
Organizing speech and hearing therapy programs in schools; state programs; professional relationships; procedures and materials for screening, scheduling, lesson planning, and evaluation.

663 U G 3
Advanced Methods in School Speech and Hearing Therapy
W. 1 3-hr. cl.
Prereq.: 662.
Advanced therapy methods and techniques for the treatment of complex speech, language, and hearing problems encountered by the school speech and hearing therapist.

665 U G 3
Instructional Programs for Exceptional Children
W. 1 2½-hr. cl.
Prereq.: Practice Teaching.
Problems, evaluation, and adjustments related to the participation of exceptional children in the regular classroom, grades one through twelve.

666 U G 3
Principles and Methods of Teaching Braille: Beginning
Su, A. 3 cl.
Theory and practice in learning and teaching braille reading and writing, including the alphabet, numerals, twenty-six one-cell whole-word signs and seventeen dot-five compound contractions. Hott.

667 U G 3
Principles and Methods of Teaching Braille: Advanced
Su, W. 1 2½-hr. cl.
Prereq.: 666.
Theory and practice in learning and teaching braille reading and writing with emphasis on contractions, punctuation, and manuscript writing; preparation for certification in braille writing. Hott.

668 U G 3
Principles and Methods in the Education of Partially Seeing Children
Su, W. 1 2½-hr. cl
Prereq.: 717.
Identification of types and patterns of visual impairment; educational placement, facilities and programs for the partially seeing; impact of visual environment on sight; use of special equipment for partial seeing. Hunt.

669 U G 3
Practicum in Educational Planning for Partially Seeing Children
Su, Sp. 1 2½-hr. cl.
Prereq.: 668.
Adaptations of curriculum for the partially seeing—methods and techniques; planning educational experiences; counseling and guidance for the partially seeing; observation and participation required. Hunt.

670 U G 3
Educational Disability
Su, A. 1 2½-hr. cl.
Prereq.: 507, or permission of instructor.
Not open to students with credit for Psych. 681.
An overview of theory and practice, including causes, diagnostic procedures, remediation, and instructional materials. Huelsman.

671 U G 3
Psycho-Educational Diagnostic Teaching
Su, A, Sp. 1 2-hr. cl., 3 1-hr. lab. arr.
Prereq.: Permission of instructor.
Not open to students with more than 6 cr. hrs. of Psych. 683.
Repeatable to a maximum of 9 cr. hrs.
Using test materials in the diagnosis of special disabilities in school work; practice with remedial procedures. Counts and Huelsman.

672 U G 3
Introduction to Adult Education
Su, A, W, Sp. 1 2½-hr. cl.
Prereq.: 4th yr. standing; for Ed. majors; 435 or 461.
The nature, extent, and significance of adult education; history and types of adult education; theoretical issues; adult learning and methodology; present trends and future developments.

673 U G 3
Parent Education
Su, W. 1 2½-hr. cl.
Prereq.: 4th yr. standing; for Ed. majors; 461 or 435.
Nature, extent, and significance of the parent education movement; home and school relationships; methods and resources; training professional and lay leaders; local and state programs.

674 U G 3
Family Participation in Early Childhood School Programs
Sp. 1 2½-hr. cl.
Prereq.: 673, or permission of instructor.
Focuses upon the purposes and importance of family involvement in early childhood school programs; types of programs, resources, methods, and curricula. Bozeman.
693.04 Speech and Hearing Therapy
693.09 Speech Education
693.10 Elementary Education
693.21 Industrial Arts Education
693.22 Trade and Industrial Education
693.23 Business Education
693.25 Teaching of English
693.26 Teaching of Mathematics
693.27 Teaching of Sciences
693.28 Teaching of Social Studies
693.29 Distributive Education
693.30 Vocational-Technical Education
693.32 Student Personnel Work
693.33 Adult Education
693.34 Guidance
693.35 Higher Education
693.36 Teacher Education
693.40 History of Education and Comparative Education
693.41 Philosophy of Education
693.43 Radio and Television Education
693.44 Educational Administration
693.45 Teaching of Foreign Languages
693.46 Audiovisual Materials of Instruction
693.47 Exceptional Children
693.48 Educational Development
693.49 Curriculum and Instruction
693.50 Educational Change
693.51 Dental Hygiene
693.52 Blind and Partially Seeing
693.54 Educable Mentally Retarded
693.58 Reading
693.61 Child Study
693.70 Early Childhood Education

694 U G 3 or 5
Group Studies in Education
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Group studies on special problems in education.
694.09 Speech Education
694.10 Elementary Education
694.13 Experience in Urban Schools
694.21 Industrial Arts Education
694.22 Trade and Industrial Education
694.24 Business Education
694.26 Teaching of English
694.27 Teaching of Mathematics
694.28 Teaching of Sciences
694.29 Distributive Education
694.30 Vocational-Technical Education
694.32 Student Personnel Work
694.33 Adult Education
694.34 Guidance
694.35 Higher Education
694.36 Teacher Education
694.40 History of Education and Comparative Education
694.41 Philosophy of Education
694.43 Radio and Television Education
694.44 Educational Administration
694.45 Teaching of Foreign Languages
694.46 Audiovisual Materials of Instruction
694.47 Exceptional Children
694.48 Educational Development
694.49 Curriculum and Instruction
694.50 Educational Change
694.51 Dental Hygiene
694.52 Blind and Partially Seeing
694.54 Educable Mentally Retarded
694.58 Reading
694.61 Child Study
694.70 Early Childhood Education

712† U G 3
Evolution of Instruction and Guidance of the Deaf
1 21/2-hr. cl.
Prereq.: 651, or Psych. 570.
Evolution of the oral and manual approaches of instruction of the deaf and their implication for the life adjustment problems of the deaf.

713† U G 4
Teaching Reading and Arithmetic to the Deaf
4 cl.
Prereq.: 660.
Developing skills in reading and arithmetic in the deaf.

714† U G 3
Teaching Social Studies and Science to the Deaf
3 cl.
Prereq.: 713.
Teaching skills in academic subjects to the deaf on the intermediate and high school levels.

715† U G 3
Education of Multihandicapped Children
1 21/2-hr. cl.
Prereq.: 651, or Psych. 570.
Differential diagnosis, classification, educational placement, and adjustment of multihandicapped children.

717 U G 3
Education Implication of Visual Impairments
Su, A. 1 21/2-hr. cl.
Prereq.: 651, or Psych. 570.
A course for school personnel, including a survey of the structure, function, and hygiene of the eyes with emphasis on educational implications of visual disabilities of blind and partially seeing children. L. Hunt.

718 U G 3
Education of the Emotionally and Socially Maladjusted
Su, A, W, Sp. 1 21/2-hr. cl.
Prereq.: 651, or Psych. 570.
Theory and Practice in the Education of Blind Children
Su, Sp. 1 2/3 hr. cr.
Prereq.: 717.
Current theories and techniques in the education of blind children; adapting general curriculum, specialized content, materials, and equipment for the blind child. L. Hunt.

The School in American Culture
A. 1 cr. 1 3-hr. lab. Field trips arr.
Prereq.: 15 cr. hrs. of professional study in Ed.
Open only to new international students.
An orientation to the contemporary American school by direct observation correlated with study of major historical forces affecting education. Sutton.

Historical and Cultural Factors in the Evolution of Educational Systems
W. 1 2/3-hr. cr.
Prereq.: 532 or 636.
Social and historical factors affecting stability and effectiveness of educational institutions and organization in countries where programs of universal education are of recent origin. Sutton.

Education and National Development
W, Sp. 1 3-hr. cr.
Roles of education in national economic and social development; includes strategies for educational development and introduction to educational planning. Sanders.

Corrective Reading
Su, A. 1 1/3-hr. cr.
Prereq.: 435 or 513, and Psych. 230.
Diagnostic techniques and instructional methods and materials useful to the elementary and secondary classroom teacher in helping individuals and small groups of problem readers.

Reading in the Secondary School
Su, Sp. 3 cr.
Prereq.: Student teaching or permission of instructor.
Not open to students with credit for 853.
Critical study of objectives, content, and organization of reading programs in secondary schools.

Directing Student Teachers
Su, A, Sp. 1 2/3-hr. cr.
Prereq.: Bachelor's degree, teacher's certificate, and teaching experience.
Principles and techniques for directing the laboratory experiences of student teachers and other teacher education students. Kerber.

Learning-Disabled Children
Su, A, W, Sp. 1 2/3-hr. cr.
Prereq.: Student teaching, or permission of instructor.
Not open to students with credit for Psych. 701.

Exceptional Children: Assessment and Instruction
A, W, Sp. 1 2/3-hr. cr., and 3 2-hr. lab.
Prereq.: Permission of instructor.
Educational assessment and instructional techniques applied to individual children who display learning and behavioral problems and who can be treated with directive teaching. T. Stephens.

Emotionally Disturbed Children: Principles of Detection
Su, A, W, Sp. 1 2/3-hr. cr.
Prereq.: Student teaching, or permission of instructor.
Detection, assessment, and therapy procedures used with disturbed children; emphasis on treatment and the application of principles of treatment in the classroom. K. Hunt.

Directive Teaching of Exceptional Children
Prereq.: Permission of instructor.
Principles of behavior modification are presented concurrently with specific examples of how these procedures are applied with trainable children. Cooper.

Applied Behavioral Analysis of Exceptional Children
Prereq.: 773, and permission of instructor.
Designed to help students demonstrate and improve skills in behavior modification. Cooper.

Observation Study of Exceptional Children
Prereq.: 778 or equiv., and permission of instructor.
A study of current methods of observation, measurement, and analysis concerning teaching exceptional children in the classroom and the home. Cooper.

Introduction to Student Personnel Work
Su. 2 1/2-hr. cr.
The nature of, and the issues involved, in student personnel work in higher education. Silverman and Johnson.
781 U G 2
The Academic Advising Process
W. 2 cl.
Prereq.: Permission of instructor.
An overview of the academic advisement process
including practical and philosophical questions about
advisement and the role of the adviser. MacMinn.

782 U G 3
The Practice of
College Student Personnel Work
A. 2 1/2-hr. cl.
Prereq.: Permission of instructor.
First practical course in professional sequence;
prerequisite to field work practice; major services are
examined and discussed; outstanding practitioners
consult on their work. Tripp.

784 U G 3:12
Internship in Educational Development
Prereq.: 411 and 544, or permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Internship experiences in research, development, or
evaluation settings. Bargar.

785 U G 5
Introduction to Inquiry, Principles, Strategies,
and Techniques
Su, A, W, Sp. 2 2-hr. cl., 1 2-hr. lab.
Prereq.: Permission of instructor.
Introduction to inquiry strategies and their role in
educational development; emphasis is on the
conceptualization of educational problems. Bargar,
Kennedy, and Gunnell.

786 U G 5
Introduction to Inquiry: Quantitative Methods
Su, A, W, Sp. 2 2-hr. cl., 1 2-hr. lab.
Prereq.: 785 or equiv., or permission of instructor.
An introduction to quantitative techniques, with
emphasis on application in educational settings.
Bargar, Kennedy, and Gunnell.

787 U G 3
Classroom Test Construction
W. 1 3-hr. cl.
Prereq.: 4th yr., or grad. standing.
General principles and techniques for construction
and utilization of classroom tests for assessment
of student achievement. Cook and Stufflebeam.

788 U G 4
Systems Concepts in Education
A. 1 3-hr. cl.
Prereq.: 4th yr. or grad. standing
Introduction to general systems theory and an
overview of its utilization and application in the
field of education. Cook and Trzebiatowski.

789 U G 3
Population Analysis and Educational Planning
W. 1 2/5-hr. cl.
Prereq.: 785 or equiv., and Soc. 751 or 754.
Repeatable to a maximum of 6 cr. hrs.
A seminar designed to study population trends,
movements, and distributions as they relate to more
effective planning for school systems. Glatt.

790 U G 3
Problems and Processes in School Desegregation
A, Sp. 1 2/5-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
A seminar designed to study major problems related
to school desegregation, and processes of solving
those problems. Giatt.

791 U G 4
Information Processing in Education
W. 1 2/5-hr. cl., 1 hr. lab. arr.
Major emphasis is placed on current applications,
limitations, problems, and potential of data processing,
information system, and computer technology in
education. Novak.

H799 U G 3 or 5
Honors Course
Prereq.: 4th yr. standing, and permission of the
adviser under whose supervision the work is to be
completed, and the College Honors Committee.
Repeatable to a maximum of 15 cr. hrs.
A program of reading and research for each student,
with individual conferences, reports, and honors

800 G 3
Principles of Business Education
A. 1 2/5-hr. cl.
Open only to grad. students majoring in business
ed., distributive ed., or vocational ed.
Meaning, purpose, and scope of the business education
program; analysis of principles and fundamental issues.
Hanna.

801 G 3
Organization and Teaching of Office Practice
Su. 3 cl.
Prereq.: Bus. Admin., 301 or equiv.
The purposes, content, organization, materials, and
methods of evaluation for an office practice course;
office practice as a part of an intensive vocational
curriculum. Wells.

802 G 3
Administration and Supervision
of Business Education
Su. 1 2/5-hr. cl.
Prereq.: Grad. status in business or vocational ed.
Administrative problems in business education related
to program, facilities, placement and follow-up of
graduates, public relations, and federal-state
reimbursement. Jennings.

803 G 3
Improvement of Instruction
in Basic Business Subjects
Sp. 3 cl.
Prereq.: 524, or equiv.
A study of objectives, methods, materials, and methods
of evaluation for courses such as general business,
consumer education, and business law. Wells.
804† G 2
Improvement of Instruction in Bookkeeping and Data Processing
Prereq.: 593, or equiv.
Evaluation of the content, materials, and methods of teaching bookkeeping, accounting, and data processing on the secondary and post-secondary school levels. Hanaa.

805 G 2
Improvement of Instruction in Secretarial Subjects
Su. 2 cl.
Prereq.: 520 and 521, or equiv.
Teaching procedures basic to the development of vocational proficiency in typewriting, shorthand, and transcription; available instructional materials, evaluation, standards of achievement. Wells.

807 G 3
Survey of Vocational Education
Su, A. 1 2½-hr. cl.
Prereq.: 535, or equiv.
Open to vocational educators, school administrators, industrial arts students, and other graduate students who desire information about vocational education. A survey of vocational education, vocational guidance, and industrial arts. Vivian.

808† G 3
Experimental Design in Education I
2 1½-hr. cl.
Prereq.: 786 or equiv.
An examination of logical and quantitative principles, especially the analysis of variance, underlying basic experimental designs employed in educational research. Kennedy.

809† G 3
Experimental Design in Education II
2 1½-hr. cl.
Prereq.: 808 or equiv.
An examination of intermediate quantitative principles underlying experimental design in education, such as repeated measures designs, hierarchial designs, and the analysis of covariance. Kennedy.

811 G 3
Science in Elementary Education
Su, A, Sp. 1 2½-hr. cl.
Prereq.: 585 or 587, or 3 yrs. of teaching experience.
Problems of elementary school science instruction with emphasis on pertinent literature and classroom implementation of current developments in science curriculum and methodology.

812 G 3
Mathematics in Elementary Schools
Su, A. 1 2½-hr. cl.
Prereq.: 585, or 587, or 3 yrs. of teaching experience.
Applications of research and theory to improve children's competence in computation and problem solving; organization of instructional materials and contemporary instructional questions are considered.

813 G 3
Language Arts in the Elementary School
Su, A, W. 1 2½-hr. cl.
Prereq.: 585, or 587, or 3 yrs. of teaching experience.
Problems, research, and current methods of teaching the four major areas of the language arts in the elementary school; listening, speaking, reading, writing.

814 G 3
Social Studies in the Elementary School
Su, W. 1 2½-hr. cl.
Prereq.: 585, or 587, or 3 yrs. teaching experience.
The educational values of social studies, reasons for, and ways and means of integrating the social sciences with emphasis upon program innovations and research.

815 G 3
Guidance Problems in the Elementary School
Su, A, Sp. 1 2½-hr. cl.
Prereq.: 585 or 587.
Selected problems which the elementary teacher faces in providing individual, small-group, and large-group guidance.

817 G 3
Advanced Course in Children's Literature
Su, A, W, Sp. 1 2½-hr. cl.
Prereq.: 467, or 813.
An evaluation of the changing role and increased importance of literature in the education of children and youth today.

818 G 3
Foundations of Elementary Education
Su, A, Sp. 1 2½-hr. cl.
Utilization of research in the basic sciences in developing background and understanding of present trends in elementary education; critical examination of current theories.

819 G 3
The Changing American Elementary School
Su, A, W. 1 2½-hr. cl.
Prereq.: 585, or 587, or teaching experience.
Involves investigation of objectives, issues, and curriculum organization of the modern elementary school program.

820 G 3
Evaluation in Elementary Schools
Su, Sp. 1 2½-hr. cl.
Prereq.: 585, or 587, or teaching experience.
Appraisal of materials and methods in terms of educational aims and research findings; consideration of instruments and procedures for comparing achievements with established objectives. Harding.

821 G 3
School Problems in Child Development
Su, W, Sp. 1 2½-hr. cl.
An advanced course based upon research in education and related fields which aids the teacher in guiding developmental activities of children in the elementary school.
822 G 3 Simulation in Preparing School Personnel
A. 1 3-hr. cl.
Intended to familiarize leadership personnel in schools and colleges with the potential of simulation as a methodology for pre- and in-service education.

823 G 3 Creative Experiences in the Elementary School Curriculum
Su, A, Sp. 3 cl.
Study of the nature of creativity and aesthetics as related to the elementary school curriculum.

824 G 3 Designing School Programs for Children Age Two to Six
Su, A. 3 cl.
A study of the characteristics and needs of children two to six years of age as they are related to the development of educational programs. Miller.

825 G 3 Methods of Developing Language and Cognition in Early Childhood
W. 1 2 1/2-hr. cl.
Prereq.: 824, or permission of instructor.
Curriculum methods and materials in developing language and cognition in school programs for children ages 3-8, based upon research findings.

826 G 3 Research in Early Childhood Education
Sp. 1 2 1/2-hr. cl.
Prereq.: 785 and 786, or permission of instructor.
Exploration of research methods and techniques related to early childhood school programs; review of research in the field; in-depth investigation of interest area.

827 G 3 Advanced Study in the Teaching of Developmental Reading
Su, A, W. 1 2 1/2-hr. cl.
Designed to provide experienced teachers the opportunity to extend and update their knowledge of the reading process and the principles underlying effective reading instruction. Emans.

828 G 3 Trends and Issues in Teaching Reading in the Elementary School
A, Sp. 1 2 1/2-hr. cl.
Prereq.: 813, or permission of instructor.
Designed for experienced teachers and curriculum workers; current developments, trends, and issues critically analyzed according to available research evidence.

829 G 3 Problems in Elementary School Curriculum and Supervision
Su, A, Sp. 1 2 1/2-hr. cl.
Prereq.: 819 and 861.
An analysis of the programs and practices involved in facing major curriculum problems in the elementary schools; supervision and curriculum will be synthesized.

832 G 3 Industrial Arts in the Elementary School
Su, Sp. 3 cl.
Prereq.: 120 or 243 or equiv.
Selection, development, and evaluation of typical experience units in both classrooms and practical arts laboratory situations at all levels of the elementary schools. Blankenbaker and Lux.

833 G 3 Industrial Arts Curriculum Planning
Su, A. 1 2 1/2-hr. cl.
Prereq.: 587, or equiv.
Review of resource reports, general and special criterion developments formulation of curriculum guides, and laboratory manuals of instruction. Ray.

834 G 3 Planning Industrial Arts Facilities
Su, W. 1 2 1/2-hr. cl.
Principles of industrial arts and technical laboratory planning including equipment selection for all school levels and meeting all curriculum requirements. Ray.

835 G 3 Organization and Administration of Industrial Education
1 2 1/2-hr. cl.
Prereq.: 836.
International and historic background curriculum resources and development, physical organization, administrative organization, supervisory operation, and professional policies. Lux.

836 G 3-5 Practicum in Industrial Arts Education
A. 3 cl.
Prereq.: 587.
Derivation of doctrine, formulation, and evaluation of basic programs, curriculum development, organizational implementation, leadership problems, and professional progress, both here and abroad. Lux.

837 G 3 Research in the Laboratory of Industries
Su, Sp. 3 cl.
Prereq.: 833 or 834, teaching experience in indus. Arts or Vocational Indus. Ed., and permission of instructor.
Individual or group studies on a conference and laboratory basis, with the publication of either a professional or technical bulletin as a goal. Ray.

839 G 3 Applied Linguistics in the Teaching of Foreign Languages
W, Sp. 3 cl.
Prereq.: 15 cr. hrs. in Ed., Ling. 601, and at least one French or Spanish course on the 600 level.
Analysis of research in applied linguistics; construction of drills, laboratory exercises, and tests; lexical items and structural inventory of French or Spanish. Allen.
   a. W. French
   b. Sp. Spanish
841 G 3
The Use of Certain Concepts of Philosophy and Logic in the Teaching of Mathematics
Sp. 3 cl.
Prereq. or concur.: 621, or equiv.
A study of the role of physical materials and certain concepts of philosophy and logic in the teaching of arithmetic, algebra, and geometry.

842 G 3
Number Concepts in School Mathematics
Su., A. 2 1/2-hr. cl.
Prereq.: 841, or permission of instructor.
The concept of number systems from the point of view of a teacher who plans to introduce them to students in grades K-12.

843 G 3
Algebraic Concepts in School Mathematics
Su., W. 2 1/2-hr. cl.
Prereq.: 841, and undergraduate major or minor in Math. or permission of instructor.
Such concepts as algebraic structures, order structures, and relation and function as unifying themes for school mathematics.

844 G 4
Geometric Concepts in School Mathematics
Sp., 4 1-hr. or 2 2-hr. cl.
Prereq.: 841, or permission of instructor.
The historical and contemporary role of geometry in school mathematics; review of research, analysis of current programs and the teaching of selected concepts.

845 G 4
Curriculum and Supervision in School Mathematics
4 cl. plus observation and participation in selected schools.
Prereq.: 842, 843, 841, or permission of instructor.
The role of state and local supervisors in the design, implementation, and supervision of school mathematics programs (K-12) with analysis of contemporary programs and materials of instruction.

846 G 3
Behavioral Approaches in Schools
W., Sp. 1 1/2-hr. cl., lab. arr.
Prereq.: 771.
Repeatable to a maximum of 6 cr. hrs.
Focuses on group instruction of learning and behaviorally handicapped children; a systems approach is stressed; students devise and implement instructional systems with groups of children. Stephens.

847 G 3
Preparation of Handicapped Children for Post-School Adjustment
W. 1 2/2-hr. cl.
Prereq.: 651, or Psych. 570.
Study of the roles of education, guidance, work experience, placement, and follow-up service in helping handicapped children adjust to employment, family, and community life.

848 G 3
Organization of Programs for Exceptional Children
A. 2 1/2-hr. cl.
Prereq.: Permission of instructor.
Planning and financing of educational programs for children who are gifted, mentally deficient, blind, partially seeing, deaf, hard of hearing, emotionally disturbed, or who have learning problems or other handicaps.

849 G 4
The Supervision of School Science Programs
A. 4 cl.
Prereq.: 551 or equiv., and teaching or supervisory experience.
For those concerned with supervision of teacher education programs in science; objectives, curricula, recent trends, classroom management, evaluation of teaching, professional literature.

850 G 4
Science in the School Curriculum
Su., W. 2 2-hr. cl.
Prereq.: 551 or equiv., and teaching or supervisory experience.
Foundations for science curriculum; current developments, planning and evaluation procedures, research.

851 G 4
Science Education in Higher Education
Sp. 2 2-hr. cl.
Prereq.: 551 or equiv., and 849 or 850, or equiv.
Course and curriculum for teacher preparation programs in science; clinical experience including student teaching, facilities, evaluation, and research, and the role of science education centers.

854 G 3
Reading in Its Social Setting
Sp. 3 cl.
Prereq.: Permission of instructor.
The influence of culture on the nature, quality, and quantity of reading development; the relationship of reading to language development and mass media.

855 G 3
Practicum in Reading
Sp. 1 cl., lab. arr.
Prereq.: Permission of instructor.
Application of research, diagnostic, prognostic, and program development methodology in field settings.

859 G 3
The Junior High School Curriculum
A. 1 2/2-hr. cl.
Prereq.: 435, or equiv.
A study of the various types of junior high school programs, with special emphasis upon teaching-learning procedures as they apply to the early adolescent years. Alberty.
Fundamentals of Curriculum
Su, A, W, Sp. 1 2½-hr. cl.
Prereq.: 818, or 862.
Not open to students with credit for 868.
A beginning course in curriculum designed to serve as an overview of the field of curriculum and instruction: kindergarten through 12th grade. Tyler.

Fundamentals of Supervision
Su, A, W, Sp. 1 2½-hr. cl.
Prereq.: 860.
A beginning course in supervision of instruction emphasizing general principles and practices in elementary and secondary schools.

The Role of the School in the Social Order
A, W, Sp. 1 2½-hr. cl.
Prereq.: 585 or 587, or equiv.
An orientation course for teachers and administrators which deals with the basic purposes of secondary education in relation to major issues and current trends.

Evaluation in Secondary Schools
Su, A, W. 1 2½-hr. cl.
Prereq.: 585 or 587, or equiv.
Study of techniques of evaluation in secondary schools; attention is given to current evaluation practices with emphasis on procedures appropriate to Ohio Schools. Duncan.

Fundamentals of Instruction
Su, A, W. 1 2½-hr. cl.
Prereq.: 585 or 587, or equiv.
Survey of instructional theory and related behavioral science disciplines; emphasis is on application of principles of instructional theory to classroom teaching. Duncan and Hough.

Curriculum Theory
Su, W. Sp. 2 1½-hr. cl.
Prereq.: 861, or equiv.
An advanced course in curriculum: kindergarten through the 12th grade.

Supervision Theory
Su, A. Sp. 2 1½-hr. cl.
Prereq.: 861, or equiv.
An advanced course in supervision of instruction: kindergarten through 12th grade. Galloway.

Educational Experimentation
Su, W. 1 2-hr. lab, conf. arr.
Prereq.: 858 or equiv., and 15 cr. hrs. of grad. work in Ed.
Repeatable to a maximum of 5 cr. hrs.

Analysis of contribution of selected experiments to elementary, secondary, and higher education; design of experimental method for attacking educational problems. Duncan.

Laboratory in Curriculum Development in Secondary Schools
Sp. 1 2½-hr. cl.
Prereq.: 862, or equiv.
An advanced course in techniques of curriculum development and organization; study of specific problems in curriculum development which are of concern to the students enrolled. Albery.

Guiding Learning Activities in the Secondary School
Su, W. 1 2½-hr. cl.
Prereq.: 862 and 864.
An advanced course dealing with basic principles and generalized techniques involved in developing, organizing, and evaluating learning activities. Galloway.

Practicum in Curriculum and Supervision
A. 1 cl., lab. arr.
Prereq.: Master's degree and 861.
Not open to students with credit for 868.
A study of the literature and methods of curriculum development and supervision of instruction in a field setting. Williams.

Practicum in Curriculum and Supervision
W. 1 cl., lab. arr.
Prereq.: Master's degree, 861 and 870.
Continuation of 870.

Practicum in Curriculum and Supervision
Sp. 1 cl., lab. arr.
Prereq.: Master's degree, 861 and 871.
Continuation of 871. Klphr.

Problems of Secondary School Supervision and Curriculum Development
Su, A. 1 2½-hr. cl.
Prereq.: 860.
Not open to students with credit for 868.
An advanced course in supervision and curriculum development emphasizing the problem involved in initiating and conducting change in the secondary school curriculum.

Introduction to Guidance Services
Prereq.: 435.
Background and purposes of guidance services; techniques used in studying the individual; informational services; counseling services; placement and follow-up; developing a guidance program.
875 G 3
Group Processes
Su, A, W, Sp. 1 2½-hr. cl.
Prereq.: Permission of instructor.
Theories, issues, trends, and supervised practice.

876 G 3
Organization and Administration of Guidance Services
Su, A, W. 3 cl.
Prereq.: 874, or equiv.
The selection, organization, and presentation of guidance materials, including analysis of types of organization, methods of initiating a guidance program, and types of in-service programs.

877 G 3
Guidance Appraisal Techniques
Su, A, Sp. 1 2½-hr. cl.
Prereq.: 874, and permission of instructor.
Basic concepts and techniques in the appraisal of the individual, non-standardized methods.

878 G 3
Guidance Appraisal Techniques
Su, A, W. 1 2½-hr. cl.
Prereq.: 874, and permission of instructor.
Basic concepts and techniques in the appraisal of the individual, standardized methods.

879 G 5
Educational and Vocational Guidance
Su, A, W, Sp. 1 2½-hr. cl., 1 2-hr. lab.
Prereq.: 874.
Theories, instruments, resources for educational and vocational guidance of elementary and secondary students including an analysis of post-secondary school educational opportunities.

880 G 3
Guidance Practices in the Elementary School
Su, A, Sp. 1 2½-hr. cl.
Prereq.: 874.
The application of guidance concepts and services to the elementary school situation.

884 G 3-6
Internship in Teaching
Prereq.: Permission of area adviser.
Not open to students with credit for 587.
Repeatable to a maximum of 12 cr. hrs.
Planned professional teaching experience toward certification for post-degree students.

885 G 3-6
Supervised Teaching in Special Education
Prereq.: Permission of instructor.
Not open to students with credit for 710.
Repeatable to a maximum of 12 cr. hrs.
Student teaching for qualified students in the area of special education. Fee.

885.52 Blind and Partially Seeing
Hunt.

885.54 Edicable Mentally Retarded
885.55 Deaf and Hard of Hearing
885.62 Behavioral Disorders

887 G 3
Student Personnel Programs for the Culturally Different
Su, A. 1 2½-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
A survey of collegiate experimental programs and practices, their philosophies, organization, administration, educational audiences, etc., for the culturally different with emphasis on black Americans.
R. Johnson.

888 G 3
Interpersonal Relations in Student Personnel Work
W, Sp. 1 2½-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Emphasis on laboratory learning process for interpersonal growth; treatment of group theory, processes, and dynamics. R. Johnson.

889 G 3-5
Practicum in Educational Communication
W, Sp. 2 cl., 3-9 hrs. arr.
Repeatable to a maximum of 10 cr. hrs.
Observation, limited participation and functional analysis of production, distribution and management operations in selected media centers, and broadcast facilities or film agencies.

899 G 1-5
Interdepartmental Seminar
(See under Interdepartmental Seminars.)

911 G 3
Conceptions of Mind in Educational Theory
A. 1 2½-hr. cl.
Prereq.: 640.73, or equiv.
A study of the doctrines of the mind that have exercised a determining influence upon educational theory and practice. Pratte.

912 G 3
The Thinking Process in Its Educational Bearings
Su, Sp. 1 2½-hr. cl.
Prereq.: 640.73, or equiv.

913 G 3
Modern Trends in Educational Philosophy
Su, A, W, Sp. 1 2½-hr. cl.
Prereq.: 640.73, or equiv.
914  G 3
Religion and Public Education
Sp.  1 2-hour cr.
Prereq.: 640.73, or equiv.
Alternative conceptions of teaching sectarian religion
in the public schools; present educational practices,
court decisions and controversial proposals.

915  G 3
Social Philosophies
and Their Educational Bearings
Su, W.  1 2-hour cr.
Prereq.: 640.73.
A study of social philosophies in terms of their
significance for educational procedures and programs.
Pratte.

916  G 3
The Educational Philosophy of John Dewey
Su, Sp.  1 2-hour cr.
Prereq.: 912, or equiv.
A systematic study of the writings of John Dewey in
their bearings upon educational theory and practice.
Pratte.

917  G 3
Comparative Philosophy of Education
W.  1 2-hour cr.
Prereq.: 912, 913, or equiv.
A study of alternative philosophies of education and
the speculative development of their implications for
educational practice. Reagan.

920  G 3
Advanced Concepts in Elementary
School Science Education
W.  3 cr.
Prereq.: 911, or permission of instructor.
Emphasis on functions of leadership personnel in
developing and improving elementary school science
programs and on evaluation of current developments
and research.

921  G 3
A Guided Survey of Research in Reading
Sp.  1 3-hour cr.
Prereq.: 6 cr. hrs. in grad. reading courses.
Repeatable to a maximum of 6 cr. hrs.
Provides acquaintance with scientific studies relating
to reading; methods used, results obtained, including
implications and limitations, and the problems
meriting further investigation.

922  G 3
Problems in Curriculum
and Instruction in Inner-City Schools
3 cr.
Prereq.: 880, 881, or equiv.
An analysis of current problems and examination of
related research in the field of curriculum and
instruction in inner-city elementary and secondary
schools.

923  G 3
Developing the Curriculum in
Elementary Teacher Education
W.  1 2-hour cr., 1 2-hour lab.
Prereq.: Ph.D. standing, or permission of instructor.
To acquaint teachers of elementary teachers with
processes of curriculum development in elementary
teacher education; to permit them to consider models'
for preparation of elementary teachers.

925  G 2-5
Seminars in Education
Prereq.: Permission of instructor.
Students with permission of advisers may register for
more than one section of 925 or for the same section
two or more times.
Research Problems in:

925.09  Speech Education
Su. Theory and Practice in Forensics.
A. The Basic College Speech Course. Makay.
A. Modern Trends in Speech Education. Lewis.
W. Creative Drama and Children's Theatre. Lewis.
Sp. Speech Facilities and Resources. Lewis.

925.10  Elementary Education:
Early and Middle Childhood Education

925.21  Industrial Arts Education
Ray.

925.22  Trade and Industrial Education
Su, W.
Reese.

925.23  Business Education.
Su.
Hanna and Wells.

925.25  Teaching of English
Bateman and Eberhart.

925.26  Teaching of Mathematics

925.27  Teaching of Sciences
Schlessinger.

925.28  Teaching of Social Studies
Su, W, Sp.
Gilliom, Jewett, and Muessig.

925.29  Distributive Education
Vivian.

925.30  Vocational-Technical Education
Reese.

925.32  Student Personnel Work
Su, A, Sp.
Silverman and Tripp.

925.33  Adult Education
Dowling and Ohiger.

925.34  Guidance
Peters, Quaranta, Riccio, and Wigtli.

925.35  Higher Education
Laughlin.
925.36 Teacher Education
Coon and Cottrell.
925.40 History of Education and Comparative Education
Mehl and Sutton.
925.41 Philosophy of Education
925.43 Radio and Television Education
Tyler.
925.44 Educational Administration
Laughlin and Nystrand.
925.45 Teaching of Foreign Languages
Su, A, Sp.
Otto.
925.46 Audiovisual Communication
W, Sp.
925.47 Exceptional Children
Sp.
Johnson and Lema.
925.48 Educational Development
Novak and Cook.
925.49 Curriculum and Instruction
Duncan, Frymier, Klohr, and Trzebiatowski.
925.50 Educational Change
Su, W, Sp.
Blank, Glatt, and Sanders.
925.52 Blind and Partially Seeing
925.54 Educable Mentally Retarded
W, Sp.
925.55 Deaf and Hard of Hearing
925.567 Reading
King and Emans.
925.61 Child Study
925.62 Behavioral Disorders
925.64 Educational Disability
925.66 Gifted
925.70 Early Childhood Education

926 G 3
Student Personnel Work as a Professional Field
Sp. 2 1/2-hr. cl.
Prereq.: Permission of instructor.
The principal objective is to provide an opportunity, by study of current, historical, and philosophical materials, for the formulation of a sound intellectual basis for professional practice in student personnel work. Tripp.

927 G 3
History of the Universities
Su, W. 2 1/4-hr. cl.
The university as an institution through ten centuries; patterns of development in different countries; German, English, American contributions to the idea of the American university. Sutton.

928 G 3
The History of Educational Thought: Ancient and Medieval
A. 1 1/2-hr. cl.
Prereq.: 632, or 636.
Study and analysis of the major educational theories of the ancient and medieval periods including the educational writings of Plato, Aristotle, and St. Augustine. Mehl.

929 G 3
The History of Educational Thought: Modern
Sp. 1 1/2-hr. cl.
Prereq.: 632, or 636.
Study of the major educational theories since 1500 including Montaigne, Milton, Locke, and Rousseau and their influence on contemporary educational theory and practice. Mehl.

930 G 6 to 12
Internship in College Student Personnel Work
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
The student is assigned as a participant-observer in a work situation closely approximating his vocational goal. The student is supervised by a qualified practitioner. Full-time commitment is normally expected. Silverman and Tripp.

931 G 3
General Methods in Adult Education
Su, W. 1 1/4-hr. cl.
Prereq.: Permission of instructor.
The psychological and sociological factors affecting adults as learners; the uses and adaptations of various methods and techniques for teaching adults.

932 G 3
Discussion Methods in Adult Education
Su, Sp. 1 1/2-hr. cl.
Prereq.: 672, and permission of instructor.
The roundtable forum, panel symposium, and other forms of discussion as applied to adult groups, laboratory practice; clinical analysis of individual difficulties. Ohliger.

933 G 9
Internship in Adult Education
Prereq.: 672, and 12 cr. hrs. of grad. work in Adult Education.
Repeatable to a maximum of 18 cr. hrs.
Limited to Ph.D. majors in Adult Education and selected master's candidates with major in adult education.

934 G 3
Organization and Administration of Adult Education Programs
A, Sp. 1 1/2-hr. cl.
Prereq.: 672, and permission of instructor.
Methods of determining needs, developing programs, staffing, financing, evaluating, and improving adult education programs in colleges and universities, public schools, and other agencies.
A focus on the nature of the college environment, entering student, academic procedures, student performance, and student culture for those planning careers in college student personnel work.

Curriculum in Teacher Education
Su, A, Sp. 2 2-hr. cl., 1 hr. arr.
Prereq.: 860, or permission of instructor.
Basics and development of curriculum in teacher education (process and product); comparative study of programs for the preparation of teachers; analysis of the implications of current research for programs of teacher education. Cottrell.

A Practicum in Student Personnel Work
Su, A, W, Sp. 1 1½-hr. cl., 6 hrs. lab. in personnel agency arr.
Prereq.: 886 and permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
Supervised practicum in campus student personnel agencies such as admissions, dean of students, housing, international students, student financial aids, student union, and undergraduate college offices. Johnson and Tripp.

Structure and Organization of American Educational Systems
Prereq.: 585, or 587, or equiv.
Local, state, and national structures are analyzed and educational policy-making and control processes are delineated. Hack, Larmie, Moore, and Wagstaff.

Theory in Organization and Administration of School Systems
Su, A, W, Sp. 1 3-hr. cl.
Prereq.: 946.
Consideration of formal and informal organization and other relevant theories of organizational structure and interpersonal behavior. Anderson, Hack, Laughlin, Muth, and Nystrand.

The Elementary School Principalship
A, W. 1 2½-hr. cl.
Prereq.: 946.
Emphasis is given to the elementary-school principal's role in providing leadership in policy-making, personnel matters, public relations, research, and business management. Staub.

Administration of Secondary Schools
Su, W, Sp. 1 3-hr. cl.
Prereq.: 946.
A study of educational administration in the secondary school with emphasis on problems and issues in organization, personnel, public relations, instructional leadership, and management. Wagstaff.
Problems of Beginning Superintendents
Su, W. 1 2½-hr. cl.
Prereq.: 946.
Definition of the superintendent's role, and the roles of the board of education, school staff, and community; examination of problems indigenous to conflict among roles. Larmee.

Administrative Problems of the City School System
Su, W. 1 3-hr. cl.
Prereq.: 946.
A study of problems of educational administration in the complex city school system with emphasis on solution of educational problems caused by the unique demographic characteristics of the city. Hack and Moore.

Legal Aspects of School Administration
Su, A, Sp. 1 2½-hr. cl.
Prereq.: 946, or equiv.
A study of statutory and case law, legal principles and provisions relevant to educational administration, particularly in the areas of personnel, finance, curriculum, contracts, property, liability, and organization. Staub.

School Community Relations
Su, W, Sp. 1 2½-hr. cl.
Prereq.: 946, or equiv.
Principles and practice in developing and maintaining appropriate school community relationships; professional and lay roles; institutional relationships; opinion analysis; communication processes; decision-making patterns. Nystrand and Staub.

Theory and Practice of Student Personnel Administration
Su, W. 1 3-hr. cl.
The organization and administration of student personnel services—legal phases of the program, policy development and staffing relationships are considered.

Staff Personnel Administration
Su, A, Sp.
Prereq.: 946.
A study of personnel administration in educational institutions; theory, principles and practices as they relate to personnel policy, recruitment, selection, orientation, appraisal, in-service education, promotion, collective negotiations, general welfare. Larmee.

School Finance
Su, A, Sp. 1 3-hr. cl.
Prereq.: 946.
Examination of the theory and economics of financing public education; emphasis on sources of revenue, variations in ability and effort, state-local plans, and the federal role. Hack.

Business Administration of Schools
W. 1 3-hr. cl.
Prereq.: 946.
Function and role of business administrators in schools; emphasis on budgeting, payroll and accounting purchasing; planning, constructing, operating, and maintaining the school plant. Hack.

School Plant Planning
Su, W. 1 2-hr. cl., 1-hr. arr.
Prereq.: 946, or equiv.
Problems and techniques in determining educational facility needs, evaluating facilities, planning for new construction and remodeling, utilizing specialized personnel; related legal and financial aspects. Conrad.

Practicum in Educational Administration I
A. 1 cl., lab. arr.
Prereq.: 946, master's degree, 2 yrs. teaching experience or equiv., and permission of instructor.
Analysis of significant research in educational administration.

Practicum in Educational Administration II
W. 1 cl., lab. arr.
Prereq.: 959.
Advanced study of administrative problems and organizational behavior from an inter-disciplinary perspective. Staub.

Practicum in Educational Administration III
Sp. 1 cl., lab. arr.
Prereq.: 960.
Continuation of 960. Hack.

Seminar in Foreign Language Education
Sp. 2 2-hr. cl.
Prereq.: 958, undergraduate major in foreign language.
Analysis of major research studies and projects in the teaching and learning of foreign languages; evaluation and implications of findings. Allen and Otto.

Foreign Language Testing
Su, W. 3 cl., and field work.
Prereq.: Permission of instructor.
Theory and practice of foreign language test construction including item writing, item analysis, reliability, validity, scoring and interpretation. Jarvis.

Evaluation Functions and Methodology in Education
A, Sp. 3 cl.
Prereq.: Psychol. 510, or equiv.
The functions and methodology of evaluation relative to planned educational change, with emphasis on the relationships between data collection, analysis, reporting and relevant decision processes. Stufflebeam and Lange.
966† G 3
Research Process:
Practicum in Educational Research
3 cl.
Prereq.: Previous courses in the basic sequence in educational research methodology, or permission of instructor.
The utilization of research strategies in the pursuit of educational problems, with emphasis on the development, conduct, and completion of individual projects.

967 G 3
Program/Project Management
Sp. 1 1½-hr. cl.
Prereq.: 788.
The use of management information systems in the planning and controlling of educational research and development projects, with particular emphasis on network planning techniques. Cook.

968 G 3
Problems in the Development of Research Projects
A. 3 cl.
Prereq.: 786, Psych. 510 or equiv.
A discussion of conceptual, methodological and communication problems encountered in the development of research projects; faculty members engaged in project development are invited to participate. Novak.

969 G 3
Planning-Programming-Budgeting System in Education
W. 1 3-hr. cl.
Prereq.: 788.
Principles and problems associated with utilization of planning-programming-budgeting system as for educational decision-making and resource allocation. Cook.

970 G 3
The English Curriculum: Language and Composition
Su., W. 2 cl.
Prereq.: 20 cr. hrs. in Ed., or 25 cr. hrs. in Eng.

971 G 3
The English Curriculum: Literature
Su., Sp. 1 1½-hr. cl.
Prereq.: 20 cr. hrs. in Ed., and 25 cr. hrs. in Eng.
Critical examination of trends in the secondary school literature program, including programs for the able and the disadvantaged student, basic objectives, types of organization, technique of developing literary appreciation. Eberhart.

972 G 3
The English Curriculum: Studies in the Teaching of Literature
Su., W. 1 1½-hr. cl.
Prereq.: 20 cr. hrs. in Ed., and 25 cr. hrs. in Eng.; familiarity with contemporary critical thought.

Role of literary theory and aesthetics in English curriculum development; study of the relation of linguistics to literature and to the other arts. Stewart.

973 G 3
Introduction to Counseling
Prereq.: 874.
Emphasis on theoretical bases of counseling and on the counseling relationship.

974 G 3
Supervised Practice in Individual Counseling: Children
Su., A, Sp. 1 1½-hr. cl.
Prereq.: 874, 973 or Psychol. 882, and permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Emphasis on counseling techniques unique to elementary age children including play media and conceptualizing the environmental press on the child.

975 G 3
Supervised Practice in Group Counseling: Children
A, W, Sp. 1 1½-hr. cl.
Prereq.: 874, 973 or Psychol. 882, and permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Supervision of each enrollee who counsels with a group of children of elementary age in a school or other institutional setting.

976 G 3
Supervised Practicum in Individual Counseling: Adolescent and Adult
A, W, Sp. 1 2½-hr. cl.
Prereq.: 874, 973 or Psychol. 882, and permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Supervised practice in counseling individual clients of adolescent or adult age; emphasis on developing counseling skills, including: counseling relationship; conceptualizing clients; self-understanding.

977† G 3
Supervised Practice in Group Counseling: Adolescents and Adults
1 2½-hr. cl.
Prereq.: 874, 973 or Psychol. 882, and permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Supervision of each enrollee who counsels with a group of adolescents or adults in a school or other institutional setting.

978 G 3
Supervised Field Experience in Counseling
Prereq.: 874, 973 or Psychol. 882, and permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Supervised practice in guidance and counseling activities in the work setting; emphasis on the range of activities performed by guidance workers in school and related settings.
982  G 3  
Evaluation in Secondary 
Social Studies Education
A.  1 ½-hr. cl.
Prereq.: Certification in secondary social studies. 
Admission to graduate program in secondary social studies. 
A seminar concerned with testing, measurement, and 
evaluation in secondary social studies; treatment of 
teacher-made and standardized tests; discussion of 
reporting practices. Mueggig.

983  G 3  
Research in Secondary Social Studies
W.  1 ½-hr. cl.
Prereq.: Certification in secondary social studies. 
Admission to doctoral program in secondary social studies. 
Seminar devoted to research needs, problems, 
procedures, and findings in secondary social studies; 
designed to aid doctoral candidates with the selection 
and implementation of their studies. Mueggig.

984  G 3  
Curriculum Theory and Development in 
Secondary Social Studies Education
Su, W.  1 ½-hr. cl.
Prereq.: Certification in secondary social studies. 
Admission to graduate program (master's or doctoral) 
in secondary social studies. 
Seminar devoted to curriculum theory and development 
in secondary social studies education; simulation 
experience where participants build a secondary social 
studies program. Mueggig.

985  G 3  
Theories of Secondary Social Studies Education
Sp.  1 ½-hr. cl.
Prereq.: Certification in secondary social studies. 
Admission to doctoral program in secondary social studies. 
A seminar devoted to basic theories of secondary social 
studies education; discussion of subject-centered, 
emergent needs, citizenship, reflective, and discipline-
oriented approaches. Mueggig.

986  G 3  
Developmental Assessment I
A.  1 ½-hr. cl.
Prereq.: Permission of instructor. 
Use of testing and observational techniques in 
developmental assessment with major emphasis on 
collecting and evaluating data related to global 
cognitive and affective functioning. Engin.

987  G 3  
Developmental Assessment II
W.  1 ½-hr. cl.
Prereq.: Permission of instructor. 
Continuation of 986, with emphasis on the techniques 
developed to assess specific abilities and disabilities 
for educational planning. Engin.

988  G 3  
Developmental Assessment III
Sp.  1 ½-hr. cl.
Prereq.: Permission of instructor. 
Continuation of 987, with emphasis on the analysis, 
synthesis, and interpretation of data. Engin.

989  G 3  
Developmental Assessment IV
Su.  1 ½-hr. cl. 
Prereq.: Permission of instructor. 
Continuation of 988, with emphasis on intervention 
and the evaluation of intervention techniques. Engin.

990  G 2  
Supervised Practice 
in Developmental Assessment
Prereq.: Permission of instructor; must be taken 
concurrently with one of the following: 990, 987, 988, 
or 989.
Repeatable to a maximum of 10 cr. hrs. 
Within a school setting and under close supervision 
each student assesses a limited number of exceptional 
and/or non-exceptional children. Engin and Huelsman.

991  G 3  
The School Psychologist in American Schools
Su.  1 ½-hr. cl. 
Prereq.: Permission of instructor. 
Overview of trends and issues confronting the 
professional school psychologist; establishing and 
maintaining a program of school psychological services. 
Engin and Bonham.

992  G 3, 6, 9, or 12  
Internship in Child Study
Prereq.: Permission of instructor. 
Repeatable to a maximum of 36 cr. hrs. 
Limited to selected Ph.D. and post-master's students 
majoring in school psychology; the intern, staff 
member, and local school supervisor pre-plan these 
professional experiences. Engin and Huelsman.

994  G 3 or 5  
Group Studies in Education
Prereq.: Permission of instructor. 
Repeatable to a maximum of 20 cr. hrs. 
Advanced group studies on special problems in 
education.
994.09 Speech Education 
994.10 Elementary Education 
994.13 Experience in Urban Schools 
994.21 Industrial Arts Education 
994.22 Trade and Industrial Education 
994.26 Business Education 
994.25 Teaching of English 
994.26 Teaching of Mathematics 
994.27 Teaching of Social Studies 
994.28 Teaching of Social Studies 
994.29 Distributive Education 
994.30 Vocational-Technical Education 
994.32 Student Personnel Work 
994.33 Adult Education 
994.34 Guidance 
994.36 Higher Education 
994.36 Teacher Education 
994.40 History of Education and Comparative Education 
994.41 Philosophy of Education 
994.43 Radio and Television Education
994.44 Educational Administration
994.45 Teaching of Foreign Languages
994.46 Audiovisual Materials of Instruction
994.47 Exceptional Children
994.48 Educational Development
994.49 Curriculum and Instruction
994.50 Educational Change
994.52 Blind and Partially Seeing
994.54 Educable Mentally Retarded
994.55 Deaf and Hard of Hearing
994.56 Reading
994.61 Child Study
994.70 Early Childhood Education

999 G Arr.
Research in Education
Refer to decimal subdivisions under 925.
Research for thesis or dissertation purposes only.

Electrical Engineering

Office: 205 Electronics Laboratories, 2015 Neil Avenue

Professors: Thurston (Chairman), Anderson, Ayres (Emeritus), Bacon, Bailin, Boone, Cornetet, Cowan, Davis, W. Davis, Deese (Emeritus), Gottling, Hsu, Kennaugh, Ko, Kouyoumjian, Kraus, Ksieniski, Levie, Long, Mathis, McGhee, McMaster (Regents), Middleton, Peake, Peters, Richmond, Smith, Walter, Warren, Weed, Weiner, and Yovits; Associate Professors: Boccacciotti, Blake, Collins, Compton, Damon, DeVore, Fenton, Hemami, Higgy (Emeritus), Hodge, Kooszkanami, Lackey, Meadors, Ruddock, Sebo, Seliga, and Swartz; Assistant Professors: Breeding, Campbell, Ehrman, Erdman, Garbacz, Huff, Lawrence (Emeritus), Mayhew, Moffatt, Noyes, Olson, Pimmel, Thiele, and White; Adjunct Assistant Professors: Barrick and McMillen; Instructors.

201 U 3 or 4
Introduction to Lumped Circuits Analysis I
A, W, Sp. 3 or 4 cl.
Prereq.: Math 153 and Physics 133.
R, L, C terminal relations; operational impedance; system equations; transfer function; power and energy; transient; and exponential source response; phasors and sines.

202 U 3 or 4
Lumped Circuits Analysis II
A, W, Sp. 3 or 4 cl.
Prereq.: 201.
Fourier series; poles and zeros; Bode plots; adjustable circuits; sinusoidal magnitude curves; network theorems, current-voltage division, series-parallel reduction; operational amplifier; mutual coupling.

203 U 3 or 4
Lumped Circuits Analysis III
A, W, Sp. 3 or 4 cl.
Prereq.: 202.
Polyphase circuits, practical circuits, analogs and duals, Fourier integral, Laplace transform, impulse response, convolution, and filters.

207 U 2
Circuits Laboratory I
A, W, Sp. 1 cl., 1 3-hr. lab.
Concur.: 201.
Familiarization with numbers and waveforms in R, L, C circuits at low frequencies.

208 U 2
Circuits Laboratory II
A, W, Sp. 1 cl., 1 3-hr. lab.
Prereq.: 207.
Resonant and coupled circuits; black box impulse, step and exponential response; periodic non-sinusoidal waves, harmonic analysis.

293 U 1-15
Individual Studies in Electrical Engineering
Repeatable to a maximum of 15 cr. hrs.

294 U 1-15
Group Studies in Electrical Engineering
Repeatable to a maximum of 15 cr. hrs.

347 U 1
Electrical Engineering Laboratory
A, W, Sp. 3-hr. lab.
Concur.: 540. Laboratory to accompany 540.

400 U 5
Basic Electronics
W. 3 cl., 2 2-hr. lab.
Prereq.: Math 156, Physics 112, and permission of instructor.
Not open to students in Engineering.
Introduction to circuits, devices, and instrumentation with emphasis on practical applications.

417 U 1
Electromagnetics Laboratory
A, W, Sp. 1 3-hr. lab.
Concur.: 512.
Transmission line parameters; attenuation, magnitude and phase of voltage and current on lines; reflected waves; waveguide characteristics and techniques; antenna patterns and impedances.

427 U 1
Electronic Devices and Circuits Laboratory I
W, Sp. 1 3-hr. lab.
Prereq. or concur.: 502.
PN junction diode characteristics and circuits; transistor characteristics and the Ebers-Moll model; small-signal parameters of the transistor; transistor bias and amplifier circuits; emitter-coupled difference amplifier.
428 U 1
Electronic Devices and Circuits Laboratory II
A, W. 1 3-hr. lab.
Prereq.: 523.
Power amplifiers, performance of linear integrated circuit operational amplifiers; oscillators; voltage regulators, logic circuits; multi-vibrators; waveform generators.

447 U 1
Electrical Energy Conversion Laboratory I
W, Sp. 1 3-hr. lab.
Concur.: 541.
Characteristics of general magnetic networks and transformers; linear and rotary electromechanical devices; transient and steady state; magnetic fields in rotating machines.

448 U 1
Electrical Energy Conversion Laboratory II
A, Sp. 1 3-hr. lab.
Prereq.: 447.
Continuation of 447 and inspection of electric power system facilities.

457 U 1
Signals and Systems Laboratory
A, W. 1 3-hr. lab.
Concur.: 550.
Laboratory study of signal processing, control systems and their components, operational amplifiers, and analog computers.

500 U 4
Electrical Engineering
Su, A, W, Sp. 3 cl., 3-hr. lab.
Prereq.: Physics 133, and Math. 254.
Introduction to circuit analysis; circuit analysis concepts and their extension to mechanical and thermal systems by analogy; electrical instruments and measurements.

510 U G 3 or 4
Field Theory I
A, W. 3 or 4 cl.
Prereq.: Physics 133 and Math. 415.
Vector relations, static electric fields, dielectric materials, boundary conditions, boundary value problems, field mapping, steady electric currents and their magnetic fields, and ferromagnetic materials.

511 U G 3 or 4
Field Theory II
W, Sp. 3 or 4 cl.
Prereq.: 510.
Time changing electric and magnetic fields, Maxwell's equations, relations between field and circuit theory, plane waves, Poynting vector, energy relations, and polarization.

512 U G 3 or 4
Transmission and Radiation
A, Sp. 3 or 4 cl.
Prereq.: 511.
General transmission theory, infinite line, terminated line, impedance transformation, rectangular waveguides, group and phase velocity, impedance of waveguides, wave propagation, and radiation.

520 U 4
Electron Devices and Controls
Su, A, W, Sp. 3 cl., 3-hr. lab.
Prereq.: 550.
Theory and applications of semiconductors, transistors, photoelectric, vacuum and gas filled tubes. Study of control circuits, feedback, amplifiers, oscillators, filters, magnetic amplifiers, and instrumentation.

521 U G 3 or 4
Electronic Devices and Circuits I
A, W. 3 or 4 cl.
Prereq.: 201 and Math. 415.
First of a sequence of four electronics courses including: introduction to electronic circuit devices and models; conduction mechanisms of semiconductors; junction diode models and circuits.

522 U G 3 or 4
Electronic Devices and Circuits II
W, Sp. 3 or 4 cl.
Prereq.: 521.
Physical electronics of bipolar and field effect transistors; small-signal models of transistors; transistors bias circuit design; low and high frequency response of single-stage amplifiers.

523 U G 3 or 4
Electronic Devices and Circuits III
A, Sp. 3 or 4 cl.
Prereq.: 522.
Multistage amplifier analysis, tuned circuits, and feedback amplifier analysis.

540 U 3
Electrical Engineering
A, W, Sp. 3 cl.
Prereq.: 500 or equiv.
Electromechanical devices; an introduction to the basic principles of analysis of electromechanical devices; the approach is organized to extend the circuit concepts and dynamic analysis introduced in the preceding course.

541 U G 4
Electrical Energy Conversion I
W, Sp. 3 cl.
Prereq.: 203; prereq. or concur. 510 and 550.
Generalized magnetic circuits and conventional transformers; theory of magnetic circuits as applied to electromechanical energy conversion, direct current, and induction machines; steady state and transient characteristics.

542 U G 4
Electrical Energy Conversion II
A, Sp. 4 cl.
Prereq.: 540 or 541; prereq. or concur. 512.
Theory of synchronous machines, and introduction to electric power systems.

550 U G 3 or 4
Introduction to Signals and Systems
A, W. 3 or 4 cl.
Prereq.: 203.
Fourier and Laplace transforms, impulse, convolution; feedback systems, block diagrams, signal-flow graphs, stability, frequency response, pole-zero analysis, and application to computers and control.
570 U G 5 Bio-Medical Engineering Analysis for Non-Engineers
A. 5 cl.
Prereq.: Math. 123 or 150 or equiv.
Not open to students in College of Engineering.
Basic concepts and techniques used in analyzing physical and bio-medical systems. Pimmel.

571 U G 5 Bio-Medical Engineering Electronics for Non-Engineers
Sp. 5 cl.
Prereq.: 550 or 570.
Not open to students in College of Engineering.
Fundamentals of solid state electronics; applications to the life science field with emphasis on limitations and laboratory uses. Pimmel.

572 U G 5 Bio-Medical Engineering Systems for Non-Engineers
W. 5 cl.
Prereq.: 570 or equiv.
Not open to students in College of Engineering.
Continuation of 570; techniques for modeling and analyzing bio-medical systems, including control systems. Pimmel.

580 U 1 Professional Aspects of Electrical Engineering
A. 1 cl.
Employment problems of graduating seniors, professional aspects of engineering and professional societies and ethics; discussion of employment practices.

601 U G 3 Communication Theory
A, W. 3 cl.
Prereq.: 523 or 622.
Theory of communication, information content, frequency spectra, noise, methods of modulation, modulators, and demodulators.

607 U G 2 Electrical Laboratory
A, W, Sp. 1 cl.; 1 3-hr. lab.
Concurr.: 601, 623, and 660.
Laboratory in the areas of logic circuits, communication theory, and active circuits.

610 U G 3 Applied Electromagnetics I
A, W. 3 cl.
Prereq.: 512.
Rectangular and cylindrical waveguides; waveguide devices; radiation and antenna parameters; array theory. Hodge.

611 U G 3 Applied Electromagnetics II
W, Sp. 3 cl.
Prereq.: 610.
Continuation of 610: aperture radiation; geometrical optics; Babinet's principle; antenna impedance; frequency independent antennas. Peters.

612 U G 3 Applied Electromagnetics III
Sp. 3 cl.
Prereq.: 611.
Continuation of 611; radio astronomy, brightness temperature, noise, radio telescopes, radars, sources, tropospheric propagation, magnetonic theory, ionospheric propagation, millimeter wave and optical propagation. Lewis.

617 U G 1 Applied Electromagnetics Laboratory
W. 1 3-hr. lab.
Prereq.: 417; prereq or concur. 611.
Electromagnetic measurement techniques; microwave sources and detectors; waveguides and waveguide devices; antenna patterns and impedance. Thiele.

623 U G 3 or 4 Electronic Devices and Circuits IV
A, W. 3 or 4 cl.
Prereq.: 523.
Continuation of the electronics sequence; physical electronics of solid-state devices, and application to logic and wave generation circuits.

631 U G 3 or 4 Electron Device Physical Theory I
W. 3 or 4 cl.
Prereq.: 522 and Physics 580.01; or equiv.
Structure of the solid state; junction diode and transistor theory and models.

632 U G 3 or 4 Electron Device Physical Theory II
Sp. 3 or 4 cl.
Prereq.: 631.
Thermionic emission, photoeffects, transport properties, dielectrics, piezoelectrics, ferroelectrics, theory and applications of magnetic materials.

660 U G 3 Switching Circuit Theory I
Su, A, W. 3 cl.
Prereq.: 520 or 523, or permission of instructor.
Introduction to combinational switching theory, Boolean algebra, and clocked sequential networks.

670 U G 3 Introduction to Bio-Medical Engineering
A. 2 cl.; 1 3-hr. lab.
Prereq.: 4th yr. Engr. or permission of instructor.
Introduction to the engineering aspects of life science utilizing lecturers from physiology, biophysics, pharmacology, medicine, and psychiatry to introduce subjects discussed in engineering terms. Campbell and Weed.

693 U G 1-18 Individual Studies in Electrical Engineering
Repeatable to a maximum of 18 cr, hrs.
694  U G 1-18
Group Studies in Electrical Engineering
Repeatable to a maximum of 18 cr. hrs.

700  U G 3
Advanced Circuits
W.  3 cl.
Prereq.: 523 or 621.
Introduction to network synthesis. W. Davis.

702  U G 3
Communications Systems
Sp.  3 cl.
Prereq.: 601.
A study of the synthesis of amplitude and frequency
modulated communication systems, with emphasis on
transmitters and receivers. W. Davis.

703*  U G 3
Space Communications
Sp.  3 cl.
Prereq.: 601.
A study of space communication systems; long-distance
transmission, wave propagation, and system
considerations. D. Davis and Peake.

704*  U G 3
Radar Systems
Sp.  3 cl.
Prereq.: 601.
A study of radar systems including applications of
modulation and detection theory; includes ranging,
tracking, mapping, and guidance and navigation
systems. D. Davis.

707  U G 2
Communications Laboratory I
W.  1 cl., 1 3-hr. lab.
Prereq.: 523 or 622, 428 or 628, and 601.
Theory and laboratory study of non-linear amplifiers
and oscillators, modulators, and detectors. D. Davis.

708*  U G 2
Communications Laboratory II
Sp.  1 cl., 1 3-hr. lab.
Prereq.: 607.
Laboratory study of communications systems. D. Davis.

710  U G 3
Microwave Circuits
A.  3 cl.
Prereq.: 719.
Not open to students with credit for 610.
Advanced waveguides, waveguide devices, amplifiers,
generators and detection devices; special microwave
techniques. Peake.

711  U G 3
Radiation from Antennas
W.  3 cl.
Prereq.: 719.
Not open to students with credit for 611.
Dipole, loop, aperture, reflector, lens, surface wave, and
other antennas; array theory; radiation resistance,
directivity, and input impedance. Kraus.

712  U G 3
Microwave Optics
A.  3 cl.
Prereq.: 719.
Geometrical optics, physical optics, aperture radiation
integrals, minimum range requirements, stationary
phase, sidelobes, backlobes, aperture blocking, radar
echo area, geometrical theory of diffraction, and
gyrotropic media. Peters.

713  U G 3
Elements of Radio Wave Propagation
Sp.  3 cl.
Prereq.: 719.
Not open to students with credit for 612.
Practical calculations and procedures for predicting
refraction and reflection by a plane or spherical earth;
tropospheric, ionospheric, and scatter propagation.
Levis.

714  U G 3
Microwave Electronics
Sp.  3 cl.
Prereq.: 512 and 522.
Vacuum and solid state microwave devices and
applications; klystrons, traveling wave tubes,
magnitrons, impact diodes, transferred electron and
LSA devices. Cornetet.

716  U G 3
Electromagnetic Theory of Optical Devices
Sp.  3 cl.
Prereq.: 203 and 719.
Derivation of geometrical optics from Maxwell's
equations, diffraction theory, optical spatial filtering,
holography, optical resonators, and propagation
through a turbulent atmosphere. Collins.

719  U G 3
Electromagnetic Field Theory I
Su, A, W.  3 cl.
Prereq.: 512 or equiv.
Fundamental laws of electrodynamics; dielectric,
magnetic, and conductive media; energy, force, and
momentum; radiation, scattering, and dispersion;
interior boundary value problems. Ko.

720  U G 3
Circuit Theory of Solid State Devices
W.
Prereq.: 521.
Advanced circuit theory of solid-state devices. Boone
and Thurston.

721  U G 3
Advanced Electronic Circuits
Sp.
Prereq.: 623.
Integrating and differentiating circuits; counting
circuits; timing circuits; pulse circuits; wave-forming
and wave-shaping circuits. W. Davis.

722  U G 3
Active Network and Logic Circuit Design
by Digital Computer
A, Sp.  3 cl.
Prereq. or concur.: 623 or permission of instructor.
Study of computer aided network design programs, topological matrices; active device modeling, linear and nonlinear solutions; logic circuit analysis and design by digital computer. Battocletti.

727 U G 2
Solid State Device Laboratory
W. 1 cl., 1 3-hr. lab.
Prereq.: 428; prereq. or concur. 720.
Laboratory study of solid-state devices. Battocletti.

728 U G 2
Advanced Electronic Circuits Laboratory
Sp.
Prereq.: 428; prereq. or concur. 721.
Laboratory study of integrating and differentiating circuits; counting circuits; timing circuits; pulse circuits; wave-forming and wave-shaping circuits. Cornetet.

732 U G 4
Quantum Electron Devices
Sp. 4 cl.
Prereq.: Math. 415 and 416; or equiv.
Electronic energy levels in quantum electron devices; application to energy transitions in crystalline and gaseous media; applications to semiconductors, masers, and lasers. Hsu.

733 U G 3
Parametric Electronics and Nonlinear Optics
W. 3 cl.
Prereq.: 522; Math. 415 and 416; or equiv.
Coupled mode theory of lumped circuit and traveling wave parametric interaction; Hamiltonian treatment of nonlinear interactions, nonlinear optics, simulated Raman and Brillouin scatterings, and phonon-phonon interactions. Hsu.

734 U G 3
Solid State Electronics Design and Technology I
W. 3 cl.
Prereq. or concur.: 522 or permission of instructor.
Discrete and planar electronic device design and associated silicon and germanium technology; semiconductor crystal growth; liquid-solid transformations; epitaxy, oxidation, diffusion, p-n junctions, planar diodes, and transistors. Middleton.

735 U G 3
Solid State Electronics Design and Technology II
Sp. 3 cl.
Prereq.: 734.
Si junction and surface FET, MOS devices; integrated active and passive device design; integrated circuit design and fabrication; photolithography; wafer processing and control testing; assembly; packaging. Middleton.

737 U G 3
Solid State Electronics Design and Technology Laboratory
A, W, Sp. 2 3-hr. lab.
Prereq.: 521 or permission of instructor.
Repeatable to a maximum of 9 cr. hrs.

Fundamental experiments in solid state semiconductor and energy conversion electronics; conductivity, Hall coefficient; magneto-resistance; drift mobility; diffusion; lifetime; p-n junctions; crystal growth; thermoelectric and optical properties. Middleton.

740 U G 3
Electric Power Systems I
A. 3 cl.
Prereq.: 542.
A study of major components of electric power systems, including transmission lines, transformers, reactors, and synchronous machines; steady state stability and load flow calculations. Sebo and Smith.

741 U G 3
Electric Power Systems II
W. 3 cl.
Prereq.: 542.
A study of symmetrical and asymmetrical faults on power systems and the methods and devices used in system protection. Sebo and Smith.

742 U G 3
Electric Power Systems III
Sp. 3 cl.
Prereq.: 542.
A study of transient operation of electric power systems; circuit breakers, circuit interruption, switching transients, traveling waves, insulation coordination, and stability. Sebo.

743 U G 3
Advanced Theory of Electrical Machines
Sp. 3 cl.
Prereq.: 542.
Matrix representation, steady-state and transient analysis of transformers; d-c, induction, synchronous, and special machines. Mathis.

747 U G 2
High Voltage Laboratory I
A. 1 cl., 1 3-hr. lab.
Prereq.: 542.
A laboratory study of high-voltage insulation. Sebo and Smith.

748 U G 2
Power System Laboratory
Sp. 1 cl., 1 3-hr. lab.
Prereq.: 740 or 741.
A laboratory study of power system engineering problems. Sebo and Smith.

749 U G 2
High Voltage Laboratory II
W. 1 cl., 1 3-hr. lab.
Prereq.: 747.
Laboratory study of high voltage impulse testing techniques. Smith.
750 U G 3
Transients in Linear Systems
Su, A. W.  3 cl.
Prereq.: 521 or 520.
Not open to students with credit for 800.
Writing system equations for electrical, mechanical, and mixed systems with lumped parameters; use of Fourier, Laplace, and Z-transform methods. McGhee.

751 U G 3
Open Cycle Control and Instrumentation
W.  3 cl.
Prereq.: 541 or 641, and concur. 550 or 650; or 520 and 540 with permission of instructor.
Engineering analysis and design applied to selected practical problems in the fields of sensors, measurement, signal handling, and systems as parts of overall control problems. Weed.

752 U G 3
Feedback Control Systems I
A.  3 cl.
Prereq.: 550.
Application of feedback principles to control systems, system equations; performance criteria; compensation, carrier systems, multivariable systems. Weiner.

753 U G 3
Magnetic Amplifiers
Sp.  3 cl.
Prereq.: 542 or 642, and 550 or 650; or 520 and 540, with permission of instructor.

754 U G 3
Feedback Control Systems II
Sp.  3 cl.
Prereq.: 550.
Analysis of nonlinear control system; numerical methods phase-plane techniques, describing functions, state variables, and Lyapunov Stability. Fenton.

755 U G 3
Digital Control Systems
W.  3 cl.
Prereq.: 550.
Difference equations, Z-transforms, digital filtering, sampling quantization, analog-digital conversion; block diagramming to model digital and hybrid control systems. Fenton.

757 U G 2
Control Systems Laboratory I
W.  1 cl., 1 3-hr. lab.
Concur.: 751 or 752.
Experiments chosen by student interest from the course content of open cycle and instrumentation and feedback control systems. Bacon.

758 U G 2
Control Systems Laboratory II
Sp.  1 cl., 1 3-hr. lab.
Concur.: 753, 754, or 755.
May be taken without 757.
Experiments chosen by student interest from the course content of magnetic amplifiers, feedback control systems, and digital control systems.

760 U G 3
Theory and Design of Digital Computers
W, Sp.  3 cl.
Prereq.: 660.
Number systems, introduction to computer programming, design of arithmetic and control units for general purpose digital computers, and interrelation of hardware and software system design. Breeding.

761 U G 3
Switching Circuit Theory II
W, Sp.  3 cl.
Prereq.: 660.
State minimization, asynchronous sequential machines, the state assignment problem, transient analysis of combinational switching networks, linear sequential networks, and threshold logic. McGhee.

762 U G 3
Information Theory
W.  3 cl.
Prereq.: 660 or 550 or permission of instructor.
Introduction to information theory; codes, sources, and transmission over noisy channels. D. Davis and Lackey.

763 U G 3
Hybrid Computation
A.  3 cl.
Prereq.: 550 and Comp. and Info. Sc. 241 or equiv.
Introduction to combined analog-digital techniques; hybrid system components; error analysis; hardware and software. Lackey.

764 U G 3
Digital Signal Processing
Sp.  3 cl.
Prereq.: 550.
Transmission of information, conversion to digital form, and conventional analysis methods; processing techniques including complex exponentials and Walsh/Haar Transform theory; generalized Fourier Transform. Lackey.

767 U G 2
Digital Computer Laboratory
A, W, Sp.  1 cl., 1 3-hr. lab.
Concur.: 760.
Laboratory study of counting, arithmetic, and digital circuits. Olson.

770 U G 3
Biological Control Systems
W.  2 cl., 1 3-hr. lab.
Prereq.: 550 or equiv.; 670 and permission of instructor or Physiol. 600.
Application of electrical engineering to the analysis of biological control systems such as visual, muscular, thermal, and cardiovascular; receptor, nerve axon, and muscle transfer characteristics. Campbell.

771 U G 3
Bio-Medical Instrumentation
Sp.  2 cl., 1 3-hr. lab.
Prereq.: 520 or 502; 670 and permission of instructor or Physiol. 600.
Application of electrical engineering to instrumentation, monitoring, and signal and data handling in bio-electrical measurements; consideration of implants, heart pacers, electrocardiograms and electrogastrographs; and speech analysis. Campbell.

772 U G 3
Advanced Bio-Medical Instrumentation
A. 2 cl., 1 3-hr. lab.
Prereq.: 520 or 522; 670 and permission of instructor or Physiol. 650.
Classroom and laboratory investigation of some of the advanced instrumentation problems in EEG, EKG, catheter measurements, spectral analysis, correlation, cell potential, and ion evaluation. Campbell.

793 U G 1-18
Individual Studies in Electrical Engineering
Repeatable to a maximum of 18 cr. hrs.

794 U G 1-18
Group Studies in Electrical Engineering
Repeatable to a maximum of 18 cr. hrs.

801 G 3
State Variable Methods in Linear Systems
A, W, 3 cl.
Prereq.: 550.
Elements of linear transformation and matrix theory; state equations and vectors; differential time-invariant and time-variable systems; discrete systems; observability and stability. Hemami.

802 G 3
Network Synthesis I
Sp. 3 cl.
Prereq.: 800 and Math. 552.
Modern theory of network synthesis with applications to advanced design of filters, equalizers, and compensators. W. Davis and Warren.

803 G 3
Network Synthesis II
A, 3 cl.
Prereq.: 802.
Continuation of 802. W. Davis and Warren.

804 G 3
Communication Theory I
A, W, 3 cl.
Prereq.: 594, 550, or permission of instructor.
The application of Fourier series and Fourier integral methods of the design and analysis of communication circuits and signals. W. Davis and Warren.

805 G 3
Communication Theory II
W, Sp. 3 cl.
Prereq.: 804 and Statist. 520.
The application of statistical methods to problems in communication systems including signal representation, modulation, detection, and filtering. W. Davis and Warren.

806 G 3 or 4
Communication Theory III
Sp. 3 or 4 cl.
Prereq.: 805.
Topics selected from the communication applications of statistical decision-theory, signal representation, optimal filtering, and other matters of current interest. Warren.

808 G 3
Theory and Analysis of Magnetic Amplifiers
W. 3 cl.
Prereq.: 523 or 622, and 800; or equiv.
Theory of magnetic materials; steady state and transient analysis of magnetic amplifiers; suppressed and free harmonics; power gain; resistive, inductive, and capacitive load. Weed.

810 G 3
Electromagnetic Field Theory II
Su, A, W. 3 cl.
Prereq.: 719.
Solution of Maxwell's equations in time and frequency domains; field theorems; integral representations; eigenfunction solutions; fields of moving charges. Kouyoumjian.

811 G 3
Waveguides and Resonators
W. 3 cl.
Prereq.: 810, and 610 or 710.
General theory of waveguides, modes, discontinuities, losses, cavities, and power considerations. Peake.

814 G 3
Advanced Antenna Theory I
Su. 3 cl.
Prereq.: 810, and 611 or 711.
Field theorems; boundary-value problems; solution of the integral equations for scattering problems; radiation integrals; far-field criteria; antenna theorems; mathematical and numerical techniques. Richmond.

815 G 3
Advanced Antenna Theory II
Sp. 3 cl.
Prereq.: 810, and 611 or 711.
Analysis and synthesis of linear and planar radiating systems; excitation and propagation of surface and leaky waves; modulated traveling-wave structures; backward-wave antennas. Walter.

816 G 3
Propagation of Electromagnetic Waves
A. 3 cl.
Prereq.: 510, and 512 or 712.
Advanced study of transmission and reception of radio waves in the presence of the earth and its atmosphere; tropospheric, ionospheric, and scatter propagation. Levis.

817 G 3
Advanced Electromagnetic Theory I
A. 3 cl.
Prereq.: 810 or equiv.
Representation of fields by vector wave functions and dyadic Green's functions; Huygen's principle for electromagnetic waves; application to antenna and scattering problems. Kouyoumjian.
818  G 3
Advanced Electromagnetic Theory II
W.  3 cl.
Prereq.: 817, or 112 and 810.
Asymptotic methods and the geometrical theory of
diffraction; integral equations and variational methods;
propagation through inhomogeneous media and
anisotropic media; surface waves. Kouyoumjian.

819  G 3
Advanced Electromagnetic Theory III
Sp.  3 cl.
Prereq.: 818, or 712 and 810.
Application of saddle-point methods to electromagnetic
problems; Fock theory for currents on curved surfaces;
application of variational and perturbation techniques
in electromagnetic problems. Kouyoumjian.

820*  G 3
Methods of Analysis of Interaction
Between Electrons and Fields
A.  3 cl.
Prereq.: 631 and 810 or permission of instructor.
Electron beams; energy transfer; induced current;
space charge waves; traveling and backward wave
interactions; coupled-mode analysis; crossed field
interactions. Cornetel.

821  G 3
Theory of Electron Guns and Electron Beams
W.  3 cl.
Prereq.: 522 and 810.
Electron optical principles; effect of thermal velocities;
effect of space charge; electron guns; periodic focusing.
Cornetel.

829  G 3
Plasma Dynamics
Sp.  3 cl.
Prereq.: 810.
Motion of ions and electrons, ionization processes,
electromagnetic phenomena in plasma, electron beams
in plasma. Ko and Peters.

830  G 3
Solid State Electron Devices I
A.  3 cl.
Prereq.: 631, 732, or equiv.
Physical properties of solids, crystal symmetry, lattice
vibrations, electrons in a periodic lattice; the effective
mass theorem. Swartz.

831  G 3
Solid State Electron Devices II
W.  3 cl.
Prereq.: 830.
Irreversible thermodynamics and the Onsager relation;
the Boltzmann transport equation, lattice and impurity
scattering, conductivity and related phenomena; optical
properties of semiconductors. Swartz.

832  G 3
Solid State Electron Devices III
Sp.  3 cl.
Prereq.: 831.
Semiconductors and metals in strong electric and
magnetic fields; theory of negative resistance devices,
microwave devices, and related topics. Swartz.

833  G 3
Theory of Semiconductor Junction Devices I
A.  3 cl.
Prereq.: 522.
Low and high level injection in p-n junctions;
recombination statistics; the bipolar transistor; static
and switching characteristics, low and high frequency
equivalent circuits, and thermal effects. Boone and
Swartz.

834  G 3
Quantum Electron Devices
A.  3 cl.
Prereq.: 732 and 810.
Analysis of energy of atomic gases as applied to gas
lasers; crystal structure of solid-state maser and laser
materials.

837  G 3
Dielectric and Magnetic Electronics
W.  3 cl.
Prereq.: 522 and 631, or equiv.
Application of dielectric and magnetic effects to
electron devices; dipoles; local fields; electromechanical
interactions; spontaneous polarization, domain
structure, and switching. Gotting.

838  G 3
Semi-Insulator Electronics
Sp.  3 cl.
Prereq.: 522 and 631, or equiv.
Conduction effects in low conductivity materials
applied in electron devices; space-charge limited
currents; tunneling devices; Schottky barrier effects;
thin film electronics. Gotting.

839  G 3
Theory of Semiconductor Junction Devices II
W.  3 cl.
Prereq.: 833.
Continuation of 833; theory of the unipolar transistor,
the MOS capacitor and transistor. Boone and Swartz.

840  G 3
Electromechanical Systems
A.  3 cl.
Prereq. or concur.: 750.
Application of the methods of electric circuit analysis
to mechanical, acoustical, electromechanical, and
electroacoustical systems. Cowan.

841  G 3
Electric Power Systems Analysis
W.  3 cl.
Prereq. or concur.: 740 and Compu. and Info. Sc. 541.
Analysis of faults, load flow, and transient stability of
electric power systems by advanced mathematical
techniques. Sebo and Smith.

842  G 3
Economic Operation and Control
of Electric Power Systems
A.  3 cl.
Concur.: 740.
Principles of economic operation and control of
isolated or interconnected electric power systems,
including effects of power losses in transmission lines.
Smith.
843  G 3
High Voltage Direct Current Power Transmission
Sp.  3 cl.
Prereq.: 660 or 682.
Principles of high voltage direct current rectifier and inverter operations, control of power flow, reactive power requirements, communication and harmonic reduction, power system security and reliability. Sebo.

850  G 3
Theory and Design of Feedback Control Systems
W.  3 cl.
Prereq.: 752.
Linear feedback theory, signal-flow graphs, return difference, stability studies with parameter variation, independent control of transmission and sensitivity functions, multi-variable systems, and approximation methods. Weimer.

851  G 3
Synthesis of Linear Feedback Control Systems
Sp.  3 cl.
Prereq.: 755 and 850.
Sampled-data systems, the Z-transform, digital compensation; synthesis of systems with statistical inputs and constraints; advanced topics. Weimer.

853  G 3
Analysis of Non-Linear Systems
A.  3 cl.
Prereq.: 754, and 601 or 851 or Statist. 520 or permission of instructor.
An advanced study of non-linear systems and methods of analysis; stability studies with Liapunov functions and functional analysis; applications from electric circuits and control systems. Fenton.

854  G 3
Optimal Control Theory I
W.  3 cl.
Prereq.: 752 and 801.
Optimal control by dynamic programming, Pontryagin's maximum principle, and variational methods; minimum time, energy, and fuel problems for linear continuous and discrete systems. Hemami.

855  G 3
Optimal Control Theory II
Sp.  3 cl.
Prereq.: 854.
Computational methods in optimal control, quasi-linearization, and invariant imbedding; estimation and filtering for continuous and discrete linear systems; introduction to stochastic system optimization. Hemami.

863  G 3
Coding Theory
W.  3 cl.
Prereq.: 660 or permission of instructor.
The coding problem; linear codes and their implementation; cyclic codes. Lackey.

864  G 3
Coding Theory and Digital Systems
W.  3 cl.
Prereq.: 760.
Coding theory; digital system hardware and software design alternatives; monitors, time sharing, and batch processing systems; hardware-software interaction in loading, assembly, and compiling. Breeding.

865  G 3
Advanced Sequential Logic
A.  3 cl.
Prereq.: 761 or permission of instructor.
State identification and fault detection; finite automata, memory definiteness, and information losslessness; linear sequential machines; finite state recognizers. McGhee.

Radio Astronomy Theory I
(See under Astron. 862.)

Radio Astronomy Theory II
(See under Astron. 863.)

870  G 3
Biological System Modeling I
A.  2 cl., 1 3-hr. lab.
Prereq.: 550, Physiol. 600 or 601.
Consideration of current literature in the area of biological system modeling: cardio-vascular, water regulation, and visual tracking and light control; laboratory implementation of models. Weed.

871  G 3
Biological System Modeling II
W.  2 cl., 1 3-hr. lab.
Prereq.: 550, Physiol. 600 or 601.
Modeling of such biological systems as thermoregulatory, respiratory, skeletal-muscle, and neurological. Digital and analog computer laboratory implementation.

872  G 3
Bio-Medical Systems Modeling and Cybernetics
Sp.  3 cl.
Prereq.: 870 or 871.
An engineering analysis of modern methods of mathematical and computer modeling of living control systems; analog, digital, and hybrid computer methods. Weed.

880  G 1-18
Advanced Studies in Electrical Engineering
Repeatable to a maximum of 18 cr. hrs.

881  G 1-3
Seminar in Electrical Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
  a. Research Topics in Electromagnetics.
     Su. Kenough and Richmond.
     Sp. Thurston.
  c. Topics in Bio-Medical Engineering
  d. Nonlinear Quantum Electronics.
     Sp.  Hsu.
e. Recent Developments in Quantum Electronics.
f. Electrodynamics of Moving Media.
   Sp. Hevayumjan.
g. Electromagnetic Theory of Optical Devices.
   A, W, Collins.
h. Radar Systems.
i. Advanced Topics in Communications.
j. Switching Theory and Logical Design.
k. Solid State Electronics Technology.
   A, W, Middleton.
l. Control Theory.
   A. Hemami.

895 G 1-5 Interdepartmental Seminar in Radio Astronomy
(See under Interdepartmental Seminars.)

999 G 1-5 Interdepartmental Seminar
(See under Interdepartmental Seminars.)

910 G 3 Advanced Antenna Theory III
A, 3 cl.
Prereq.: 810, 804, and 611 or 711.
Time modulated antennas, synthetic aperture antennas, logical
switching antennas, nonlinear processing
antennas, and correlation arrays; the effects of
signal-processing on beamwidth, gain, and
multiple-target response. Ko and Walter.

993 G 1-18 Individual Studies in Electrical Engineering
Repeatable to a maximum of 18 cr. hrs.

999 G Arr. Research in Electrical Engineering
Research for thesis or dissertation purposes only.

Engineering Graphics

Office: 240 Hitchcock Hall, 2070 Neil Avenue
Professors Yarrington (Chairman), Hang, Kearns, LaRue,
Paffenbarger (Emeritus), Parkinson, Reed, Romeo,
Shupe, and Watkins; Associate Professor Smith;
Assistant Professors Baldwin, Devereaux, and Kennedy.

110 U 4 General Engineering Graphics
Su, A, W, Sp. 4 2-hr. cl. and lab.
Prereq. or concurr.: Math. 150.
Not open to students with credit for 112.
Graphic language of engineering and its application
to the analysis, development, representation, and
communication of engineering concepts. Watkins.

121 U 3 Graphic Presentation I
A, W, Sp. 3 2-hr. cl. and lab.
Representation of three-dimensional objects by
precise graphics; orthographic and pictorial, shades
and shadows. Parkinson.

122 U 3 Graphic Presentation II
A, W, Sp. 3 2-hr. cl. and lab.
Prereq.: 121.
Continuation of 121; intersections and developments,
size description, fastenings, engineering drawings, and
graphic technology. Reed.

123 U 3 Graphical Methods
A, W, Sp. 3 2-hr. cl. and lab.
Prereq.: 122.
Graphical aids for representing and interpreting
technical data, and solving management problems;
includes logic diagrams, network diagrams, and flow
scheduling, and break-even charts. Romeo.

H190 U 4 General Engineering Graphics
A, W, Sp. 4 2-hr. cl. and lab.
Prereq.: Honors admission to College of Engineering.
Graphic language of engineering and its application to
the analysis, development, representation, and
communication of engineering concepts; intensified
coverage of selected topics.

194 U 1-5 Special Problems in Engineering Graphics
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Selected problems of an experimental nature stressing
the systematic approach to engineering graphics.
problems and embracing appropriate modes of attack.

200 U 3 Computer Utilization with Introduction
to Engineering Analysis
Su, A, W, Sp. 3 cl. and lab. hr.
Prereq. or concurr.: Math. 152.
Digital computer applications to engineering analysis;
processing a program in an algebraic language utilizing
the facilities of the Computer Center. Kearns.

202f U 4 Space Geometry
A, W. 4 2-hr. cl. and lab.
Prereq.: 122.
Not open to students with credit in 162.
Theory and application of descriptive geometry in the
solution of technical problems; includes axonometric
projection, perspective, topographic drawing, shade,
and shadow. Romeo.

204 U 4 Technical Drawing
A. 4 2-hr. cl. and lab.
Prereq.: 102, 110, or 122.
Commercial drawing practice; size specification, tolerances, and fits; technical sketching and layout of machine parts and assemblies; drawing symbols and schematic diagrams; drafting room procedures. 

208 U 4 Structural Drawing
W. 4 2-hr. cl. and lab.
Prereq.: 102, 110, or 122.
Introduction to structural drafting; steel and frame structures; riveted, bolted, and welded connections; terminology and erection requirements. Reed.

208 U 4 Production Illustration
Sp. 4 2-hr. cl. and lab.
Prereq.: 206 or permission of instructor.
Commercial and industrial applications of pictorial representation; instrument drafting techniques, rendering, templates, automated drafting, and reproduction methods. Baldwin.

237 U 5 Graphic Presentation
Sp. 5 2-hr. cl. and lab.
Representation of three-dimensional subjects by precise graphics; orthographic and pictorial; shades and shadows. Parkinson.

400 U 3 Advanced Engineering Computation
W, Sp. 3 1-hr. cl.
An advanced course in numerical and computational methods with emphasis on the application of the digital computer to the solution of engineering problems. Kearns.

410 U 3 Computer Graphics
W, Sp. 3 1-hr. cl.
An advanced course in graphics with emphasis on the application of computer-generated graphics to the solution of engineering problems. LaRue.

593 U G 1-5 Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Opportunity to pursue special-interest topics not otherwise offered.

755 U G 3 Chemical Plant Design
Sp. 2 3-hr. cl. and lab.
Prereq.: Chem. E. 5th yr. standing; concur. Chem. E. 754.
Sketching and preliminary layout for industrial chemical plants, including design and selection factors for equipment and process auxiliaries. Parkinson.

Engineering Mechanics

UNICE: 209 Boyd Laboratory, 155 West Woodruff Avenue

Professors West (Chairman), Folk (Emeritus), Graff, Graham, LeMessa, Ott (Emeritus), and Powell (Emeritus); Associate Professors Clausen, Fu, Poplar, Stevens, Tucker (Emeritus), and Wu; Assistant Professors Engin, Tuschak, and Wells.

204 U 3 Applied Mechanics
A. 3 cr.
Prereq.: Math. 152.
Not open to students with credit for 201.
Statics of force systems by analytical and graphical means; introduction to response of deformable bodies to axial, bending, and torsional loads; area-moment methods.

205 U 3 Applied Mechanics
W. 3 cr.
Prereq.: 204.
Not open to students with credit for 202.
Continuation of 204.

206 U 3 Applied Mechanics
Sp. 3 cr.
Prereq.: 205.
Not open to students with credit for 202.
Continuation of 205.

210 U 4 Statics
Su, A, W, Sp. 3 cr., 2 1-hr. lab.
Prereq.: Physics 131; prereq. or concur. Math. 254.
Resultant and equilibrium of coplanar and noncoplanar force systems; trusses, frames, and connected bodies; friction, centroids and moment of inertia of masses and areas.

215 U 5 Statics and Strength of Materials
A, W, Sp. 5 cr.
Prereq.: Physics 131; prereq. or concur. Math. 254.
Resultant and equilibrium of isolated and connected body force systems; introduction to response of deformable bodies to action of axial, bending and torsional loads.

410 U 4 Dynamics
A, W, Sp. 4 cr.
Prereq.: 210 or 215.
Not open to students with credit for 415 or 510.
Linear and angular motion from constant and variable forces; connected bodies; impulses; momentum; energy.
415 Dynamics
Su, A, Sp, 4 cl.
Math (honors) may be available to students enrolled in a
college honors program.
Prereq.: 210 or 215; Math. 255 or 415.
Not open to students with credit for 510.
Dynamics of particles and rigid bodies; impulse,
momentum, work, and energy; three dimensional
vector acceleration; conservative systems; single
degree of freedom vibration analysis.

420 Strength of Materials
Su, A, W, Sp. 4 cl.
H420 (honors) may be available to students enrolled
in a college honors program.
Normal and shearing stress and strain; energy;
torsion; flexural stress; beam deflections; combined
stress, theories of failure; columns.

427 Strength of Materials Laboratory
A, Sp. 1 2-hr. lab.
Prereq. or concur.: 420.
Experimental study of response of deformable bodies
to loads using mechanical and electrical gages and
methods of photoelasticity.

622 Advanced Strength of Materials
A, W, Sp. 4 cl.
Prereq.: 420 and Math. 255.
Not open to students with credit for 521 or 522.
Mohr's Circle for strain; failure theories; curved beams;
bending of non-symmetrical sections; non-circular
torsion; beams on elastic foundations; load-deflection
relations by energy methods.

627 Experimental Methods in Mechanics
A, Sp. 2 cl., 2 lab. hrs.
Prereq.: 420.
Static and dynamic strain analysis by electrical gages;
grid techniques; brittle coatings; analogies; reflective
photoelasticity in normal and oblique incidence;
motion measurements.

680 Fluid Dynamics
A. 5 cl.
Prereq.: 410 and Math. 514.
Basic equations and concepts of fluid flow; two and
three dimensional inviscid flow problems; conformal
transformations; vortex motion; viscous flow; boundary
layer effects; compressible flow.

711 Advanced Engineering Dynamics
W. 3 cl.
Prereq.: 410 and Math. 255 or 556.
Three-dimensional vector statics, kinematics and
kinetics of particles and rigid bodies; energy,
momentum, and stability; application of Lagrange's
equations to machinery, vehicles, and ballistics;
gyroscopic.

731 Vibrations of Discrete Systems
A. 3 cl.
Prereq.: 410 and Math. 255 or 556.
Free and forced vibrations of mechanical systems
having lumped mass and elasticity; normal
coordinates; dissipative system; stability; simple
engineering applications.

732 Non-Linear Vibrations
Sp. 3 cl.
Prereq.: 731 and Math. 552 or equiv.
Vibrations of damped and undamped systems with
non-linear restoring forces; self-sustained oscillations;
application of Hill's equation of stability of non-linear
oscillations.

740 Applied Elasticity I
A. 3 cl.
Prereq.: 622 and Math. 512, or equiv.
Classical problems in elasticity. St-Venant torsion and
bending theory; plane problems in rectangular and
polar coordinates; axisymmetric problems;
thermoelasticity.

741 Applied Elasticity II
W. 3 cl.
A continuation of 740.

748 Photoelasticity
W. 2 cl., 2 lab. hrs.
Prereq. or concur.: 741.
Stress analysis using polarized light techniques;
polariscope optics; photoelastic materials and models;
two and three dimensional problems; dynamics
photoelasticity, photoplasticity, and thermal studies.

751 Theory of Elastic Stability
A. 3 cl.
Prereq.: 622, and Math. 255 or 556; or equiv.
Buckling of struts, rings, arches, and plates; torsional
instability; stability criteria, exact and approximate
methods.

752 Theory of Dynamic Stability
Sp. 3 cl.
Prereq.: 731.
Study of the criteria for dynamic stability; methods of
stabilizing critical mechanical systems; applications to
space mechanics, structures, and vehicles.

754 Theory of Thin Elastic Plates
W. 3 cl.
Prereq.: 622 and Math. 512, or equiv.
Derivation of the basic equations; classical solutions
for rectangular and polar coordinates; approximate
methods.
7571* G 3
Elements of Inertial Guidance and Navigation
Sp. 3 cl.
Prereq.: 711.
Moment of momentum of rigid bodies; perturbing
torques in the angular equations of motion of a rigid
body; gyrodynamics; accelerometers; inertial platforms
and surface and subsurface navigation systems; control
systems dynamics; a survey of modern mathematical
techniques in the study of dynamical systems.

793 U G 2-5
Individual Studies in Engineering Mechanics
Prereq.: 711, 731, 741, and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
See 794 for topics.

794 U G 2-5
Group Studies in Engineering Mechanics
Prereq.: 711, 731, 741, and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
The student must register for specific problems in the
areas indicated below, and may register for more than
one at a time.

- Experimental Stress Analysis
- Dynamics
- Fluid Mechanics
- Applied Elasticity
- Strength of Materials
- Vibrations
- Plasticity
- Plates and Shells
- Continuous Media
- Review of Advanced Foreign Literature in Mechanics

800 G 3
Methods of Engineering Analysis
A. 3 cl.
Prereq.: 10 cr. hrs. of 700-level courses in Engr. Mech.;
Math. 512 or equiv.
Not open to students with credit for 700.
Solution of boundary value, eigenvalue, and initial
value problems arising in mechanics by approximate
methods; weighted residual and stationary functional
methods.

811* G 3
Analytical Dynamics
Sp. 3 cl.
Prereq.: 711.
Lagrange's equations of motion for particles and rigid
bodies; impulse; small oscillations; non-holonomic and
dissipative systems; Hamiltonian systems; applications
to intricate engineering problems.

812 G 3
Energy Principles in Mechanics
A. 3 cl.
Prereq.: 622 and Math. 255, or equiv.
Theoretical development of energy principles in
mechanics; strain energy and complementary energy
with related minimal principles; applications to
problems in elasticity, dynamics, and vibrations.

831 G 3
Vibrations of Continuous Systems
W. 3 cl.
Prereq.: 711, prereq. or consent. Math. 512 or 557.
Equations of motion for strings, membranes,
prismatical bars, and plates for various boundary
conditions; approximate methods for complicated
shapes; wave propagation in elastic media.

832 G 3
Vibrations Laboratory
Sp. 2 2-hr. lab.
Prereq.: 831.
Experiments in vibrations of discrete systems, beams,
plates, and shells; propagation of stress waves;
material properties by dynamic measurements.

833 G 3
Elastic Wave Propagation
Sp. 3 cl.
Prereq.: 740 and 831.
Dispersion and group velocity; waves in extended
media; propagation and reflection in half space;
Lamb problem; waves in plates and rods by exact
theory; scattering of waves.

835* G 3
Random Vibrations
A. 3 cl.
Prereq.: 831.
Description of random processes; statistical properties
of the response of mechanical systems; optimization
of systems subjected to random inputs; instrumentation.

840 G 3
Theory of Continuous Media
A. 3 cl.
Prereq.: 740.
Equilibrium, compatibility, and strain displacement
relationships for a general continuum; constitutive
equations for problems of elasticity, fluid dynamics,
and inelasticity.

843 G 3
Advanced Elasticity
A. 3 cl.
Prereq.: 741.
Complex variable methods; anisotropic elasticity;
three-dimensional elasticity; mixed boundary value
problems; thermoelectricity.

847 G 3
Theory of Plasticity
Sp. 3 cl.
Prereq.: 740 and Math. 512.
Plastic range stress-strain relations; elasto-plastic
behavior of beams, and trusses; torsion of prismatical
bars; plane strain; shear lines; limit analysis.

854 G 3
Plates and Shallow Shells
Sp. 3 cl.
Prereq.: 754.
Advanced methods for the analysis of bending in thin,
elastic plates having arbitrary shapes, loading, and
boundary conditions; bending theory of shallow shells,
and problem solutions.
855  G 3
Theory of Thin Elastic Shells
W, 3 cl.
Prereq.: 175.
Differential geometry of surface; general equations for an arbitrary shell; membrane theory; shells of revolution.

860*  G 3
Classical Hydrodynamics
Sp. 3 cl.
Prereq.: 711; Math. 512, 513, and 514, or equiv.
Basic equations and concepts of inviscid fluid flow, solutions to two- and three-dimensional problems; conformal transformations; approximate methods.

864  G 3
Theory of Viscoelasticity
W, 3 cl.
Prereq.: 740.
Basic concepts of time dependent inelastic behavior; viscoelastic constitutive laws; correspondence principles; quasi-static and dynamic problems.

889  G 1
Seminar in Engineering Mechanics
W, Sp. 1 cl.
Repeatable to a maximum of 6 cr. hrs.
Lectures and discussions covering a wide range of topics presented by staff, graduate students, and guest speakers.

993  G 2-5
Individual Studies in Engineering Mechanics
Prereq.: Evidence of sufficient background in area of study chosen, and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
See 994 for topics.

994  G 2-5
Group Studies in Engineering Mechanics
Prereq.: Evidence of sufficient background in area of study chosen and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
The student must register for specific subject in the areas indicated below and may register for more than one at a time.

b. Advanced Dynamics.
d. Applied Elasticity.
e. Strength of Materials.
f. Vibrations.
g. Plasticity.
h. Plates and Shells.
i. Continuous Media.

999  G Arr.
Research in Engineering Mechanics
Research for thesis or dissertation purposes only.

ENGLISH

Office: 421 Denney Hall, 164 West 17th Avenue

Professors Gabel (Chairman), Muste (Vice Chairman), Altick (Regents), Beja, Canzoneri, Cervetti, Dathorne, Derby (Emeritus), Estrich (Emeritus), A. Ferguson, Fullington (Emeritus), Hughay (Emeritus), Kahri, Kincaid, Kuhn, Logan (Emeritus), Mankets, Marshal, Maurer, Percival (Emeritus), Robbins, Soelner, Utley, Walley (Emeritus), Webber, Wheeler, and Wilson (Emeritus); Associate Professors Batterby, Bickle, Brown, Cox, S. Ferguson, Good, Grigsby, Jones, Lockridge, Martini, Scheps, Sena, Shapio, Snow (Emeritus), Varandy, and Woodson; Assistant Professors Adams, Auburn, Baillie, Barnes, Cooley, Craig (Emeritus), Dasher, Dees, Dorsey (Emeritus), Dumble (Emeritus), England, Frantz, Fellmer, Kamealo (Emeritus), Kane (Emeritus), Libby, Mitchell, Mullen, Munday, O'Sullivan, Passe, Swetnam, Thornton, Vronland, Weatherford, J. Williams, and Zacher; Instructors Broach, Canary, Connor, Edwards, Faulkner, Haber (Emeritus), Hoch, Lord (Emeritus), Rupright, Sucheston, Tucker, Vogel (Emeritus), and D. Williams.

ENGLISH FOR FOREIGN STUDENTS
Course credit may not be counted toward graduation.

071  U 5
General English for Foreign Students
Review of English structure for foreign students; proceeds from basic oral-aural patterns to their application in writing. Hoch, Director.

072  U 5
Advanced English for Foreign Students
Develops academic and social effectiveness in the use of advanced patterns in written and spoken English. Hoch, Director.

073  U 3
Special Problems in English for Foreign Students
Attention given to special academic problems of foreign students; concentrated work on idiomatic structure and diction in writing reports, themes examinations, and theses. Hoch, Director.

ENGLISH COMPOSITION
No prerequisite except as established by testing and course sequence.

100  U 5
Freshman English Composition
Su, A, W, Sp. 5 cl.
Not open to students with credit for 112, 103, 104, 105, H195, or English 201. Training in the fundamentals of expository writing, as illustrated in the student's own writing and in the essays of professional writers. Good, Director.

160  U 3
Introduction to Literature
Open only to freshmen.
An introduction to selected works of major British and American writers, designed to stimulate and train the reader's appreciation of literature.
193  U 3-5
Individual Studies
A, W, Sp.  3-5 cr.
Prereq.: Freshman standing and permission of Director of Freshman English.
Repeatable to a maximum of 10 cr. hrs.

194  U 3-5
Group Studies in English
Su, A, W, Sp.  4 or 5 cr.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Designed to give groups of students an opportunity to pursue studies not otherwise offered in English.

GENERAL PREREQUISITES FOR COURSES NUMBERED 200
Unless otherwise indicated, the prerequisites for 200-level courses are English 100, 103, 105, or H195.

220  U 5
Introduction to Shakespeare
Not open to students with credit for 262. Students majoring in Engl. in College of Humanities should elect 300 instead of 220.

260  U 5
Introduction to Poetry
Designed to help students understand and appreciate poetry through intensive study of a representative group of poems.

261  U 5
Introduction to Fiction
Intensive study of a number of short stories and novels to acquaint the general student with some of the important themes and techniques of fiction.

262  U 5
Introduction to Drama
Not open to students with credit for 220.

265  U 5
The Writing of Fiction I
Prereq.: Permission of instructor.
Practice in the writing of fiction; analysis and discussion of student work, with some attention on general methods of fiction and the publishing situation.
Canzonieri, Director.

266  U 5
The Writing of Poetry I
W.
Prereq.: Permission of instructor.
Practice in the writing of poetry; emphasis on the students' own work, with reference to established poetic patterns and established poetry.
H299  U  5
English Honors Pro-seminar
W.  5 cl.
Prereq.: Cumulative point-hour ratio of 3.5 or better, with 3.5 or better in Engl. and permission of dept.
An introduction to the materials and methods of literary study through intensive reading in one major English or American author; topic varies quarterly. Jones, Director.

301  U  5
Informative Writing
Prereq.: 3rd yr. standing and 103 or equiv.
Not open to students with credit for 302.
Intensive advanced training in the art of informative writing.

302  U  5
Critical Writing
Prereq.: 103 or equiv., 3rd yr. standing. Engl. majors only.
Not open to students with credit for 301.
Intensive practice in writing various kinds of analyses of literary texts. Shapiro, Director.

305  U  3
Technical Writing
A, W, Sp.  2 cl., 1 hr. conf.
Prereq.: 3rd yr. standing in the B.S. curricula.
Training in practical writing for industry, business, and research, with emphasis on the special requirements and techniques for the professional report. Blickle, Director.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 500
These courses may provide graduate credit only in departments other than English. Prerequisites: 15 hrs. of courses in English on the 200 level, or 10 hrs. in English and 15 in specified allied departments.

513  U  5
Introduction to Medieval Literature
Sp.
The study of masterpieces from the Middle Ages, chosen for their values in interpreting medieval culture as well as for their independent literary worth.

520  U  5
Shakespeare
A critical consideration of the art, personality, and achievement of Shakespeare in the light of Renaissance and modern significance.

521  U  5
The English Renaissance
Sp.
Not open to students with credit for 521.
A study of Tudor prose and poetry as they exemplify literary art and as they reflect the creative and inquiring temper of the age.

522  U  5
Early 17th Century Literature
A.
A study of the poetry and prose of 1600-1660, excluding the major works of Milton.

530  U  5
Milton
W.  5 cl.
A study of the major poetry and prose, with emphasis on Paradise Lost, Paradise Regained, and Samson Agonistes.

531  U  5
The Age of Wit and Satire
A.
The skeptical mind of the Early Enlightenment as shown in lyric and satiric verse, essays, and drama, from Dryden to Pope.

535  U  5
Literature of the 18th Century
W.
The ideas and artistry of the Age of Reason as reflected in the work of major figures: Swift, Pope, Fielding, Sterne, Boswell, Johnson, and Blake.

540  U  5
Romantic Poetry
A, Sp.
English literary and intellectual romanticism as seen in the poetry of Wordsworth, Coleridge, Byron, Shelley, and Keats, and selected critical documents of the period.

541  U  5
Victorian Poetry
W.
Readings in the poetry of Tennyson, Browning, Arnold, Swinburne, Rossetti, Meredith, Hopkins, and Hardy, as seen against the background of Victorian ideas and literary taste.

542  U  5
The 19th Century English Novel
A, Sp.
Not open to students with credit for 542.
Readings in a group of major novelists, such as Austen, Dickens, Thackeray, and others, with special emphasis upon social and humanistic values.

543  U  5
20th Century British Fiction
Su, A, W, Sp.  5 cl.
Not open to students with credit for 543.
A study of the development of British fiction after 1900, with emphasis on such major novelists as Conrad, Joyce, Lawrence, and Woolf.

547  U  5
20th Century Poetry
A, W.  5 cl.
A study of 20th century American and British poetry, with emphasis on the major figures.
551  U  G  5
The American Renaissance in Literature
The readings of this course do not duplicate those of 290.
An introduction to the major American writers of the
mid-19th century: Poe, Hawthorne, Melville,
Emerson, Thoreau, and Whitman.

552  U  G  5
American Literature, 1865-1914
Studies in fiction and poetry emphasizing such major
figures as Twain, Howells, James, Dickinson, Robinson,
Crane, Dreiser, and Willa Cather.

553  U  G  5
20th Century American Fiction
A study of American fiction after 1900, including short
story, short novel, and novel, with emphasis on the
works of major novelists.

570  U  G  5
English Style and Usage
Variety in style and use in written and spoken English.

570†  U  G  5
Afro-American Language
A, Sp.  4 or 5 cl.
A lexical, phonological, and grammatical examination
of Afro-American language as used in black literature,
the blues, street-corner dialogues, and in other social
and cultural situations.

581  U  G  5
Afro-American Folklore
A.  4-5 cl.
A study of the oral traditions of black American culture
including folktales and other narrative lore, folksongs,
blues, spirituals, and work songs.

H590  U  5
Junior Honors Seminar
A, W, Sp.  5 cl.
Prereq.: Cumulative point-hour ratio of 3.0 or better,
with a 3.5 or better in Engl. and permission of dept.
Intensive study of one of the major periods of English
and American literature; periods vary quarterly.
H590.01 The Middle Ages
H590.02 The Renaissance
H590.03 Neo-Classicism
H590.04 Romanticism
H590.05 The Later 19th Century
H590.06 The Modern Period

594  U  G  5
Group Studies
A, W, Sp.  4 or 5 cl.
Topic varies from quarter to quarter on subjects not
otherwise covered by English courses.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600
These courses may provide graduate credit in all
departments. Prerequisites: 15 hrs. of courses in
English on the 300 level, or 10 hrs. in English and
10 hrs. on the 300-500 level in specified allied
departments.

615  U  G  5
Introduction to Chaucer
A.
A close study of Troilus and Criseyde and The
Canterbury Tales as introduction to the artist and his
period.

624  U  G  5
English Drama: Medieval and Renaissance
Su.
Prereq.: 230, 262, or equiv.
A study of English popular drama from its origin to
1642, with special emphasis upon the evolution of
dramatic concepts and theatrical art.

634†  U  G  5
English Drama: Restoration
and 18th Century
W.
Prereq.: 220, 262, or equiv.
A study of English drama from 1660 to 1800:
Restoration heroic drama and wit comedy. 18th
century sentimental drama, the comedy of Goldsmith
and Sheridan.

642†  U  G  5
19th Century Prose
Su.
Selections from the principal romantic and Victorian
non-fictional prose writers, read both as literary art
and as documents of contemporary thought.

648  U  G  5
Contemporary Literature
Su.  W.  5 cl.
A study of the development of contemporary American
and British fiction and poetry, concentrating upon
representative works of major authors from 1945 to
the present.

649  U  G  5
Modern Drama
A.
An historical and critical examination of the major
developments, personalities, and achievements in the
drama of Europe and America since the advent of
Ibsen.

665†  U  G  5
The Writing of Fiction II
A.
Prereq.: 265 or equiv. and permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Practice in the writing of fiction; continuation of 265 at
an advanced level.
666† U G 5
The Writing of Poetry II
W. 3 cl., 2 hrs. arr.
Prereq.: 266 or equiv. and permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Practice in the writing of poetry; continuation of 266 at an advanced level.

667† U G 5
Playwriting
W.
Prereq.: Permission of instructor.
Practice in the writing of plays; analysis and discussion of student work, with some attention to general dramatic methods.

669† U G 5
Applied English Phonology
W.
A study of English phonology and its application to a variety of literary and non-literary resources.

670 U G 5
American Folklore
Sp.
A study of the major forms of American folklore with emphasis on folktales, legends, folksongs, and ballads.

671 U G 5
Introduction to English Grammar
A.
A study of various systems of English grammar, with emphasis on their application to writing and teaching.

672 U G 5
Introduction to the History of English
Su, Sp.
A study of the historical development of the English language, with emphasis on its outer history, and on the history of words and sentences.

676 U G 5
History of Literary Criticism
W.
An intensive study of the basic texts in literary criticism from Plato to T. S. Eliot.

680 U G 5
Literary and Cultural Heritage of the Middle East
W.
An introduction to Assyro-Babylonian, Arabic, and Persian literature in their historical and cultural settings.

693 U G 1-5
Individual Studies in English
Prereq.: Senior standing and permission of instructor and of Dept. Undergrad. or Grad. Committee.
Students may register for individual directed study under this number for work not normally offered in courses.

H695 U 5
Senior Honors Seminar
W. 5 cl.
Prereq.: Cumulative point-hour ratio of 3.0 or better, with a 3.5 or better in Engl. and permission of dept.
Selected problems (themes, movements, genres, and styles) emphasizing continuity and development in English and American literary and linguistics history; topic varies quarterly.

699 U 5
Senior Seminar and Tutorial
Prereq.: Engl. majors in their last qtr.
A reading course designed to unify the student's knowledge of English and American literature and to clarify his understanding of problems of interpretation and criticism. Woodson, Director.

H783 U G 3-5
Honors Essay
Prereq.: 4th yr. standing; the record of A in at least half his Engl. courses and an average of B in all of his courses; the permission of professor under whose supervision the work is to be completed.
Open only to candidates for distinction in Engl. who have in their junior year completed with high grades a program approved by the Committee on Honors.
Repeatable to a maximum of 10 cr. hrs.
A program of reading arranged for each student, with individual conferences, reports, and honors thesis. Jones, Director.

GENERAL PREREQUISITES FOR COURSES NUMBERED 800
Prerequisites: 30 hrs. of courses in English or 20 hrs. in English and 25 hrs. in specified allied disciplines.

800 G 2
Introduction to Graduate Study
A. 2 cl.
Open only to M.A. candidates.
Required of all M.A. candidates.
An introduction to the methods and tools of graduate study in English and American literature.

810 G 5
Introduction to Old English Language and Literature
A. 5 cl.
The reading of Old English prose with special attention to the language and to cultural background.

812 G 5
Beowulf
W.
Prereq.: 810 or equiv.
A close study of the text of Beowulf and its background.

813 G 5
Middle English
Sp.
Prereq.: 810 or permission of instructor.
A study concentrating on 12th to 14th century English language and literature.
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<th>Code</th>
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<tr>
<td>814</td>
<td>G 5</td>
<td>Studies in Early English Literature</td>
</tr>
<tr>
<td></td>
<td>Su.</td>
<td>Prereq.: Either 616, 810, 813, or equiv.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A detailed and critical study of a medieval author or topic, exclusive of Chaucer.</td>
</tr>
<tr>
<td>815†</td>
<td>G 5</td>
<td>Studies in Chaucer</td>
</tr>
<tr>
<td></td>
<td>W.</td>
<td>A critical study of some aspect of Chaucer's work in depth.</td>
</tr>
<tr>
<td>816†</td>
<td>G 5</td>
<td>The Middle Ages</td>
</tr>
<tr>
<td></td>
<td>Sp.</td>
<td>3 cl.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A lecture-survey of Late Middle English literature concentrating on the period 1300-1500.</td>
</tr>
<tr>
<td>820</td>
<td>G 5</td>
<td>Shakespeare</td>
</tr>
<tr>
<td></td>
<td>A.</td>
<td>An intensive consideration of selected problems in the scholarly study of Shakespeare.</td>
</tr>
<tr>
<td>821</td>
<td>G 5</td>
<td>Studies in Renaissance Prose</td>
</tr>
<tr>
<td></td>
<td>W.</td>
<td>A close study of significant verse of late 16th and early 17th centuries.</td>
</tr>
<tr>
<td>822</td>
<td>G 5</td>
<td>Studies in Renaissance and Early 17th Century Poetry</td>
</tr>
<tr>
<td></td>
<td>A.</td>
<td>A close study of significant verse of late 16th and early 17th centuries.</td>
</tr>
<tr>
<td>823</td>
<td>G 5</td>
<td>Spenser</td>
</tr>
<tr>
<td></td>
<td>W.</td>
<td>A study of Spenser's poetry, its literary significance and its relation to foreign, classical, and native English poetic traditions.</td>
</tr>
<tr>
<td>824</td>
<td>G 5</td>
<td>Studies in Renaissance Drama</td>
</tr>
<tr>
<td></td>
<td>A.</td>
<td>5 cl.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A critical study of significant trends in English drama between 1500 and 1642, excluding Shakespeare.</td>
</tr>
<tr>
<td>826†</td>
<td>G 5</td>
<td>The Renaissance</td>
</tr>
<tr>
<td></td>
<td>W.</td>
<td>3 cl.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A lecture-survey of literature of the English Renaissance, 1500-1660.</td>
</tr>
<tr>
<td>830</td>
<td>G 5</td>
<td>Milton</td>
</tr>
<tr>
<td></td>
<td>Sp.</td>
<td>3 cl.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A critical study of the poetry and prose of John Milton, viewed against his social and literary background.</td>
</tr>
<tr>
<td>831</td>
<td>G 5</td>
<td>The Age of Dryden</td>
</tr>
<tr>
<td></td>
<td>A.</td>
<td>A detailed study of Dryden and his contemporaries.</td>
</tr>
<tr>
<td>832</td>
<td>G 5</td>
<td>The Age of Pope and Swift</td>
</tr>
<tr>
<td></td>
<td>Sp.</td>
<td>A detailed study of Pope, Swift, and their contemporaries.</td>
</tr>
<tr>
<td>833</td>
<td>G 5</td>
<td>The Age of Johnson</td>
</tr>
<tr>
<td></td>
<td>A.</td>
<td>A detailed study of Johnson, Boswell, and their contemporaries.</td>
</tr>
<tr>
<td>834</td>
<td>G 5</td>
<td>Studies in the 18th Century English Novel</td>
</tr>
<tr>
<td></td>
<td>Su.</td>
<td>4 cl.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intensive study of a selected critical or historical problem in English prose fiction from 1660 to 1800.</td>
</tr>
<tr>
<td>836</td>
<td>G 5</td>
<td>The Restoration and 18th Century</td>
</tr>
<tr>
<td></td>
<td>W.</td>
<td>3 cl.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A lecture-survey of English literature between 1660-1798.</td>
</tr>
<tr>
<td>840</td>
<td>G 5</td>
<td>Studies in Romantic Poetry and Poetics</td>
</tr>
<tr>
<td></td>
<td>A.</td>
<td>Literary romanticism, as represented by one or more of the poets (Blake, Coleridge, Wordsworth, Byron, Shelley, and Keats), in relation to contemporary intellectual and political movements; topic varies year to year.</td>
</tr>
<tr>
<td>841</td>
<td>G 5</td>
<td>Studies in Victorian Poetry</td>
</tr>
<tr>
<td></td>
<td>Su.</td>
<td>3 cl.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The artistic values of the poetry, its place in the romantic tradition, its reflection of the contemporary intellectual and social milieu; topic varies year to year.</td>
</tr>
<tr>
<td>842†</td>
<td>G 5</td>
<td>Studies in 19th Century Prose</td>
</tr>
<tr>
<td></td>
<td>A.</td>
<td>Selected non-fictional prose, read as examples of literary art and as documents of the age's religious, political, social, and aesthetic thought; topic varies from year to year.</td>
</tr>
<tr>
<td>843</td>
<td>G 5</td>
<td>Studies in the 19th Century English Novel</td>
</tr>
<tr>
<td></td>
<td>W.</td>
<td>5 cl.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intensive study of some aspect of the novel in the period from Jane Austen to Thomas Hardy; topic varies from year to year.</td>
</tr>
<tr>
<td>846</td>
<td>G 5</td>
<td>The 19th Century</td>
</tr>
<tr>
<td></td>
<td>A.</td>
<td>3 cl.</td>
</tr>
</tbody>
</table>
847  G  5
20th Century Poetry
W.
Prereq.: Acquaintance with the major poets studied in 847 is assumed.
An intensive study of a representative body of modern poetry, with emphasis on several major poets of
England and America.

848  G  5
Studies in 20th Century British Fiction
A. Sp.
Prereq.: Acquaintance with modern continental
novelists is recommended.
Tendencies in modern British fiction as seen in the
works of such major figures as Conrad, Forster, Joyce,
Virginia Woolf, and D. H. Lawrence.

849  G  5
Studies in Major 20th Century Writers
W.
An intensive study of the works of one or two major
poets, novelists, or dramatists, such as Conrad, Shaw,
O'Neil, Eliot, Stevens, Joyce, Faulkner, or Hemingway.

851  G  5
Studies in the American Renaissance
Su, Sp.
Prereq.: 551 or equiv.
An intensive study of several authors drawn from the
following list: Cooper, Poe, Hawthorne, Melville,
Emerson, Thoreau, and Whitman.

852  G  5
Studies in American Literature, 1865-1914
A.
Prereq.: 552 or equiv.
An intensive study of several major authors of the
period, including Twain and James.

853  G  5
Studies in Individual American Writers, 1800-1900
W.
An intensive study of the works of a single major
American author of the 19th century; author varies
yearly.

855  G  5
Studies in 20th Century American Fiction
Su, Sp. 4 cr.
An examination of the development of 20th century
American fiction as seen in the works of several
central novelists such as Faulkner, Fitzgerald, and
Hemingway.

856  G  5
American Literature
Sp. 3 cr.
A lecture-survey of American literature between 1820
and 1900.

870  G  5
Studies in Folklore
W. 4 cr.
Intensive study of some particular aspect of folklore.

871†  G  3
Principles and Methods of Linguistic Analysis
Su.
Prereq.: Permission of director.
The study of the principal methods of the analysis of
the English language.

872  G  3
Structural Analysis of English Expository Prose
A.
Prereq.: Permission of director.

873†  G  3
Principles and Methods of Literary Analysis
W.
Prereq.: Permission of director.
Principles and methods of the study of English poetry,
drama, and prose fiction.

876  G  5
Studies in Critical Theory
Sp.
A review of theory and practice in some of the
principal forms of literary analysis.

877  G  5
Advanced English Grammar
W.
Prereq.: Grad. standing and one of the following: 669,
671, 672, Ling. 600, 601, Speech 852, or equiv.
An advanced approach to the grammar and the
grammars of English and to their application to
teaching and writing.

878  G  5
History of the English Language
Sp.
Prereq.: Grad. standing, and one of the following: 669,
671, 672, Ling. 600, 601, Speech 852, or equiv.
An advanced approach to the history of English, with
emphasis on inner history as well as its outer matrix,
and its place among the world's languages.

880  G  5
Studies in English or American Literature
Prereq.: Permission of Dept. Grad. Committee
Chairman.
Offered occasionally as an intensive course on some
phase of English or American literature.

Medieval and Renaissance Culture
(See Medieval and Renaissance Studies 888.)

Medieval and Renaissance Literature
(See Medieval and Renaissance Studies 889.)

GENERAL PREREQUISITES FOR COURSES
NUMBERED 900
Prerequisites: 15 hrs. of English on the 800 level.

910†  G  5
Studies in the Medieval Period
W, Sp.
Individual research in a major aspect of Old and
Middle English literature.
911† G 5
Studies in the Medieval Period
Su.
Prereq.: 910.
Continuation of 910.

912† G 5
Research in Chaucer
W.
Individual research in various aspects of medieval literature, with Chaucer as center.

913† G 5
Research in Chaucer
Sp. 5 cr.
Prereq.: 912.
A continuation of 912.

920† G 5
The English Renaissance
W.
Reading and research in non-dramatic literature of the English Renaissance; topics may vary from year to year.

921† G 5
The English Renaissance
Sp.
Prereq.: 920.
A continuation of 920.

922† G 5
Studies in the Age of Shakespeare
Su.
Exploration of the problems, materials, and methods relevant to a scholarly study of Shakespeare's work and cultural environment, culminating in individual research.

923† G 5
Studies in the Age of Shakespeare
A.
Prereq.: 922.
Continuation of 922.

931† G 5
Research in the Restoration Period
A.
Individual research in Restoration literature, Dryden to Pope; oral and written reports.

934† G 5
Research in the Restoration Period
W.
Prereq.: 933.
Continuation of 933.

935† G 5
Studies in 18th Century Literature
W.
Problems in the literature and ideas of the Age of Reason.

936† G 5
Studies in 18th Century Literature
Sp.
Prereq.: 925.
Continuation of 935.

940 G 5
Studies in 19th Century Literature
A.
Reading and research in the literary production of the century and its intellectual and social backgrounds; topic varies from year to year.

941 G 5
Studies in 19th Century Literature
W.
Prereq.: 940.
Continuation of 940.

947† G 5
Studies in 20th Century Literature and Cultural History I
A. 4 cr.
Individual research in British and American literature of the 20th century.

948† G 5
Studies in 20th Century Literature and Cultural History II
W. 4 cr.
A continuation of 947.

950 G 5
Studies in American Literature and Cultural History Before 1900—I
W.
Individual research in problems in American literature before 1900.

951 G 5
Studies in American Literature and Cultural History Before 1900—II
Sp.
Prereq.: 950.
Continuation of 950.

930 G 5
Bibliography and Method
W.
For advanced graduate student in the methods and tools of literary research.

932† G 5
Textual Criticism and Editing
W.
Prereq.: 980.
Evaluation of literary editorial methods, past and present; training in skills requisite to the textual critic and scholarly editor; practice in textual editing.
Survey of insects and close relatives that affect public health crops, livestock, and the home; control methods, including the safe use of insecticides with environmental considerations. Holdsworth.

500  U G 5
Entomology for Biology Majors
Su. 3 cl., 2 2-hr. labs.
Not open to students with credit for 200, 200.01, or 200.02.
The biology, morphology, metamorphosis and habits of insects; methods of collecting, preserving, culturing and identifying the more important families. Fee.

561  U 3
Horticultural Entomology
Sp. 3 cl.
Prereq.: 460 and 10 additional cr. hrs. 200 level or above in Entom. or Hort.
A detailed study of insects and mites attacking horticultural crops.

602  U G 3
Biology of the Honey Bee
Sp. 3 cl.
Prereq.: 200.01 and Genetics 140 or equiv.
The behavior, social organization, morphology, physiology, reproduction, diseases, and genetics of the honey bee studied from a comparative and evolutionary viewpoint. Rothenbuhler.

611  U G 4
Field Entomology
Su (1st Term). 3 all-day clss.
Given only at the Franz Theodore Stone Laboratory.
deals primarily with collecting, identification, and field methods; field trips are made to various islands of Lake Erie and the mainland.

612  U G 4 or 5
Aquatic Entomology
Sp.
a. Su. (4 cr. hrs.) Given only at Franz Theodore Stone Laboratory. 3 all-day cl.
b. Sp. (5 cr. hrs.) Given only on Columbus campus. 4 2-hr. cl.
Prereq.: 200.01 or 611 or equiv.
Designed for preparation in the teaching of biology or for research on aquatic resources; taxonomy and ecology of immature and adult aquatic insects are emphasized. Britt. Fee.

621  U G 5
External Morphology of Insects
A. 2 cl., 6 hrs. lab.
Prereq.: 200.01 and 200.02, or equiv.
a study of the comparative external morphology of insects with special emphasis on evolutionary trends and on taxonomic application of morphology. Borror. Fee.

631  U G 5
Insect Physiology
A. 3 cl., 2 2-hr. labs.
Prereq.: 200.01 or equiv. and Chem. 235 or 241 and 243, or equiv.
The general physiology of insects and other arthropods; the laboratory will stress the use of insects to demonstrate fundamental physiological processes. Fisk. Fee.
660 U G 5
Advanced Economic Entomology
A. 3 cl., 2 2-hr. labs.
Prereq.: 460 or equiv.
The principles of insect control; field and laboratory studies will be made of major insect control problems. Fee.

661 U G 5
Medical Entomology
Sp. 3 cl., 2 2-hr. labs.
Prereq.: Microbiol. 607, or Zool. 610, or equiv.
A consideration of the recognition characteristics, biology, and control of insects and other arthropods of importance to the health of man, livestock, and wildlife. Venard. Fee.

682 U G 5
Principles of Insect Toxicology
W. 3 cl., 2 2-hr. labs.
Prereq.: 631, or equiv., or permission of instructor.
The properties of insecticides, modes of action, metabolism, toxicity factors, joint action, resistance, experimental procedures and interpretation of data. Collins. Fee.

670 U G 4
General Acarology
Su. 1 cl., 4-hr. lab.

693 U 2-5 G 2-10
Individual Studies
Prereq.: Permission of instructor.
Individual work in the field of the chosen problems.

694 U G 2-5
Group Studies
Prereq.: Permission of instructor.
Group work in the field of the chosen problems.

711 U G 5
Insect Pathology
Sp. 3 cl., 2 2-hr. labs.
Prereq.: Microbiol. 607, or equiv.
Diseases of insects, both infectious and non-infectious, and the resulting pathologies; the epizootiology of diseases and use of microorganisms for insect population management. Hink. Fee.

751* U G 5
Systematic Entomology
W. 2 cl., 6 lab. hr.
Prereq.: 621.
A survey of all orders except Diptera, Lepidoptera, and Hymenoptera, with emphasis on the determination of insects to family and beyond; collecting and preserving insects. Borrer. Fee.

752+* U G 5
Systematic Entomology
W. 2 cl., 6 lab. hrs.
Prereq.: 621.
Continuation of 751, covering the Diptera, Lepidoptera, and Hymenoptera. Borrer. Fee.

753* U G 5
Immature Insects
W. 1 cl., 4 2-hr. lab.
Prereq.: 751 and 752, or equiv., and permission of instructor.
A survey of immature stages of insects with emphasis on the anatomy and taxonomy of holometabolous larvae. Holdsworth. Fee.

800 G 1
Entomology Seminar
A, W, Sp. 1 1/2-cl. hr.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Faculty, graduate students, and outside speakers will participate; topics: recent advance in various entomological fields.

802+* G 5
Research Methods: Living Insects
Sp. 3 cl., 2 2-hr. labs.
Prereq.: Permission of instructor.
Current field and laboratory research methods of trapping, sampling, handling, and rearing insects; conducting life history studies; and measuring environment factors. Fisk. Fee.

821* G 5
Internal Morphology of Insects
Sp. 3 cl., 2 2-hr. labs.
Prereq.: 621.
Internal structures of insects, including anatomy, function, histology, embryology, and metamorphosis; laboratory includes preparation of permanent microscopic slides of insect tissues. Fisk. Fee.

831 G 5
Advanced Insect Physiology
W. 2 cl., 2 3-hr. labs.
Prereq.: 631, or Zool. 432, or equiv.
Topics include insect integument, water balance, excretion, digestion, nutrition, respiration, growth and metamorphosis; the project type laboratory provides experience in techniques of insect physiology. Fisk. Fee.

841 G 5
Biological Control
W. 3 cl., 3 hr. lab.
Prereq.: Permission of instructor.
The principles of biological control with particular reference to insects. Briggs and Stairs.

870 G 4
Medical-Veterinary Acarology
Su. 1 cl., 4-hr. lab.
3 hrs. cl.-lab daily (Su. 3 wks).
The mites associated with man, domestic animals, and wildlife, stressing their ecology and behavior in relation to transmission of viral, rickettsial, bacterial, and protozoan diseases. Johnston. Fee.
Food Science and Nutrition

Office: 122 Vivian Hall, 2321 Fyffe Road

Professors Kristoffersen (Acting Chairman), Gould, Harper, and Slatter; Associate Professors Allred, Blaisdel, Hansen, and Mikolaich; Assistant Professors Josephson and Kenyon; Instructor Lindamood.

GENERAL PREREQUISITES FOR COURSES NUMBERED 200

Unless otherwise indicated, the prerequisites for 200-level courses are 45 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed., or specified course(s) numbered 100-199.

201 U 5
Fundamentals of Dairy Foods and Their Industries
Sp. 3 cl., 2 2-hr. lab.
Scope, trends, and practices of the dairy foods industry; industrial dairying and the agricultural complex; characteristics of milk and dairy-related foods. Lindamood. Fee.

289 U 3
Dairy Foods Industries Apprenticeship
Open only to students majoring in food science and nutrition.
Ten weeks practical experience or equivalent in an approved processing plant; written report required. Kristoffersen.

GENERAL PREREQUISITES FOR COURSES NUMBERED 300 AND 400

Unless otherwise indicated, the prerequisites for 300 and 400-level courses are 90 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed., or specified course(s) numbered 100-399.

Fundamentals of Food Engineering
(See Agr. E. 310.)
(Offered in cooperation with the Dept. of Food Science and Nutrition.)

411 U 3
Sensory Evaluation and Selection of Dairy Foods
Sp. 3 2-hr. labs.
Prereq.: 201 or equiv. in depts. offering degrees in Food Tech.
Fundamentals of sensory perception; evaluation of dairy foods; panel selection and training; analysis and market application of results; products standards and grades. Josephson. Fee.

Refrigeration Engineering in the Food Industry
(See Agr. E. 411.)
(Offered in cooperation with the Dept. of Food Science and Nutrition.)

469 U 3
Field Studies of Industrial Problems
Open only to students majoring in food science and nutrition.
Ten weeks in-plant study of industrial problems in approved dairy foods organizations; written report required. Kristoffersen.

493 U 3-5
Individual Studies
Su, A, W, Sp. 9-, 12-, or 15-hr. lab.
H493 (honors) may be available to students enrolled in a college honors program or eligible for enrollment. Prereq.: Junior standing.
Individual study course to permit undergraduate students to explore in depth selected areas of dairy technology.

GENERAL PREREQUISITES FOR COURSES NUMBERED 500

Unless otherwise indicated, the prerequisites for 500-level courses are 15 cr. hrs. in courses in the same discipline numbered 200 or higher or 12 cr. hrs. in courses numbered 200 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 200 or higher in specified allied disciplines, or bachelor's degree.

521 U G 3
Dairy Foods Standards and Analysis
A. 3 cl.
Prereq.: 14 cr. hrs. Chem.
Not open for graduate credit to majors in food science and nutrition.
The modern dairy foods laboratory; chemical characteristics and analysis of milk and dairy-related foods; evaluation and utilization of analytical methods; regulations, standards, and agencies, Josephson.
522  U G 3
Dairy Foods Standards and Analysis: Laboratory
A. 1 cl., 2 3-hr. lab.
Prereq.: or concur.: 521.
Not open for graduate credit to majors in food science and nutrition.
Application of modern analytical methods to dairy foods; comparison and interpretation of results; laboratory project studies and technical report preparation. Josephson. Fee.

Marketing Dairy Products
(See Agr. Econ. 526.)
(Of offered in cooperation with the Dept. of Food Science and Nutrition.)

584  U 3-5
Group Studies
Prereq.: Jr. standing.
Intersession to a maximum of 10 cr. hrs.
Intensive study of selected areas in dairy technology not provided in other courses and appropriate to the needs of the students.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 600
Unless otherwise indicated, the prerequisites for 600-level courses are 15 cr. hrs. in courses in the same discipline numbered 300 or higher, or 10 cr. hrs. in courses numbered 300 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 300 or higher in specified allied disciplines.

601  U G 3
Advances in Dairy Foods
Su. 1st term. 3 2-hr. cl.
Prereq.: Advanced undergrad. or grad. standing.
Not open to majors in food science and nutrition.
Basic food components and their properties, changes in the dairy foods industry and consumer habits, food formulations, nutritional, health, sanitation, and quality aspects. Kristoffersen.

Food Engineering Design and Control
(See Agr. E. 611.)
(Of offered in cooperation with the Dept. of Food Science and Nutrition.)

631  U G 3
Fluid Dairy Foods
W. 3 cl.
Prereq.: Agr. E. 310.
Science, engineering and economic principles of unit operations for fluid milk and related dairy foods; products properties; quality control; public health aspects. Harper.

632  U G 3
Fluid Dairy Foods: Laboratory
W. 1 cl., 2 3-hr. labs.
Prereq.: 631 and Agr. E. 310.
Application of unit processes in the fluid milk and related dairy food industry; equipment use and production planning; processing and production control; special products. Harper. Fee.

634  U G 5
Lipid and Fermented Concentrated Dairy Foods
Sp. 3 cl., 2 3-hr. labs.
Prereq.: 631 and 632.
Chemical, physical and microbiological phenomena as related to lipid foods, cheese, and similar products; applications of engineering, processing and business principles. Kristoffersen. Fee.

636  U G 5
Concentrated and Frozen Dairy Foods
A. 3 cl., 2 3-hr. labs.
Prereq.: Agr. E. 411.
Unit operations in concentration and freezing; applications of science, engineering and management to concentrated and frozen dairy and dairy-type foods. Fee.

638  U G 3-5
Individual Studies
Su, A, W, Sp. 9-, 12-, or 15-hr. lab.
H993 (honors) may be available to students enrolled in a college honors program or eligible for enrollment.
Prereq.: Food science and nutrition 4th yr. standing and permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Individual project studies of current problems; planning, conducting, and reporting research.

695  U G 3
Seminar
A. 3 cl.
Prereq.: Food science and nutrition 4th yr. standing.
Not open for grad. credit to majors in food science and nutrition.
Leading research workers and their contributions; review, interpretation, and significance of current research; preparation and oral presentation of technical papers. Harper.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 700
Unless otherwise indicated, the prerequisites for 700-level courses are 15 cr. hrs. in courses in the same discipline numbered 400 or higher, plus additional specified course(s) numbered 600 or higher.

723  U G 5
Technical Control of Dairy Foods
Sp. 3 cl., 2 3-hr. labs.
Prereq.: 636.
Not open to students with credit for 623.
Utilization of science and engineering in industrial technical control; application of advanced chemical, physical and microbiological techniques. Harper. Fee.

745  U G 5
Management of Dairy Foods Operations
W. 2 3-hr. cl.
Prereq.: 4th yr. standing.
Organized management structure; practices and trends in dairy foods operations; efficiency guidelines; product, materials, and utilities conservation; personnel evaluation and utilization; analysis of current industry problems. Kristoffersen.
Group Studies
Repeattable to a maximum of 10 cr. hrs.
Intensive study of selected areas of dairy food science not provided in other courses and appropriate to the needs of the students.

GENERAL PREREQUISITES FOR COURSES NUMBERED 800 AND 900
Unless otherwise indicated, the prerequisites for 800 and 900-level courses are 30 cr. hrs. in courses in the same discipline, or 20 cr. hrs. in the same discipline, plus 25 cr. hrs. in specified allied disciplines.

830 G 3-5
Advances in Dairy Food Science
Prereq.: 723.
Repeatable to a maximum of 15 cr. hrs.
830.01 Microbiology and Fermentation
Su (1st term), Harper and Nolajakic.
830.02 Proteins and Protein Utilization
Su (1st term), Josephson and Harper.
830.03 Emulsion Systems
Su (1st term).
830.04 Food Engineering
Su (1st term), A. Blaisdell and Harper.
830.05 Research Methods
Su (2nd term), Harper.

850 G 1
Seminar
A, W, Sp. 1 cr.
Graduate student-staff participation in a study of teaching and research trends and opportunities; critical analysis of research approaches, findings, and publications.

898 G 1
Interdepartmental Seminar in Nutrition and Food Technology
Sp.
(See under Interdepartmental Seminars.)

998 G Arr.
Research: Thesis
Research for thesis purposes only.

999 G Arr.
Research: Dissertation
Research for dissertation purposes only.

Forestry
(SCHOOL OF NATURAL RESOURCES)
Office: 140 Howlett Hall, 201 Fyffe Court
Professors Gatherum (Chairman), Cowen, Kriebel, Larson, and Touse; Associate Professors Brown, Vimmerstedt, Voigt (Associate Chairman, Voigt), and Whitmore; Assistant Professor Houston.

GENERAL PREREQUISITES FOR COURSES NUMBERED 200
Unless otherwise indicated, the prerequisites for 200-level courses are 15 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.; or specified course(s) numbered 100-199.

221 U 5
Coniferous Dendrology
A. 3 cr., 2 2-hr. labs.
Prereq.: Bot. 102.
A study of the principal species of Gymnosperms in the United States with emphasis on identification, range, and silvicultural characteristics. Cowen.

222 U 5
Hardwood Dendrology
Sp. 3 cr., 2 2-hr. labs.
Prereq.: Bot. 102.
A study of the principal species of Angiosperms in the United States with emphasis on identification, range, and silvicultural characteristics. Cowen.

223 U 5
Silvics
W. 5 cr.
Prereq.: Bot. 102.
The effect of site factors on forest vegetation and action of forest cover on the site; characteristics of individual trees and forest stands. Brown, Gatherum, Houston, Larson, Vimmerstedt, and Voigt.

GENERAL PREREQUISITES FOR COURSES NUMBERED 300 AND 400
Unless otherwise indicated, the prerequisites for 300- and 400-level courses are 90 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.; or specified course(s) numbered 100-399.

310 U 5
Principles of Forestry
A. 3 cr., 2 2-hr. lab.
History of American forests, their character and occurrence; underlying fundamentals of silviculture and forest management; introduction to forest management and protection. Touse.

321 U 5
Silviculture
A. 5 cr.
Prereq.: 221, 222, and 223.
A study of the methods of handling the forest on a permanent basis to assure the reproduction and proper growth of tree crops. Fee.
323 U 5
Forest Mensuration
W. 5 cl.
Prereq.: 221, 222, and 224.
The measurement of the forest and forest products.

325 U 5
Forest Management
Sp. 5 cl.
Prereq.: 321 and 323.
A study of the practical problems of managing woodland property, both from the technical and the financial standpoint. Fee.

431 U 5
Wood Structure and Properties
A. 5 cl.
Prereq.: 221 and 222.
The classification and identification of the important timber species based upon wood structure and properties; defects in wood; moisture relationships; physical and chemical properties. Touse and Whitmore.

432 U 5
Manufacturing Forest Products
W. 5 cl.
Intensive study of the manufacturing industries based on wood products or products derived from wood by chemical and other means. Touse.

433 U 5
Analysis of Forest Industry Management
Sp. 5 cl.
Prereq.: 431 and 432.
A survey of the common problems encountered by managers of the wood-using industries; emphasis on sources of information and methods of solution. Touse.

GENERAL PREREQUISITES FOR COURSES NUMBERED 500
Unless otherwise indicated, the prerequisites for 500-level courses are 15 cr. hrs. in courses in the same discipline numbered 200 or higher, or 10 cr. hrs. in courses numbered 200 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 200 or higher in specified allied disciplines; or baccalaureate degree.

593 U G 2-5
Individual Studies
Prereq.: Permission of instructor.
HS93 (honors) may be available to students enrolled in a college honors program or eligible for enrollment. Special problems in the field of forestry and forest products.

GENERAL PREREQUISITES FOR COURSES NUMBERED 800 AND 900
Unless otherwise indicated, the prerequisites for 800- and 900-level courses are 30 cr. hrs. in courses in the same discipline, or 20 cr. hrs. in specified allied disciplines, plus 25 cr. hrs. in specified allied disciplines.

999 G Arr.
Research in Forestry
Research for thesis and dissertation purposes only.

French
Office: 248 Diefer Cunz Hall of Languages, 1841 Millikin Road
Professors Bulatkin (Chairman), Astier, Carlot, Cotrell, Davidson, Doremest (Emeritus), Havens (Emeritus), Keller, and Meiden; Assistant Professors Ares, Williams, and Winthrop.

101 U 5
Elementary French
Su, A, W, Sp. 5 cl.
Elements of French grammar, with oral and written exercises; attention to ear training and oral practice; elementary reading based on French geography, history, and customs.

102 U 5
Elementary French
Su, A, W, Sp. 5 cl.
Prereq.: 101.
The elements of French grammar with abundant oral and written exercises; development of conversational skill; reading, vocabulary building, attention to French idioms.

103 U 5
Intermediate French
Su, A, W, Sp. 5 cl.
Prereq.: 102.
Review of salient points of elementary grammar, attention to French idioms; reading of short stories, plays, and novels.

104 U 5
Intermediate French
104.01 - Basic
104.02 - Conversation
104.03 - Fr. Society
104.04 - Civilization
104.05 - Sci & Phil
104.06 - Scientific Reading
Su, A, W, Sp. 5 cl.
Prereq.: 103 or 112.
Course conducted in French. Reading of French plays, short stories, and novels; emphasis on oral practice and French idioms.

105 U 5
Elementary French Conversation and Composition
Su, A, W, Sp. 5 cl.
Prereq.: 104.
Course conducted in French.
Intensive practice in oral and written French, based on texts and periodicals concerned with French life of today; grammar and idiom review.

110 U 10
Intensive Elementary French
A, W, Sp. 10 cl.
Prereq.: Permission of dept.
Not open to students with credit for 101 or 102.
Elementary French for students wishing to acquire the basic skills in one quarter; intensive drill in form, syntax, vocabulary, and idiom; equivalent to 101 and 102.
112       U 5, 10, 15
Intensive French
Su.  15 cl. Enrollment limited to 25 students.
Prereq.: Permission of chairman.
Full time of student and full fees required. Equiv.
of 101, 102, 103. Students with credit for 101 or the
equiv. may not register for more than 10 cr. hrs.
Students with credit for 101 and 102 or the equiv. may
not register for more than 5 cr. hrs. Students with
credit for 103 or the equiv. may not register for credit.
Elementary and Intermediate French; intensive drill in
form, syntax, vocabulary, and idiom; reading of short
stories, novels, and plays.

162       U 5
Elementary-Intermediate French
for Selected Students
W.  5 cl.
Prereq.: Grade of A in 101 and permission of dept.
Successful completion of 101-162-163 fulfills language
requirements and satisfies prereq. for 400-level
literature courses.

163       U 5
Elementary-Intermediate French
for Selected Students
Sp.  5 cl.
Prereq.: 162.
Successful completion of 101-162-163 fulfills language
requirements and satisfies prereq. for 400-level
literature courses.

193       U 1-15
Individual Studies
Prereq.: Permission of dept.
Repeatable to a maximum of 30 cr. hrs.

194       U 1-15
Group Studies
Prereq.: Permission of dept.
Repeatable to a maximum of 30 cr. hrs.

271       U 3
French Classics in Translation; The Middle Ages
to the Mid-Eighteenth Century
Su.  A,  3 cl.
Prereq.: Engl. 100 or equiv.
Does not count toward a French major.
Reading, analysis, and discussion of major French
works in translation, beginning with the Song of
Roland and continuing with authors such as Montaigne,
Pascal, Moliere, Voltaire, Rousseau.

272       U 3
French Literature in Translation
Su. W.  3 cl.
Prereq.: Engl. 100 or equiv.
Does not count toward a French major.
Readings of the late 18th and 19th centuries;
treatment of the Confessions of Rousseau, novels by
Balzac, Stendhal, and Flaubert.

273       U 3
Modern French Literature in Translation
Su, Sp.  3 cl.
Prereq.: Engl. 100 or equiv.
Does not count toward a French major.
Discussion of readings in English of 20th century
French masterpieces; treatment of the French novelists
and dramatists, Proust, Gide, Malraux, Sartre, and
Camus.

401       U 3
Review Grammar and Composition
Su, A, W, Sp.  3 cl.
Prereq.: 105.
Review of French grammar; composition on assigned
topics and practice in translation.

402       U 3
Intermediate French Conversation
and Composition
A, Sp.  3 cl.
Prereq.: 105.
Vocabulary building, practice in speaking French,
conversation, and composition dealing with social and
economic aspects of French life.

403       U 3
Intermediate French Conversation
and Composition
Su, W.  3 cl.
Prereq.: 105.
Vocabulary building, practice in speaking French,
conversation, and composition dealing with intellectual
and artistic aspects of French life.

404       U 5
French Pronunciation
Su, A, W, Sp.  5 cl.
Prereq.: 105.
Not open to students with credit for (633).
Formation of French sounds, rules of pronunciation
and diction; lectures and practical exercises; use of
phonetic symbols.

421       U 5
Introduction to Modern French Literature
Su, A, W, Sp.  5 cl.
Prereq.: 104.
Not open to students with credit for (417).
Rapid reading and discussion of French literary
movements and masterpieces of the 19th century and
their relation to modern France.

422       U 5
Masterpieces of French Literature: Middle
Ages and Renaissance
A, W, Sp.  5 cl.
Prereq.: 421.

423       U 5
Masterpieces of French Literature:
17th and 18th Centuries
A, W, Sp.  5 cl.
Prereq.: 421.
441* U 5
La civilisation française des origines a nos jours.
A. 5 cl.
Prereq.: 401, 402, or 403.
Course conducted in French.
Major developments of French culture to 1900.

571 G 5
Basic French for Graduate Students
Su, A, W, Sp. 5 cl.
Prereq.: Graduate standing.
Credit does not apply to the minimum number of hours
required for the master's or doctoral degrees. No audit.
Designed primarily for students who have no formal
preparation in French; covers basic grammar and
vocabulary.

572 G 3
French for Research I
Su, A, W, Sp. 3 cl.
Prereq.: Grade of C or above in 571, or equiv.
preparation demonstrated by a placement test.
Credit does not apply to the minimum number of hours
required for the master's or doctoral degrees. No audit.
Repeatable twice.
Satisfactory completion of this course (grade of A or B)
will be accepted as evidence of a dictionary
reading knowledge in fulfillment of Ph.D. language
requirement.

573 G 3
French for Research II
Su, W. 3 cl.
Prereq.: Grade of A or B in 572, or equiv. preparation
demonstrated by a placement test.
Credit does not apply to the minimum number of hours
required for the master's or doctoral degrees. No audit.
Repeatable twice.
Satisfactory completion of this course (grade of A or B)
will be accepted as evidence of a thorough reading
knowledge in fulfillment of Ph.D. language requirement.

601 U 5
Modern French Syntax
Su, A, W, Sp. 5 cl.
Prereq.: 401.
Systematic review of French grammar with composition
and other exercises, based on contemporary authors;
modern tendencies in syntactic analysis. Meiden.

602 U G 3
French Translating
Su, A, W, Sp. 3 cl.
Prereq.: 401 or equiv.
Translation from French to English and English to
French.

603 U G 3
Advanced Spoken and Written French
Sp. 3 cl.
Prereq.: 402, 403, and 601 or equiv.
Intensive practice in speaking and writing French;
based on contemporary usage.

604 U G 3
Advanced French Pronunciation
and Phonostylistics
W. 2 cl., 1 lab. hr.
Prereq.: 404 or permission of instructor.
Training in auditory and oral aspects of French
pronunciation; special emphasis on analysis of
different types of spoken French.

621 U G 5
French Literature of the Renaissance
A. 5 cl.
Prereq.: 421 and either 422 or 423.
Selections from Marot, Rabelais, the Pleiade and
Montaigne as they reflect the age of humanism and
illustrate the transition from medieval to modern
forms and ideas. Cottrell.

622 U G 5
French Classicism, 1600-1715
Sp. 5 cl.
Prereq.: 421 and either 422 or 423.
The formation of the classic spirit; the perfection of
dramatic form and the 17th century portrait of man.
Williams.

623 U G 5
French Literature of the Enlightenment
A. 5 cl.
Prereq.: 421 and either 422 or 423.
A study of the ideas of the eighteenth century in their
relation to modern times; special emphasis on
Montesquieu, Voltaire, Diderot, and Rousseau. Williams.

624 U G 5
The Romantic Period in French
Literature, 1800-1850
W. 5 cl.
Prereq.: 421 and either 422 or 423.
The development of romanticism and rise of realism in
the first half of the 19th century in the novel, poetry,
and drama. Carlu.

625 U G 5
French Literary Currents 1850-1914
Sp. 5 cl.
Prereq.: 421 and either 422 or 423.
Realism, naturalism, symbolism, and the movements
of reaction in the novel and in literary criticism.
Cottrell.

626 U G 5
Contemporary French Literature
Sp. 5 cl.
Prereq.: 421 and either 422 or 423.
20th century literary currents, and their significance,
with special attention given to the novel; Proust, Gide,
Malraux, Mauriac, Bernanos, Saint-Exupery, Camus,
Sartre, and others. Ames.

627 U G 3
Contemporary French Drama
A. 3 cl.
Prereq.: 421 and either 422 or 423.
Plays of L'Ennemard, Romaine, Claudel, Giraudoux,
Cocteau, Montherlant, Anouilh, Sartre, Camus,
and Ionesco; the different theatres and directors from
Coqueau to the present day. Ames and Astier.
Modern French Poetry
A. 3 cl.
Prereq.: 421 and either 422 or 423.
Source and processes of poetic creations as exemplified in selected works of French poets from Baudelaire to the present time. Ames and Astier.

Explication de textes
Su., W. 3 cl.
Prereq.: 421 and either 422 or 423.
Repeatable to a maximum of 6 cr. hrs.
Intensive linguistic and literary exploration of representative passages from modern French authors.

French Literature
Su. 3 cl.
Prereq.: 421 and either 422 or 423.
Repeatable to a maximum of 15 cr. hrs.

La civilisation française contemporaine
A. 3 cl.
Prereq.: 401 and 402 or 403.
Course conducted in French.
Life, institutions, and culture of contemporary France. Carluft.

Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.

Group Studies in French
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.

Advanced Translation and Comparative Stylistics
A. 3 cl.
Prereq.: 602 or permission of instructor.
A comparative study, through intensive translation, of the stylistic resources of French and English. Astier.

Honors Course in French
Prereq.: 4th yr. standing with a grade of A in at least half of the French courses and an average of B in the remainder, and permission of dept. and the Honors Committee of the College.
Repeatable to a maximum of 15 cr. hrs.
Offers undergraduates with special aptitudes a greater opportunity to do independent study than is possible in the ordinary course; work in conference, library, or phonetics laboratory.
825* G 3
Topic and Problems
in 18th Century French Literature
A. 3 cl.
Prereq.: 623 or permission of instructor.
Intensive exploration of a special topic or problem, with readings in literary works and in relevant
criticism and scholarship. Davidson and Williams.

826 G 3
Topics and Problems
in 19th Century French Literature
Sp. 3 cl.
Prereq.: 624, 625, or permission of instructor.
Intensive exploration of special topics or problems with readings in literature works in relevant criticism
and scholarship. Carlut.

827 G 3
Topics and Problems
in 20th Century French Literature
A. 3 cl.
Prereq.: 626 or equiv.
Intensive study of a specific topic or problem with readings of selected literary and critical works. Astier.

828 G 5
Old Provençal
A. 5 cl.
Prereq.: 813 or Span. 813.
Origin of the troubadour lyric; its history, as to form and content, in the 11th and 12th centuries; elements
of phonology and morphology. Bulatkin.

829 G 5
Old Provençal
W. 5 cl.
Prereq.: 828.
Troubadour lyric in the 13th century; increased attention to non-lyric genres, and to prose; continuation
of linguistics, with greater emphasis on semantic problems. Bulatkin.

831 G 2-5
Seminar in French Literature
Su (2-3 cr. hrs.), A, Sp. (3-5 cr. hrs.).
Prereq.: Permission of instructor.

832 G 2-5
Seminar in French Literature
Su (2-3 cr. hrs.), W, Sp. (3-5 cr. hrs.).
Prereq.: Permission of instructor.

833 G 3-5
Seminar in French Literature
Sp.
Prereq.: Permission of instructor.

842* G 5
Topics and Problems in Provençal Literature
from the 18th to the 20th Century
Sp. 5 cl.
Prereq.: 821 or 822 or permission of instructor.
Repeatable to a maximum of 10 cr. hrs.

843* G 3
Major Authors of the 16th Century
Sp. 3 cl.
Prereq.: 621 or permission of instructor.
Intensive exploration of the works of outstanding authors of the period. Cottrell.

844 G 3
Major Authors of the 17th Century
W. 3 cl.
Prereq.: 622 or permission of instructor.
Intensive exploration of representative works. Davidson.

885 G 5
Introduction to Methods in the History
and Criticism of Literature
A. 4 or 5 cl.
Selected readings in basic literary history, criticism, and theory, with practice in the use of standard
bibliographical aids to scholarship. Williams.

886* G 3
Bibliography and Method
Sp. 3 cl.
A course to acquaint graduate students with tools, problems, and methods of linguistic and literary
research. Davidson.

Medieval and Renaissance Culture
(See Medieval and Renaissance Studies 888.)

Medieval and Renaissance Literature
(See Medieval and Renaissance Studies 889.)

993 G 1-5
Individual Studies in French
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

994 G 1-15
Group Studies in French
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
Investigation of minor problems in the various fields
of French literature and language.

999 G Arr.
Research in French Language or Literature
Research for thesis and dissertation purposes only.
Genetics

Office: 18A Botany and Zoology Building, 1735 Neil Avenue
Professors Griffling (Chairman), Fachheirher, Harvey, House, Jaap, Kriebel, Paddock, Plaine, Rothenbuhler, Weaver, and Young; Associate Professors Birky, Byers, Swiger, and Skavaril; Assistant Professors Allaire, Clay, Periman, and Pfefferle; Instructor Essman.

140 U 5
Introduction to Genetics
A, W, Sp. 5 cl.
Prereq.: Biol. 100.
An introductory course emphasizing applied aspects of genetics, primarily for students outside the College of Biological Sciences.

500 U G 5
General Genetics
A, W, Sp. 5 cl.
Prereq.: Biol. 100 plus 5 additional cr. hrs. in biology, and Math. 150 or equiv. Not open to students with credit for 314, 630 or Biol. 314 or 630.
The principles of genetics, including molecular genetics, transmission genetics of prokaryotes and eukaryotes, developmental and non-chromosomal genetics, and the genetics and evolution of populations.

631 U G 5
The Cytological Basis of Genetics
W. 2 cl., 3 2-hr. labs.
Prereq.: 500 or equiv. Not open to students with credit for Biol. 631.
Documentation of the correlation between genetic principles and chromosome behavior by studying the mitotic and meiotic cells of several organisms with oil immersion microscopy. Paddock. Fee.

632 U G 5
Plant Genetics
A. 3 cl., 2 2-hr. labs.
Prereq.: 500, Bot. 101 or 102 or 500, and 10 additional cr. hrs. in Biological Sciences.
Not open to students with credit for Bot. 650. Effects of lethals, linkage, heterozygote, intragression, polyploidy, self-incompatibility, and cytoplasm; laboratory experience with acetocarmine stains, colchicine, progeny tests, random number tables, and herbarium specimens. Paddock. Fee.

650 U G 5
Analysis and Interpretation of Biological Data I
Su, A, Sp. 4 cl., 1 2-hr. lab.
Prereq.: Math. 150 or equiv. and 15 cr. hrs. of courses at the 300- level or higher in a dept. of the College of Agriculture and Home Economics or in the College of Biological Sciences.
Not open to students with credit for Biol. 650.
Methods of analyzing biological data including: sampling, descriptive statistics, distributions, group comparisons, statistical inference, one-way and nested analysis of variance and linear regression and correlation. Skavaril. Fee.

651 U G 5
Analysis and Interpretation of Biological Data II
Su, W. 4 cl., 1 2-hr. lab.
(Given in C. Qtr. at Wooster only)
Prereq.: 650 or Biol. 650.
Not open to students with credit for Biol. 651.
Methods used in analyzing data classified in two or more ways: Latin-square, split-plot and factorial designs, analysis of covariance, data transformations, multiple regression and least-squares. Harvey and Weaver.

660 U G 5
Computer Applications in Genetics
W. 4 cl., 1 2-hr. lab.
Prereq.: 500 or equiv., 650 or equiv., and Comp. and Info. Sci. 241 or equiv.
Simulation techniques and applications of modern computer methodology to problems in genetics. Skavaril.

683 U 2-5 G 2-10
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs. for undergraduate credit and to a maximum of 35 cr. hrs. for graduate credit.
Individual work in the field of the chosen program.
b. Physiological and developmental genetics. House and Pfefferle.
c. Mathematical and population genetics. Allaire, Clay, Griffling, Harvey, Jaap, Kriebel, Skavaril, Swiger, and Young.

694 U 2-5 G 2-10
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs. for undergraduate credit and to a maximum of 35 cr. hrs. for graduate credit.
Group work in the field of the chosen program.
(See areas in 693.)

730 U G 3 or 5
Cytogenetics
Sp. 3 cl., 2 2-hr. labs.
Prereq.: 500 and 630 or Biol. 630 and 631.
Not open to students with credit for Biol. 730.
Origin, transmissibility, and effects of chromosomal aberrations; their usefulness in practical breeding and in attacks on fundamental cytogenetic problems. Paddock. Fee.

800 G 1
Genetic Seminar
A, W, Sp. 1 1½-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Faculty, graduate students, and outside speakers will participate. Young.
Physiological Genetics
830†* G 5
Sp. 5 cl.
Prereq.: 1 qtr. each of Physiol., Embryol., and Biochem.
Not open to students with credit for Biol. 830.
A consideration of the theoretical and experimental aspects of physiological genetics, pertaining to the concept of the gene, its biochemical nature, replication, and mutation.

The Nature of Gene Action
831†* G 5
Sp. 5 cl.
Prereq.: 1 qtr. each of Physiol., Embryol., and Biochem.
Not open to students with credit for Biol. 831.
A study of the action of genes at all levels of expression with special emphasis on the role of genes in developmental processes. House.

Mathematical Genetics
832 G 5
Sp. 4 cl., 1 2-hr. lab.
Prereq.: 30 cr. hrs. in Genetics, Math., and Statistics.
Not open to students with credit for Biol. 832 or (816).
The construction of mathematical models, use of path coefficients, generation matrices, least-squares and maximum likelihood methods for estimating genetic parameters and breeding values in quantitative genetics. Harvey.

Transmission Genetics Theory
840†* G 3
W. 3 cl.
Prereq.: 500 or equiv.; Statist. 520 and 521, or equiv., and permission of instructor.
The mathematical basis of transmission genetics to include any level of polygenic inheritance. Grifling.

Quantitative Genetics and Selection Theory
841* G 3
W. 3 cl.
Prereq.: 500 or equiv.; Statist. 520 and 521, or equiv., and permission of instructor.
The genetic basis for complexly inherited, quantitative, biological variables and the theory of truncation selection as it pertains to such variables. Grifling.

Behavior Genetics
850 G 5
(See Zoology 840.)

Geodetic Science

Interdepartmental Seminar in Developmental Biology
890 G 2
A, W, Sp. 1 2-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Students will present oral reports and lead discussion on research progress in specific areas of developmental biology.

Research in Genetics
999 G Arr.
Research for thesis and dissertation purposes only.

Geodetic Science

Office: Cockins Hall, 1958 Neil Avenue
Professors Uotila (Chairman), Mortiz (adjunct), Mueller, and Rapp; Associate Professors Ghosh and Merchant; Assistant Professor Steward.

GENERAL PREREQUISITES FOR ALL 500-LEVEL COURSES
Prerequisite for all 500-level courses in Math. 151.

Field and Land Surveying
512 U 5
W. 4 cl., 1 3-hr. lab.
Basic plane surveying techniques for geodetic science students.

Fundamentals of Geodetic Surveying
515 U G 5
A. 4 cl., 1 3-hr. lab.
Prereq.: 512 or equiv., or permission of instructor.
Principles of establishment and extension of major control; principles of construction and use of angular, distance, elevation difference, and gravity measuring devices.

Fundamentals of Photogrammetry
525 U G 4
A. 3 cl., 1 2-hr. lab.
Prereq.: Physics 131.
History; major problems in photogrammetry; scope of applications; geometric optics; photography; metric cameras; physical photographic distortion; stereoscopy; comparators; stereoscopic plotters.

GENERAL PREREQUISITES FOR ALL 600-LEVEL COURSES
Prerequisites for all 600-level courses include Math. 254 and Physics 131.

Introduction to Advanced Geodesy
613 U G 5
Sp. 5 cl.
Prereq.: 515, 646, and 650; or equiv.
Not open for graduate credit to students registering for 658, 776, or 777.
Determination of geodetic reference surfaces by geometric, gravimetric, and celestial methods; establishing horizontal and vertical and three-dimensional control.

624 U G 4
Instrumentation in Photogrammetry
W. 2 cl., 2 3-hr. lab.
Prereq.: 525 or equiv.
Introduction to instruments used in photogrammetry; single, double, and multi-image types; stereoplotters, comparators, and analytical plotters; evaluation, testing, and adjustment of instruments.

625 U G 4
Photo Interpretation
A. 3 cl. 1 3-hr. lab.
Prereq. or concur.: 525 or permission of instructor.
Principles of reading, analysis and interpretation of photographs; application of photographs in geological, forest, agricultural, geographical, etc., interpretations; using the techniques of non-mapping problems.

626 U G 4
Metric Photography
A. 3 cl. 1 3-hr. lab.
Prereq.: 525 or equiv.
Properties, design and calibration of various photogrammetric cameras; physical characteristics and quality control of photography; photogrammetric airplanes and auxiliary devices; image evaluation.

627 U G 5
Introduction to Advanced Photogrammetry
Sp. 4 cl., 1 3-hr. lab.
Prereq.: 525 and 653; or equiv.
Not open for graduate credit to students registering for 660, 778, 779.
Coordinate transformation in photogrammetry and their differential forms; space resection and orientation; intersection, critical geometry; photogrammetric mapping; photogrammetric surveying; spatial triangulation.

645 U G 3
Applied Mathematical Methods in Geodetic Science I
A. 3 cl.
Mathematical techniques used in geodetic science; Taylor series; vector analysis; matrix computations; elements of differential geometry.

646 U G 3
Applied Mathematical Methods in Geodetic Science II
W. 3 cl.
Prereq.: 645 or equiv.
Continuation of 645; complex variables, analytic functions; and conformal mapping; use of divided differences; spherical harmonics.

650 U G 3
Adjustment Computations I
A. 2 cl., 1 3-hr. lab.
Prereq. or concur.: 645 or equiv.
Classification of errors, measures of dispersion, variance, covariance, propagation of errors, weights, observation, condition and normal equations, examples.

651 U G 4
Adjustment Computations II
W. 3 cl., 1 3-hr. lab.
Prereq.: 650 or equiv.
A posteriori variances, representation of residuals, combination of observation and condition equations, generalized minimum variance solution for hybrid measuring systems, statistical tests, empirical fitting of polynomials.

655 U G 4
Geometric Geodesy
W. 4 cl.
Prereq.: 659 or equiv.
Historical development; geometry of the reference ellipsoid; reductions and use of ellipsoid as a reference surface; organization of major geodetic control; introduction to advanced geometric geodesy problems.

660 U G 3
Geometric Photogrammetry
W. 2 cl., 1 3-hr. lab.
Prereq.: 525 and 645; or equiv.
Interior, exterior orientation; space resection and intersection; coordinate transformations, affine, isogonal, (Helmert), projective (collineality), direction cosines, gimbal, and their differential forms, critical geometry.

664 U G 3
Geodetic Astronomy
W. 3 cl.
Prereq.: 645 or equiv.
Stellar coordinate systems; stellar positions and motions; time; star catalogues; principles of position determination.

665 U G 2
Observational Geodetic Astronomy
Sp. 1 cl., 1 3-hr. lab.
Prereq.: 650 and 664; or equiv.
Instrumentation; timekeeping and dissemination; determination of astronomic latitude, longitude, and azimuth.

666 U G 4
Elements of Cartography and Map Projections
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 645 and 658; or concur.: 613; or equiv.
Projections of the sphere; the mathematics of the principal map projections used for major map series; cartographic processes and developments.

666 U G 5
Field Work in Geodesy
Su (1st term). 1 cl., 5 4-hr. labs.
Prereq.: 515.

687 U G 5
Field Work in Geodetic Astronomy
Su (2nd term). 1 cl., 5 4-hr. labs
Prereq.: 664.
688 U G 5
Field Work in Photogrammetry
Su (2nd term), 4 cl., 5 4-hr. labs.
Prereq.: 512 and 525.

693 U G 2-9
Individual Studies in Geodetic Science
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
Assigned reading laboratory or field work, under the
guidance of a staff member, arranged to meet the
requirements of individual students.

694 U G 2-9
Group Studies in Geodetic Science
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.

760 U G 4
Advanced Geometric Geodesy
A. 4 cl.
Prereq.: 658 or equiv.
Solution of long line problems on the ellipsoid; datum
transformations; determination of the size and shape
of the reference ellipsoid; fundamentals of three-
dimensional geodesy.

761 U G 5
Mathematical Projections in Geodesy
Sp. 4 cl., 1 3-hr. lab.
Prereq.: 666 or equiv.
Use of analytic functions; representation of the
ellipsoid on a sphere; geometry of the projected
geodesic; Mercator, Transverse Mercator, Oblique
Mercator, Conformal Conic projections.

762 U G 4
Advanced Adjustment Computations
A. 3 cl., 1 3-hr. lab.
Prereq.: 651 or equiv.
Analyses of mathematic models; systematic errors,
correlations, inner adjustment, multivariate statistical
analysis; generalized matrices in adjustment.

783 U G 3
Navigation
Sp. 3 cl.
Prereq.: 664 or equiv.
Sea, air, and space navigation, analysis of
instruments, environmental factors, and geometric
aspects.

776 U G 4
Gravimetric Geodesy
Sp. 4 cl.
Prereq.: 646, 651, and 658; or equiv.
The gravity and its potential; the disturbing potential
and its representation; applications and current
methods.

777 U G 3
Satellite Geodesy
A. 3 cl.
Prereq.: 651, 658, and 664; or equiv.
Geometric and dynamic applications of artificial
satellites in geodesy; determination of station positions
and the gravity field of the earth.

778 U G 5
Analog Photogrammetry
Sp. 4 cl., 1 3-hr. lab.
Prereq.: 650 and 660; or equiv.
Geometric concepts in models, strips, and blocks,
without and with auxiliary information; use of analog
photogrammetry in large, medium, and small scale
mapping.

779 U G 4
Computational Photogrammetry
A. 3 cl., 1 3-hr. lab.
Prereq.: 651 and 660; or equiv.
Correction for refraction, distortion; procedures in
resection, orientation, intersection; observations on
exterior orientation, on survey coordinates; numerical
spatial triangulation; system calibration; error
estimates; engineering applications.

784 Group Studies
Prereq.: Permission of instructor.
784.01 Non-Conventional Photogrammetry U G 4
A.
Studies in strip, panoramic, and weather satellite
photography systems; Ranger, Surveyor, and Lunar
Orbiter and Mariners systems; electron microscopy
and holography.

784.02 Advanced Geodetic Astronomy U G 3
A.
Prereq.: 664 and 665.
Star catalogues and their relationships; time and
latitude determinations in observatories; coordinated
timekeeping and dissemination; eclipses and
occultations; modern astronomical techniques.

784.03 Geodetic Applications U G 4
of Digital Computers
W.
Advanced programming techniques; computer
developments and use in geodesy, photogrammetry,
and cartography.

802 G 4
Advanced Computational Photogrammetry
W. 3 cl., 1 3-hr. lab.
Prereq.: 778 and 779; or equiv.
Weight constraints, method of independent bases;
fundamental constraints, surface geometry enforcement;
dynamic aerial calibration; close range calibration,
apPLICATION; Ridley photography and specialized
comparator techniques.

805* G 4
Advanced Stereophotogrammetry
W. 3 cl., 1 3-hr. lab.
Prereq.: 778 and 779; or equiv.
Differential formulas, parallax formulas; relative and
absolute orientation; model errors; quality control in
model orientations; critical surface; convergent
photography.
Photogrammetry in Practice
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 778 and 779; or equiv.
Planning for aerial, terrestrial, and close-range photogrammetry jobs; ground control and signalization; map compilation, efficiency assessment, economic considerations; technical writing; various applications of photogrammetry.

Photo-Triangulation
W. 3 cl., 1 3-hr. lab.
Prereq.: 778 and 779; or equiv.
Spatial photo-triangulation, analytical and analytical; strip and block triangulations; error propagation; use of auxiliary data; independent geodetic control; partial control extension; accuracy and economy considerations.

Advanced Geodetic Geodesy
A. 4 cl.
Prereq.: 776 and 777; or equiv.
Boundary-value problem; use of spherical harmonics; statistical application; appropriate representations; computations in space; combination of gravimetric and satellite data; interpretation of the gravity field.

Selenodetic and Lunar Mapping
W. 3 cl.
Prereq.: 777 or equiv.
Dynamics of the earth-moon system; instrumentation in selenodetic; analysis of the gravity field of the moon; position determination of the moon; lunar mapping.

Advanced Satellite Geodesy
W. 3 cl., 1 3-hr. lab.
Prereq.: 777 or equiv.
Dynamics of earth orbiting satellites; equations of motion and their solutions; advanced data acquisition method; analysis for the gravity field and station positions.

Map Projection Analysis
A. 3 cl.
Prereq.: 761 or equiv.
Discussion of geodetic and non-geodetic map projections with emphasis on projection characteristics; mathematics of choosing a suitable map projection.

Research Principles and Techniques
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.

Seminar
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.

Group Studies in Geodetic Science
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.

Research in Geodetic Science: Thesis
Prereq.: Permission of instructor.
Research for thesis purposes only.

Research in Geodetic Science: Dissertation
Research for dissertation purposes only.

Geography
Office: 156 Hagerty Hall, 1775 College Road
Professors Taaffe (Chairman), L. Brown, S. E. Brown, Carlson (Emeritus), Casetti, Cox, Demko, Gauthier,
Golledge, Hunker, Patten, Randall, Rayner, Smith (Emeritus), and Van Cleef (Emeritus); Assistant
Professors Arnfield, Semple, and Youngmann.

World Regional Geography
Su, A, W, Sp. 5 cl.
A comparative study of representative regions of the world; an examination of the cultural, social, economic,
and political developments in relation to the geographical conditions.

Introduction to Physical Geography
Su, A, W, Sp. 5 cl.
H220 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
The elements and processes of the natural environment, their characteristics, distribution, and implications in the human habitat.

Economic Geography
Su, A, W, Sp. 5 cl.
H240 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Not open to students with credit for 340.
Geography of the world's principal commodities; a survey of the economic activities of the major political
areas in relation to their geographic conditions.
400 U 3 Geography of United States and Canada
W, Sp. 3 cl.
Prereq.: Either 200, 220, 240, or equiv.
A geographical analysis of the United States and Canada; the correlation of their natural resources and other environmental factors with their economic and cultural development.

401† U 3 Geography of Ohio
Sp. 3 cl.
Prereq.: Either 200, 220, 240, or equiv.
An appraisal of geographic factors in the development of Ohio's natural resources, agriculture, manufacturing, and commerce; historical development of the major economic factors.

505 U G 4 Geography of Latin America
A, W. 3 cl.
Prereq.: Either 200, 220, 240, or equiv., or permission of instructor.
Not open to students with credit for 405. Geographic analysis of Middle and South America emphasizing the interrelationships of the resource base, cultural characteristics, and outside influences upon economic development.

505.01 Middle America
A.
Not open to students with credit for 405.01.

505.02 South America
W.
Not open to students with credit for 405.02.

508 U G 4 Geography of Africa
W. 3 cl.
Prereq.: Either 200, 220, 240, or equiv., or permission of instructor.
Not open to students with credit for 408. The African environment and the development of culture and economic life; impact of alien culture in Africa; Islamic and western influences in creating geographic regions.

510 U G 4 Geography of Western Europe
Sp. 3 cl.
Prereq.: Either 200, 220, 240, or equiv., or permission of instructor.
Not open to students with credit for 410. Geographic factors in the economic, social, and political progress of the nations of Western Europe; major problems of the area in the light of their geographic background.

511 U G 4 Geography of Eastern Europe
W. 3 cl.
Prereq.: Either 200, 220, 240, or equiv., or permission of instructor.
Not open to students with credit for 411. Resources, their assessment, and development, and related problems in Eastern Europe; the geographic significance of each state to the Communist bloc and to the West.

512 U G 4 Geography of the Soviet Union
Su, A, Sp. 3 cl.
Prereq.: Either 200, 220, 240, or equiv., or permission of instructor.
Not open to students with credit for 412. The major regional divisions of the Soviet Union; the resource base in relation to the economic and political aims of the Soviet State.

515 U G 4 Geography of the Middle East
Sp. 3 cl.
Prereq.: Either 200, 220, 240, or equiv., or permission of instructor.
Not open to students with credit for 415. The Middle East and its natural region in relation to local and international problems; physical and cultural patterns in relation to the current economies.

516† U G 4 Geography of the Far East
Sp. 3 cl.
Prereq.: Either 200, 220, 240, or equiv., or permission of instructor.
Not open to students with credit for 416. The geographic divisions of southern, southeastern, and eastern Asia; the major activities of the people in the regions of densest population and greatest economic importance.

520 U G 4 Climatology
A. 3 cl.
The elements and the controls of climate; types of climate and their distribution; climates and their effects on the economic and other activities of man.

530 U G 4 Conservation of Natural Resources
W. 3 cl.
Economic and geographic appraisal of resource conservation in the United States; regional and national planning for resource utilization.

545 U G 4 Geography of Transportation
W. 3 cl.
A geographical analysis of the nature and distribution of rail, water, highway, pipeline, and air transport facilities and their importance in regional development.

550 U G 4 Political Geography
A. 3 cl.
Prereq.: Permission of instructor.
The geographical characteristics of nation states; the geographic factors in the evolution, structure, and function of states; the relation of geopolitics to political geography.

590 U G 4 Elements of Cartography
A. 2 cl., 2 2-hr. labs.
A study of cartographic techniques of map compilation and presentation including generalization, symbolization, reproduction, and simple computer mapping.
605 \ U \ G \ 5
Special Problems in the Geography of Latin America
Sp. 3 cl.
Prereq. 500 or permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
The analysis of selected topical problems in Latin American geography; typical problem areas are urbanization, industrialization, transportation, agricultural development, and regional development.

612+ \ U \ G \ 5
Special Problems in the Geography of the U.S.S.R.
Sp. 4 cl.
Prereq.: 512 or permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Spatial analysis of selected topical problems in Soviet geography.

620 \ U \ G \ 5
Intermediate Climatology
W. 4 cl., 1 hr. lab.
Prereq.: 520 or equiv. and permission of instructor.
Detailed analysis of atmospheric processes, the general circulation and associated macro- and micro-climates; forecasting climatic parameters; applied climatology and bioclimatology; climatic change.

640 \ U \ G \ 5
Location of Manufacturing
A, W. 3 cl.
Prereq.: Permission of instructor.
The changing character and concentration of industrial districts; representative industries in relation to labor supply, sources of raw material and power, transportation, and markets.

642 \ U \ G \ 5
Geography of Development
A. 3 cl.
Prereq.: Permission of instructor.
Spatial aspects of economic development; spatial analysis of traditional economics, industrial regions, transport linkages and migration patterns in developing countries.

647 \ U \ G \ 5
Locational Analysis
W, Sp. 3 cl.
Prereq.: Permission of instructor.
Historical review of major location theories and evaluation of application of such theories to geographic problems.

650 \ U \ G \ 5
Urban Geography
A, W, Sp. 3 cl.
Prereq.: Permission of instructor.
Origin and growth of cities; structure and function of urban centers, their areal expansion, and intertrade center relations, each examined in relation to city planning.

660 \ U \ G \ 5
Intermediate Political Geography
W. 3 cl.
Prereq.: 560 or equiv. and permission of instructor.
Application of spatial analysis and related models, behavioral theory, and quantitative techniques to the study of the spatial dimensions of political activity.

670 \ U \ G \ 5
Population Geography
W. 3 cl.
Prereq.: 240.
Analysis of population distributions, locational arrangements of growth, densities, and migration flows; spatial relationships between population variables and social, economic, and environmental factors.

675 \ U \ G \ 5
Cultural Geography
A. 3 cl.
Prereq.: Permission of instructor.
Examination of cultural factors in organization of space; cultural groups as spatial systems; effects of cultural homogeneity, conflict, and change on spatial interaction.

Natural Resources Problems, Programs, and Policies
(See Agr. Econ. 680.)

681 \ U \ G \ 5
Cartography
W. 2 cl., 2 hr. labs.
Prereq.: 580 or permission of instructor.
The inception, conceptualization, execution, and presentation of thematic statistical maps is studied; emphasis on cartographic design.

682 \ U \ G \ 3-5
Individual Studies in Cartography
Prereq.: Permission of instructor.
Individual study of cartographic subjects: map compilation, cartographic classification, regionalization, and multi-dimensional representation, computer mapping and real-time computer cartographics.

693 \ U \ G \ 1-15
Individual Studies
Prereq.: Permission of instructor.
Repeatable with permission of instructor.
Individual study of a special problem or of a particular region.

694 \ U \ G \ 3-5
Group Studies
W, Sp.
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Group study of special topics in various fields of geography.
Undergraduate Seminar in Applied Geography
Sp. 2 2-hr. cl.
Prereq.: 20 cr. hrs. in Geog.
The practical application of theoretical geographical concepts to problems in the local area.

Introduction to National Security
(See Nat. Sec. Pol. S. 702.)

Advanced Locational Analysis
Sp. 2 2-hr. cl.
Prereq.: 647 or permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Discussion of advanced problems in locational and regional analysis; application of programming techniques, the transportation model, spatial equilibrium analysis, multiregional activity analysis, and regional growth models.

Research Principles and Techniques in National Security
(See Nat. Sec. Pol. S. 783.)

Seminars in Regional Geography
Sp. 2 cl.
Repeatable to a maximum of 20 cr. hrs.
Geographical investigation of a selected area; the region under study will be announced.

Seminars in National Security Research
(See Nat. Sec. Pol. S. 801.)

Seminars in Physical Geography
A, W, Sp. 2 cl.
Each decimal subdivision repeatable to a maximum of 20 cr. hrs.
820.01 Problems in Climatology
820.02 Problems in Soils Geography
820.03 Special Problems

Dynamic Climatology
A. 2 2-hr. cl.
Prereq.: 620 or permission of instructor.
Dynamics, thermodynamics, energy conservation, flows, conversion processes; large scale circulation patterns with particular emphasis upon turbulence at the synoptic scale; weather processes, and regional climates.

Microclimatology
W. 2 2-hr. cl.
Prereq.: 620 or permission of instructor.
Radiation and turbulence processes, conduction; variation in wind, temperature, humidity, soil moisture, evaporation, soil temperature; influence of vegetation and artificial structures.

Applied Climatology
Sp. 2 2-hr. cl.
Prereq.: 620 or permission of instructor.
The effects of climate upon plants and animals (bioclimatology), upon industrial processes and structures, and upon landforms; forecasting; climate modification.

Seminars in Resource Analysis
Each decimal subdivision repeatable to a maximum of 20 cr. hrs.
The development of theory in resource analysis and its application to selected problems.
830.01 Theory of Resource Analysis
830.02 Problems of Resource Analysis

Seminars in Economic Geography
A, W, Sp. 2 cl.
Readings and research in specific aspects of economic geography.
Each decimal subdivision repeatable to a maximum of 20 cr. hrs.
840.01 Location Theory
840.02 Special Topics

Seminars in Transportation Geography
Each decimal subdivision repeatable to a maximum of 20 cr. hrs.
The development of theory in transportation geography and its application to selected problems.
845.01 Theory of Transportation Geography
845.02 Problems in Transportation Geography

Seminars in Urban Geography
A, W, Sp. 2 cl.
The development of theory in urban geography and its application to selected problems.
Each decimal subdivision repeatable to a maximum of 20 cr. hrs.
850.01 Theory of Urban Geography
850.02 Problems in Urban Geography

Seminars in Political Geography
Sp.
Prereq.: 660 or permission of instructor.
Each decimal subdivision repeatable to a maximum of 30 cr. hrs.
The development of theory in political geography and its application to selected problems.
860.01 Theory of Political Geography
860.02 Problems of Political Geography
G 3.5
Seminars in Population and Social Geography
W, Sp.
Each decimal subdivision repeatable to a maximum of 30 cr. hrs.
The development of theory in population and social geography and its application to selected problems.
870.01 Theory of Population and Social Geography
870.02 Problems in Population and Social Geography

G 3.5
Seminars in Cartography
Sp.
Repeatable to a maximum of 20 cr. hrs.
Readings and research in cartography.

G 4
Development of Geographic Thought
A. 3 cr.
The evolution of concepts concerning the nature, scope, and methodology of geography; present focus and trends as reflected in current literature.

G 4
Application of Quantitative Methods in Geography
A, W. 2 cr., 2 lab.
Prereq.: Course in introductory statistics and permission of instructor.
Application of quantitative methods to geographic problems: spatial statistics, area sampling, maps of residuals, regionalization methods, and simulation maps.
To be taken in sequence:
883.01 Applications I
883.02 Applications II

G 4
Field Work in Geography
Sp. 2 cr., Sat. lab.
The practice of field observation and geographic mapping.

G 3.5
Seminars in Geography
Repeatable to a maximum of 20 cr. hrs.
Topics to be announced each quarter.

G 1.5
Interdepartmental Seminar
W.
Topics to be announced each quarter.

G 5
Special Topics in Quantitative Geography
A, W, Sp. 1 3-hr. cl.
Prereq.: 883.01 and 883.02.
Repeatable to a maximum of 15 cr. hrs.
Applications of advanced mathematical and statistical models to problems in geographical analysis.

G Arr.
Research in Geography: Thesis
Research for thesis purposes only.

G Arr.
Research in Geography: Dissertation
Research for dissertation purposes only.

Geology
Office: 107 Mendenhall Laboratory, 125 South Oval Drive

Professors Bull (Chairman), Bates, Corbato, Ehlers (Mineralogy), Faure, Foster (Mineralogy), Goldthwait, Laméy (Emeritus), La Rocque, McConnell (Mineralogy), McLachlan (Mineralogy), Moore, Pettyjohn, Schopf, Spieker (Emeritus), Stephenson, Sweet, Wenden (Mineralogy), and White; Adjunct Professor Anderson; Associate Professors Bergstrom, Collins, Mayer, Summerson, and Tettenhorst (Mineralogy); Adjunct Associate Professors Cameron and Geel; Assistant Professors Elliot, Kendall, McKenzie, Sitter, and Utgard.
(See also Mineralogy.)

U 5
Introduction to Geology
Su, A, W, Sp. 4 cr., 1-hr lab. arr., 1 half-day field trip.
Not open to students with credit for 101 or 102.
Recommended for nonscience majors.
The materials of the earth's crust, the processes that produce and modify them, and the development of the earth and its life forms through time.

U 5
Physical Geology
A, W, Sp. 4 cr., 1 2-hr. lab., 1 half-day field trip.
H101 (honors) may be available to students enrolled in a college honors program or by permission of dept.
Recommended first course in Geol. for science majors or those with substantial background in science.
Minerals and rocks and their origin; tectonic forms and how they are produced; structural features of the earth's crust.
102  U 5
Historical Geology
A, W, Sp.  4 cl., 1 2-hr. lab., 1 half-day field trip.
HU20 (honors) may be available to students enrolled
in a college honors program or by permission of dept.
Prereq.: 100 or 101.
Recommended second course in geology for science
majors or those with substantial background in
science.
The history of the earth and its inhabitants through
geologic time.

201  U 5
Introduction to Paleontology
Sp.  4 cl., 1 2-hr. lab.
Prereq.: 100 or 101.
An introduction to animal and plant groups
significant in the geologic record.  Fee.

262  U 3
The Common Minerals and Rocks
W.  3 2-hr. labs.
Prereq.: 101 and Cham. 121.
Not open to Geol. majors or students with credit for
203.
A study of the common minerals and rocks, their
associations, occurrences, identifying properties, and
origin.  Moore.

283  U 5
The Common Rocks
A, Sp.  2 cl., 3 2-hr. labs.
Prereq.: 101 or 401 (or 451) and Mineral. 412 or 422.
Not open to students with credit for 202.
Origin, occurrence, association, and mineral
composition of the common rocks; laboratory includes
work by megascopics and microscopic methods.  Moore.

204  U 5
Water Resources
W.  5 cl., 2 ½-day field trips.
Prereq.: 100 or 101.
Occurrence, movement and behavior of water in the
hydrologic cycle with reference to scientific and
technological problems relating to water-resources
development and conservation.  Pettyjohn.

205  U 3
Quantitative Methods in Geology
A, Sp.  2 cl., 1 2-hr. lab.
Prereq.: 101; prereq. or concur. 102 and Math. 151; or
permission of instructor.
Introduction to quantitative methods and techniques,
both graphic and mathematical, and their application
in the analysis of geologic data.  Corbatos.

206  U 3
Oceanography and Marine Geology
Sp.  3 cl.
Prereq.: 100 or 101.
Not open to students with credit for 632.
The origin, development, and structure of ocean basins
and their contents; contemporary oceanic processes of
geoicnic significance.  Anderson.

294  U 1-5
Group Studies
Prereq.:  Permission of instructor.
Repeatable to a maximum of 15 cr. inst.
Group study of special topics in various fields of
geology.

Elementary Mineralogy and Crystallography
(See Mineral. 421.)

Elementary Optical Mineralogy
(See Mineral. 422.)

502  U 5
Stratigraphy and Paleontology
A, Sp.  6 days in field in late Su. or just preceding A.
or Sp.; 2 2-hr. labs. and field trips in A. or Sp.
Prereq.: 102, 203, 205, and 10 cr. hrs. in Biological
Sciences.
Principles of, and procedures in, lithostratigraphy
and biostratigraphy, illustrated by field and laboratory
studies of sedimentary rocks and fossils.  Bates,
Bergstrom, Collinson, and Sweet.  Fee.

530  U 5
Structural Geology and Geophysics
W.  4 cl., 1 2-hr. lab.
Prereq.: 205 and Physics 132 or 133.
A study of the principal kinds of geologic structures
and their interpretation; an introduction to geophysical
exploration of subsurface structures.  Moore.

550  U 5
Geomorphology
A, Sp.  4 cl., 1 2-hr. lab., field trips,
Prereq.: 101 or permission of instructor.
Detailed study of processes that shape the land
surface and the forms produced under diverse climates.
White.  Fee.

570  U 1-3
Senior Thesis
Prereq.:  Senior standing in Geol.
Repeatable to a maximum of 3 cr. hrs.
The preparation of a report of professional quality,
based on a research project.

580  U 5
Field Work in Earth Science
Sp.  Requires full time of student for 5 wks.
Prereq.:  30 qtr. hrs. in Geol., Geog., Astron. or
Meteor. with a minimum of 15 qtr. hrs. in Geol.; Ed.
551 and permission of instructor; Geol. 201, 202, and
550 recommended.
Not open to Geol. majors.
Essentials of field observation, mapping and data
accumulation in the solution of earth-science
problems; the work is done in selected off-campus
field localities.  Mayer and Utgard.  Fee.
581 U G 4
Field Geology I
Su (1st term). Requires full time of student.
Prereq.: 203, 205, and permission of instructor; 530 recommended.
Concentrated training in the basic essentials of field observation and mapping; the work is done in central Utah, with headquarters in Ephraim. Collinson and Elliot. Fee.

582 U G 6
Field Geology II
Su (2nd term). Requires full time of student.
Prereq.: 581.
Continuation of 581. Fee.

583 U G 3
Field Geology for Science Teachers
Sp. 5-day period during recess between W. and Sp.; pre-trip meeting and post-trip report.
Prereq.: 100 or equiv. and permission of instructor.
Intended primarily for in-service teachers.
Not open to Geol. majors.
Application of geological principles in the field; interpretation of earth features observable on a traverse crossing the Appalachian Mountain system.
Bates, Elliot, Mayer, McKenzie, and Utgard.

594 U G 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to maximum of 15 cr. hrs.
Group study of special topics in various fields of geology.

600 U G 5
Sedimentation and Sedimentary Rocks
A. 2 2-hr. cl., 1 3-hr. lab.
Prereq.: 502.
Source, dispersal, and accumulation of sediments; the interpretation of the environmental distribution of sedimentary rocks. Summerson.

601 U G 5
Sedimentary Petrology
W. 3 cl., 2 2-hr. labs.
Prereq.: 600 or permission of instructor.
Interpretation of sedimentary rocks based on mineralogic and textural study of thin sections and grain mounts. Kentcall.

603 U G 5
Stratigraphy
W. 3 cl., 2 2-hr. labs.
Prereq.: 502.
Advanced study of the principles and procedures of stratigraphic nomenclature, subdivision, correlation, and interpretation, with examples from the international stratigraphic record. Bates, Bergstrom, Collinson, and Sweet.

614 U G 5
Paleobiology
A. W. 2 cl., 3 2-hr. labs.
Prereq.: 201 or 502 or 520.
Repeatable to a maximum of 10 cr. hrs.
Advanced consideration of the preservation, morphology, development, interrelations, and paleoecologic significance of fossil animals and plants. Bergstrom, La Rocque, Schoepf, and Sweet.

620 U G 5
Introduction to Isotope Geology
W. 5 cl.
Prereq.: Senior standing in Geol., Mineral., or related fields.
Theory of natural isotope abundance variations and applications to problems in the earth sciences. Faure and Sutter.

621 U G 5
Introduction to Geochemistry
A. 5 cl.
Prereq.: Senior standing in Geol., Mineral., or related fields; Chem. 122 or equiv.
Applications of the law of mass action and chemical thermodynamics to mineral equilibria of geological and geochemical interest. Faure.

626 U G 5
Metamorphic Petrology
Sp. 3 cl., 2 2-hr. labs.
Prereq.: Permission of instructor.
Petrography, petrogenesis, and occurrence of metamorphic rocks; macroscopic and microscopic examination of metamorphic rocks and selected petrographic suites in the laboratory. Ehlers.

Practicum in the Earth Sciences for Teachers
(See Ed. 626).
(Offered in cooperation with Ed.)

633 U G 5
Advanced Structural Geology
Sp. 4 cl., 1 2-hr. lab.
Prereq.: 530.
Not open to students with credit for 630 or 830.
Rock mechanics, mechanisms of deformation, geotectonics, and structural analysis; solution of structural problems. Sutter.

640 U G 5
Fundamentals of Geophysics
A. 4 cl., 1 2-hr. lab.
Prereq.: 530.

643 U G 3
Geophysics Gravimetry
A. 3 cl.
Prereq.: 4th yr. standing in Geol.; or 4th yr. standing in Geol. Sci., Physics, Civil E., and 100 or 101.
650 U G 5
Glacial and Pleistocene Geology
Sp. 5 cl., field trips.

651 U G 5
Hydrogeology
Sp. 5 cl., 2 ½-day field trips.
Prereq.: Senior standing in Geol., or 4th yr. standing in Engr. and 103; or 101 and 204. Geologic and hydrologic factors controlling the occurrence and behavior of ground water. Pettyjohn. Fee.

660 U G 5
Geology of Mineral Deposits
W. 4 cl., 1 2-hr. lab.
Prereq.: 203.
660.01* Geology of Metallic Mineral Deposits
The occurrence, origin, distribution, properties, and uses of the metallic minerals. Faure.
660.02* Geology of Nonmetallic Mineral Deposits
The occurrence, origin, distribution, properties, and uses of the nonmetallic minerals. Bates.

661 U G 5
Petroleum Geology
Sp. 3 cl., 2 2-hr. labs.

670 U G 5
General and Economic Geology of Selected Areas
Su. 30-day period preceding A. Post-trip readings and report.
Prereq.: 502, 530, and 550, or permission of instructor. Repeatable to a maximum of 15 cr. hrs. Concentrated field study of the stratigraphy, structural geology, tectonics, petrology, and geomorphology of a selected region, with special attention to the economic utilization of earth materials. Bates, Bergstrom, Collinson, Kendall, Summerson, and Sweet. Fee.

683 U G 1-5
Individual Studies in Geology
Prereq.: Permission of instructor. Special problems in any branch of geology for which the student has the proper qualifications.
693.01 Economic Geology
693.02 Geology of Glacial Geology
693.03 Extraterrestrial Studies
693.04 Field Geology
693.05 Geochemistry
693.06 Geomorphology
693.07 Geophysics
693.08 History of Geology
693.10 Hydrogeology
693.11 Marine Geology, Limnology, and Oceanography
693.12 Paleontology
693.13 Petrology and Petrography
693.14 Photogeology
693.15 Sedimentology
693.16 Stratigraphy
693.17 Structural Geology
693.18 Earth Science Education
693.19 Unspecified

694 U G 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Group study of special topics in various fields of Geology.

800 G 3
Seminar in Stratigraphy
A, W. 2 2-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.

801 G 3
Seminar in Sedimentation and Sedimentary Rocks
W, Sp. 2 2-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Consideration of sedimentation, and the structures, petrography, depositional environments, and paleologic interpretation of sedimentary rocks. Collinson, Kendall, and Summerson.

810 G 3
Seminar in Paleobiology
W, Sp. 2 2-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Advanced topics in paleozoologic and paleobotanic morphology, taxonomy, and procedure; current questions in biostratigraphy, paleoecology, and evolutionary development of fossil floras and faunas. Bergstrom, La Rocque, Schoff, and Sweet.

821 G 3
Seminar in Isotope Geology and Geochemistry
Sp. 2 2-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Discussion of selected topics in isotope geology, geochronology, geochemistry, and cosmochemistry. Faure and Sutter.

822 G 2-3
Seminar in Petrology
A, W. 2 2-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Theoretical, experimental, geographic, and petrographic topics in igneous, sedimentary, and metamorphic petrology. Ehlers, Elliot, Kendall, Moore, and Sutter.
G 3
Seminar in Geophysics and Structural Geology
A, Sp. 2-2 hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Selected topics in solid-earth geophysics, glaciology, tectonics, structural analysis, or continental and ocean-basin structure. Bull, Corbato, Moore, and Sutter.

G 3
Seminar in Geomorphology and Quaternary Geology
A, W. 2-2 hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Current and classical problems in geomorphology and Quaternary geology, such as desert and coastal geomorphology, submarine topography, periglacial and karst morphology, volcanology, and Quaternary geochronology. Goldthwait and White.

G 3
Seminar in Hydrogeology and Oceanography
A, Sp. 2-2 hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Topics in hydrogeology and oceanography, such as groundwater hydrology and hydraulics, basin management, reef and atoll development, or paleo-oceanography. Anderson, Pettyjohn, and White.

G 3
Seminar in Mineral Deposits and Fossil Fuels
Sp. 2-2 hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Study of selected deposits of metallic minerals, industrial rocks, and minerals, or fossil fuels. Bates, Faure, and Schopf.

G 3
Seminar in the History of Geology
Sp. 3 cl.
Discussion of the development of geology, intended to give the student a firm basis for comprehension of the science as it exists today. La Rocque.

G 1-3
Interdepartmental Seminar in Polar and Alpine Studies
Sp.
(See under Interdepartmental Seminars.)

G Arr.
Research in Geology
Research for thesis and dissertation purposes only.

German
Office: 314 Dieter Cunz Hall of Languages, 1811 Millikin Road
Professors Hofmann (Chairman), Bekker, Fleischhauer, and Wittkowski; Associate Professors Bekin, Gottwald, W. Haas, Schmidt, and Vitt; Assistant Professors Allerdissen, Cotter, Edse, Goodman, Gundel, Langguth, Lee, Nelson, Riechel, and Vredevoed; Instructors Chadeayne, U. Haas, and Kuehn.

PLACEMENT AND PROFICIENCY EXAMINATIONS
Students with two years of high school German register for German 103; however, in order to insure proper registration, placement tests are required of all students who continue their study of German in the department after beginning their language in high school. Such tests are given on the first day of instruction in each quarter. Consult the Humanities section of the Colleges of the Arts and Sciences catalog.

Students who are given advanced standing in the department as a result of the placement and proficiency examination become eligible for University credit.

EXCESS ENTRANCE CREDITS IN GERMAN
Freshmen who have excess credits in foreign language are eligible for examination for advanced standing. The examination is given at the same time as the placement tests mentioned above.

101
Elementary German
Su, A, W, Sp. 5 cl.

102
Elementary German
Su, A, W, Sp. 5 cl.
Prereq.: 101 or equiv.

103
Intermediate German
Su, A, W, Sp. 5 cl.
Prereq.: 102 or 110 or equiv.
Reading; oral and written practice; grammar review; students may select from among the following subdivisions which emphasize specific skills and subject matter.

103.01 Basic
Not open to students with credit for 103.
Balanced use of the basic language skills: reading, aural comprehension, speaking, and writing.

103.02 Conversation
Not open to students with credit for 103.
Emphasis on speaking and aural comprehension.

103.03 Humanities and Civilization
Not open to students with credit for 103.
Emphasis on reading in the humanities and in German culture and civilization.

103.04 Literature
Not open to students with credit for 103.
Emphasis on the reading of German literary texts.
104 U 5 Intermediate German
Su, A, W, Sp. 5 cl.
Prereq.: 103 or 112 or 113.
Reading; oral and written practice; vocabulary building; students may select from among the following subdivisions which emphasize specific skills and subject matter.
104.01 Basic
Not open to students with credit for 104.
Balanced use of the basic language skills: reading, aural comprehension, speaking, and writing.
104.02 Conversation
Not open to students with credit for 104.
Emphasis on speaking and oral comprehension.
104.03 Humanities and Civilization
Not open to students with credit for 104.
Emphasis on reading in the humanities and in German culture and civilization.
104.04 Literature
Not open to students with credit for 104.
Emphasis on the reading of German literary texts and topics.
108 U 2 Elementary German Conversation
Prereq.: 102; also open to students with grade of A in 101. No audit.
110 U 10 Intensive Elementary German
A, W, Sp. 10 cl.
Prereq.: Permission of dept.
Not open to students with credit for 101 or 102.
Elementary German for students who wish to acquire the basic language skills in one quarter; equivalent to 101 and 102.
112 U 5, 10, 15 Intensive German
Su. Enrollment limited to 20 students.
Prereq.: Permission of dept.
Full time of student and full fees required.
Students with credit for 101 or the equiv. may not register for more than 10 cr. hrs. Students with credit for 101 and 102 or the equiv. may not register for more than 5 cr. hrs. Students with credit for 103 or the equiv. may not register for credit. Register before May 11. No audit.
Elementary and intermediate German for students desiring comprehensive knowledge of German in the shortest possible time; students will devote their entire time to this course.
113 U 5 Intermediate Scientific German
A, W, Sp. 5 cl.
Prereq.: 102 or 110.
Not open to students with credit for 103.
Introductory readings in scientific German.
114 U 5 Intermediate Scientific German
A, W, Sp. 5 cl.
Prereq.: Either 103, 112, or 113.
Not open to students with credit for 104.
Introductory readings in scientific German.
162 U 5 Elementary-Intermediate German for Selected Students
W. 5 cl.
Prereq.: Grade of A in 101.
Not open to students with credit for 117.
163 U 5 Elementary-Intermediate German for Selected Students
Sp. 5 cl.
Prereq.: 162.
Not open to students with credit for 118.
Successful completion of the sequence 101-162-163 fulfills language requirements and provides eligibility for 200-level courses.
Continuation of 162.
203 U 3 Intermediate German Conversation
A, W, Sp. 3 cl.
Prereq.: 104 and 109 or equiv. with a minimum grade of C. 203 may be taken concur. with 204. No audit.
Practice in spoken everyday idiomatic German, based on texts concerning German life today.
204 U 2 German Composition I
A, W, Sp. 2 cl.
Prereq.: 104 and 109 or equiv. with a minimum grade of C. 204 may be taken concur. with 203. No audit.
Practice in simple writing with some conversation.
205 U 2 German Composition II
W, Sp. 2 cl.
Prereq.: 204.
Themes, reports, and translations of difficult texts.
211 U 3 German Review Grammar
A, W. 3 cl.
Prereq.: 104, 163, or equiv.
Not open to students with credit for 119.
Syntax and structure of the language.
221 U 5 Introduction to German Literature: The 20th Century
A, W, Sp. 5 cl.
Prereq.: Either 104, 163, or equiv.
Students are advised to register also for 203 and 204.
Readings from representative authors such as Mann, Schnitzler, Duerrenmatt.
222 U 5 Introduction to German Literature: The 19th Century
A, W, Sp. 5 cl.
Prereq.: Either 104, 163, or equiv.
Students are advised to register also for 203 or 204.
Not open to students with credit for 226.
Readings from Brentano, Hoffmann, Storm, and Keller.
223 U 5
Introduction to German Literature: The Classical Period
W. Sp. 5 cl.
Prereq.: Either 221, 222, or equiv.
Students are advised to register also for 203 and 204.
Not open to students with credit for 225.
Readings from Goethe and Schiller.

260 U 3
Early German Literature in Translation
A. 3 cl.
Credit does not apply to a major in German.
Trends in German literature of the Middle Ages, the Renaissance and the Reformation as reflected in representative literary monuments. Bekker.

261 U 3
German Classics in Translation
W. 3 cl.
Credit does not apply toward a major in German.
Social and intellectual forces in Germany as reflected in German literature from the Enlightenment to the middle of the 19th century; masterpieces from Goethe to Gottfried Keller.

262 U 3
Modern German Literature in Translation
Sp. 3 cl.
Credit does not apply toward a major in German.
Intellectual forces and literary trends in German literature from the end of the 19th century to the present; masterpieces from Gerhart Hauptmann to Bertolt Brecht. Hoffmann.

361* U 3
German Civilization I
A. 3 cl.
Taught in Eng.
The cultural heritage of the German people from the beginning to about 1500; institutions, phases of civilization, interrelationship of social and literary history. Haas.

362* U 3
German Civilization II
W. 3 cl.
Taught in Eng.
German civilization from Luther to the Age of Goethe; cultural trends, social changes, historical development to the end of the Holy Roman Empire. Haas.

409 U 3
Advanced German Conversation
W. 3 cl.
Prereq.: 203.

463* U 3
German Civilization III
Sp. 3 cl.
Prereq.: 10 cr. hrs. in 200-level courses in German with the exception of 260, 261, and 262.
Taught in German.
Intellectual, artistic, and social trends in the German speaking countries from 1815 to the present. Haas.

571 G 5
Basic German for Graduate Students
Su, A, W, Sp. 5 cl.
Prereq.: Grad. standing.
Credit does not apply to the minimum hours required for the Master's or doctoral degrees. No audit.
The fundamentals of German grammar, as required for the reading of German texts in the sciences and humanities.

572 G 3
German for Research I
Su, A, W, Sp. 3 cl.
Prereq.: Grade of C or above in 571 or equiv.
preparation demonstrated by placement test.
Open only to graduate students. Credit does not apply to the minimum hours required for the Master's or doctoral degrees. No audit.
Repeatable twice.
Satisfactory completion of this course (grade of A or B) will be accepted as evidence of a dictionary reading knowledge in fulfillment of Ph.D. language requirement.

573 G 3
German for Research II
Su, W, Sp. 3 cl.
Prereq.: Grade of A or B in 572, or equiv. preparation demonstrated by a placement test and permission of instructor.
Open only to graduate students. Credit does not apply to the minimum hours required for the Master's or doctoral degrees. No audit.
Repeatable twice.
Reading of difficult material at a reasonable rate of speed and with only infrequent use of dictionaries.
Completion of this course with a grade of A or B will be accepted as evidence of a thorough reading knowledge of German.

GENERAL PREREQUISITES FOR COURSES NUMBERED 593, 594, AND ALL 600-LEVEL COURSES
Unless otherwise indicated, the prerequisites for 593, 594, and all 600-level courses are: a minimum of 10 hours of 221, 222, 223, plus a minimum of 5 hours of 203, 204, 205, 211. Exceptions may be allowed by instructors for students with special qualifications.

593 U 2-5
Individual Studies
Prereq.: Permission of chairman.
Repeatable to a maximum of 10 cr. hrs.
Individual investigation of minor problems in German language and literature.

594+ U 2-5
Group Studies
Prereq.: Permission of chairman.
Repeatable to a maximum of 10 cr. hrs.
Investigation of minor problems in German literature and language.

605† U 2-5
Introduction to the Study of Language
Sp. 3 cl.
Elements of linguistics with emphasis on the historical study of languages and on semantics; the position of Germanic in the Indo-European family of languages.
UG 3
Introduction to the Historical Study of German
Sp. 3 cr.
The historical development of the German language, with a short survey of the Germanic languages; internal and external influences which have determined its characteristics (phonology, morphology, and vocabulary). Belkin.

UG 3
Medieval German Literature
A. 3 cr.
Survey of German literature from the 8th century to the end of the Middle Ages. Belkin.

UG 3
Literature of Humanism, Reformation, and Baroque
W. 3 cr.
Survey of German literature from 1400 to 1700. Bekker.

UG 3
The German "Novelle"
A. 3 cr.
Reading and analysis of masterpieces of the 19th and 20th centuries: Kleist, Eichendorff, Stifter, Keller, and Thomas Mann.

UG 3
The German Drama
W. 3 cr.
Reading and analysis of masterpieces of the 19th and 20th centuries: Schiller, Kleist, Grillparzer, Hebbel, and Brecht. Wittkowsky.

UG 3
German Lyrics
Sp. 3 cr.
Analysis of German lyrics from 1200 to the present; study of specific forms: Volkslied, ballad, sonnet, and individual great lyricists. Hoffmann.

UG 3
Advanced German Composition
W, Sp. 3 cr.
Prereq.: 205, 211, or permission of instructor. Composition on assigned topics and practice in translation. Haas.

UG 3
Practical German Pronunciation
A. 2 2-hr. cr.
Prereq.: Permission of instructor. Standard German pronunciation; oral and written drill. Fleischhauer.

UG 1 or 3
Proseminar
Su, Sp. 3 cr., 3 cr. hrs.
Su (1st term). 3 cr., 1 cr. hr.
Prereq.: Permission of chairman. Repeatable to a maximum of 24 cr. hrs.

UG 3
Masterpieces of German Literature
Su. 3 cr.
Prereq.: Permission of chairman. Repeatable to a maximum of 18 cr. hrs. Selections from works of major German writers; topic varies each year.

UG 2-5
Individual Studies in German
Prereq.: Permission of chairman. Repeatable to a maximum of 30 cr. hrs. Investigation of minor problems in the various fields of German literature and philology. Bekker, Belkin, Fleischhauer, Schmidt, Vitt, and Wittkowski.

UG 2-15
Group Studies in German
Sp.
Prereq.: Permission of chairman. Repeatable to a maximum of 30 cr. hrs. Investigation of minor problems in the various fields of German literature and philology.

UG 15
Study Tour of Germany
Sp.
Prereq.: Minimum of 25 cr. hrs. in German or equiv., and permission of department chairman. The first five weeks will be devoted to intensive study on this university campus; the remainder of the course will be spent in travel in Germany; in Germany only German will be spoken and formal instruction will be given daily by the tour leader.

GENERAL PREREQUISITES FOR COURSES NUMBERED 700
Prerequisites for 700-level courses are graduate standing, or 4th yr. standing with 9 cr. hrs. in German at the 600-level, and permission of chairman.

UG 4
German Literature of the 18th Century
A. 4 cr.
The literature of the Enlightenment and Storm and Stress; Lessing, Klopstock, Wieland.

UG 4
German Classical Literature
722.01* Goethe and Schiller I
W. 4 cr.
Young Goethe and Schiller; their development and early works.

722.02* Goethe and Schiller II
Sp. 4 cr.
Goethe's and Schiller's major later works and their significance for modern times.

UG 3
Goethe's Faust
Sp. 3 cr.
History of the Faust legend from the 16th century to Goethe; reading and discussion of the play.
724†* U G 4
German Romanticism
A. 4 cl.
The romantic revolt against the ideas of classicism. Novalis, the Schlegels, Tieck, Kleist, Eichendorff, and E. T. A. Hoffmann, Selchin.

725†* U G 4
German Literature of the 19th Century
W. 4 cl.
Literary forces and trends from Goethe's death to the founding of the German Reich (Grillparzer, Buechner, Hebbel, Raimund, Moerike, Stifter, Keller, and Meyer).

726† U G 4
Modern German Literature
Sp. 4 cl.
Main currents of German thought and literature from Nietzsche to the present; Hauptmann, Schnitzler, Mann, Rilke, George, Hofmannsthal, Kafka, and Brecht.

730 U G 3
Advanced Stylistics
W. 3 cl.
Prereq.: Grade of A in 630, or permission of instructor. Stylistic analysis on an advanced level of German prose; compositions, reports, and discussion. Vitt.

777 U G 2-5
Colloquium in German Literature
Prereq.: Permission of Chairman. Repeatably to a maximum of 30 cr. hrs.
Selected topics, problems, and works in the various fields of German literature.

H783 U 3-5
Honors Course
W, Sp. 2 1/2-hr. cl.
Prereq.: 4th yr. standing with a grade of A in at least half of the German courses and an average of B in the remainder, and permission of chairman and the Honors Committee of the Colleges.
Repeatably to a maximum of 15 cr. hrs.
Offers undergraduates with special aptitudes a greater opportunity to do independent study than is possible in the ordinary course. Schmidt.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 800
Prerequisites for 800-level courses are graduate standing and permission of chairman.

800 G 3
Bibliography and Method
A. 2 cl.
Required of all candidates for grad. degrees. The tools, problems, and methods of literary research.

801† G 4
Middle High German
A. 4 cl.
Middle High German texts; methods of textual criticism. Fleischhauer.

802† G 4
Old Saxon and Old High German
W. 4 cl.
Readings from the Helland and selected Old High German texts. Fleischhauer.

803† G 3
Gothic
Sp. 3 cl.
Readings from the Bible; Gothic as a basis for the comparative study of the Germanic languages and historical German phonology and morphology. Fleischhauer.

806* G 3
History of the German Language
W. 3 cl.
Prereq.: 801.
Basic concepts of historical linguistics; the major factors of change in the history of German from Proto-Germanic to the present. Fleischhauer.

821* G 3
History of German Literature Until 1700
A. 3 cl.
Readings from the earliest period to the end of the 17th century. Belkin.

822* G 3
History of German Literature Until 1700
W. 3 cl.
Continuation of 821. Bekker.

823* G 3
History of German Literature Until 1700
Sp. 3 cl.
Continuation of 822. Bekker.

860 G 5
Seminar in German Literature
Selected topics from German Literature after 1500; problems of methods and interpretation.

870 G 3
Seminar in German Linguistics
A, W. 2 cl.
Selected topics from medieval literature, word history, stylistics, and psychology of language.

Medieval and Renaissance Culture
(See Medieval and Renaissance Studies 888.)

Medieval and Renaissance Literature
(See Medieval and Renaissance Studies 889.)

993 G 1-5
Individual Studies in German
Prereq.: Permission of Chairman.
Repeatably to a maximum of 15 cr. hrs.
With the approval of department chairman, doctoral students may register for individual study in areas normally not covered by courses. Bekker, Belkin, Fleischhauer, Schmidt, Vitt, and Wittkowski.
998  G Arr.
Research in German: Thesis
Su, A. W. Sp.
Repeatable to a maximum of 20 cr. hrs.
research for master’s thesis.

999  G Arr.
Research in German: Dissertation
Su, A. W. Sp.
Research for dissertation purposes only.
Bekker, Belkin, Fleischhauer, Hoffmann, Schmidt, Vitt, and Wittkowski.

Graduate School Course

801  G 2
College Teaching
W, Sp. 2 cr.
Designed to acquaint prospective college teachers with
the major problems involved in college teaching.

Greek

Office: 217 Derby Hall, 154 North Oval Drive

Professors Morford (Chairman), Abbott, Babcock, Lenard, Forbes (Emeritus), and Titchener (Emeritus);
Associate Professors Davis, Hahn, and Schlamp;
Assistant Professors Shumaker, Snyder, and Tracy;
Adjunct Assistant Professor Drachman; Instructor
Sweet.

See Classics also.

101  U 5
Elementary Greek
A. 5 cr.

102  U 5
Elementary Greek
W. 5 cr.
Prereq.: 101.

103  U 5
Intermediate Greek Reading
Sp. 5 cr.
Prereq.: 102.

112  U 5, 10, 15
Intensive Introduction to Greek
Su, W. 10 cr. and 10 or more hrs. of supervised study,
Full time of student and full fees required.

109  U 5
New Testament Greek
A. 5 cr.
Prereq.: 103 or 112.
Intended primarily for pre-theological students.

221  U 5
Attic Prose
A. 5 cr.
Prereq.: 103 or 112.
Babcock.

222  U 3
Euripides
W. 3 cr.
Prereq.: 210 or 221.
Not open to students with credit for 202.
Sweet.

223  U 3
Homer
Sp. 3 cr.
Prereq.: 210 or 221.
Not open to students with credit for 200.
Schlam.

603†  U G 3
Demosthenes
Sp. 3 cr.
Prereq.: 2 courses at 200 level.
Morford.

604†  U G 3
Herodotus
A. 3 cr.
Prereq.: 2 courses at 200 level.
Not open to students with credit for 201 except by
permission of chairman, Shumaker.

605†  U G 3
Aristophanes
W. 3 cr.
Prereq.: 2 courses at 200 level.
Morford.

606†  U G 3
Sophocles
W. 3 cr.
Prereq.: 2 courses at 200 level.
Davis.

608†  U G 3
Thucydides
Sp. 3 cr.
Prereq.: 2 courses at 200 level.
Lenardon.
609* U G 3
Plato
Sp. 3 cl.
Prereq.: 2 courses at 200 level.
Hahm.

612 U G 3
Greek Prose Composition
W.
Prereq.: At least 1 course at 600 level.
Hahm.

645† U G 3
Koine to Modern Greek
Sp.
Prereq.: 2 courses at 200 level.
Historical survey of the post-classical development of
the Greek language, with representative texts from
different periods.

693 U G 1-6
Individual Studies in Greek
Prereq.: 2 courses at 600 level, or permission of
instructor.
Repeatable to a maximum of 15 cr. hrs.
Passages for reading and topics for investigation will
be selected to meet the needs of individual students.

694 U G 1-6
Group Studies
W.
Prereq.: 4 courses more advanced than 104, or
permission of chairman.
Repeatable to a maximum of 20 cr. hrs.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 800 AND ABOVE
Prerequisites for admission to courses numbered 800
and above are graduate standing and permission of
the Chairman.

800 G 3
Prosseminar
A.
Required of all graduate students. Students may not
receive credit for both Latin 800 and Greek 800.
An introduction to the materials and methods of
research; the history of classical scholarship;
individual assignments in bibliographical problems.
Abbott.

803† G 4
Sophocles
Su.
Davis.

810† G 3
Structure of the Greek Language
A. 3 cl.
Drachman.

811 G 4
Greek Dialects
A.
Drachman.

831† G 4
Homer and the Homeric Language
A.

832† G 4
Hesiod
A.
Lenardon.

833† G 4
Pindar
Sp.
Shumaker.

834 G 4
Aeschylus
Sp.
Lenardon.

835 G 4
Aristotle
A.

836† G 4
Hellenistic Poetry
Su.
Marford.

850† G 4
History of Greek Literature
A.
Lectures and assigned reading on the development of
Greek literature; required and suggested passages for
translation in each author studied. Hahm.

851† G 4
History Greek Literature
W.
Continuation of 850. Schlam.

852† G 4
History of Greek Literature
Sp.
Continuation of 851. Shumaker.

860† G 3
Greek Palaeography
W. 3 cl.
Prereq.: Advanced reading ability in Greek and
permission of instructor.

861† G 3
Textual Criticism
Sp. 3 cl.
Prereq.: 860.

Medieval and Renaissance Culture
(See Medieval and Renaissance Studies 888.)

Medieval and Renaissance Literature
(See Medieval and Renaissance Studies 889.)
Health Education


Professors: Cushman (Chairman), Beyrer, and Kaplan;
Assistant Professors: Beetham and Grosshans;
Instructors: Brown, Johnson, Matson, Meeks, and Vitale.

101 U 1
Hygiene
A, W, Sp. 1 cr., 1 lab. hr.
Required of all freshmen except those who take 103 or 200.
Designed to influence knowledge, attitudes, and behavior related to individual health.

102 U 1
First Aid
Su, A, W, Sp. 2 cr., lab.
A consideration of first aid practices to the injured; completion leads to Red Cross certificates in first aid.

103 U 3
Health for the College Student
A, W, Sp. 3 cr.
Not open to students with credit for 101 or 200.
May be substituted for Health Ed. 101 to fulfill University requirement.
A study of student health problems; designed to foster understandings and attitudes needed for intelligent decision-making related to present and future health needs.

200 U 5
Hygiene
Su, A, W, Sp. 5 cr.
Not open to students with credit for 103.
Designed to establish a basis for positive health and efficiency through a consideration of various conditions and factors which affect health.

201 U 3
Current Concepts in Community Health
Sp. 3 cr.
Prereq.: 101 or equiv.
A study of community health programs, the need for them, the problems and issues involved, and how these problems can be solved.

300 U 3
Health Education for Elementary Teachers
Su, A, W, Sp. 3 cr.
Prereq.: 101 or equiv., and Psych. 230.
Not open to undergraduate minors or majors in Phys. Ed., or Health Ed.
The teacher's responsibility for health of school child; screening, referral, vision and hearing, nutritional problems, instructional programs, emergency care, teacher's health.

301 U 3
Health Education for Secondary Teachers
Su, A, W, Sp. 3 cr.
Prereq.: 101 or equiv., and Psych. 230.
Not open to students preparing for secondary school teaching of Health Ed. or Phys. Ed.
A study of health problems as they relate to the individual secondary school student; emphasis on the role of the teacher in the secondary school health program.

402 U 3
Safety Education
Sp. 3 cr.
Prereq.: 102.
The study of epidemiology of accidents, development of preventive programs and safety consciousness; the teaching of first aid and Red Cross instructor's certification. Matson.

501 U 3
The School Health Program
A, W, Sp. 3 cr.
Prereq.: 200.
For physical education students not in Health Education major or minor.
A consideration of the total school health program, including healthy school living, health services, and the teaching of health.
UG 3
Personal Health Problems
A. 3 cl.
An advanced course in personal health problems, extensive reading and reporting in selected health areas. Cushman and Beyrer.

UG 2
Current Progress in Disease Control
Sp. 2 cl.
Prereq.: 4th yr. grad, standing in a health science area. Authorities in medicine and health sciences will interpret how current findings may affect disease prevention and control; newer knowledge of cancer, dental caries, etc., will be discussed. Cushman and Fogle.

UG 3
Education for Human Sexuality
W. 3 cl.
Prereq.: 200, 622 or equiv., Sociol. 330, and permission of instructor.
Review of current information on health and sexuality by educators and school personnel; consideration of the sex education curriculum, teaching methods, materials, and controversial issues. Kaplan.

UG 3
School Health Services
Su, A, W. 3 cl.
Prereq.: 200 or equiv.
Consideration of healthful school living and health services, including health appraisal, counseling, educational adjustments, communicable diseases, and emergency programs. Cushman.

UG 5
The Teaching of Health
Su, W, Sp. 5 cl.
Prereq.: 621.
Not open to students with credit for 610. Principles, methods, materials, and resources involved in teaching health; direct, correlated, and integrated curriculum patterns; individual teaching experience. Cushman, Beyrer, and Kaplan.

UG 3
Organizational Relationships in School Health Education
Su, W, Sp. 3 cl.
Not open to students with credit for 620. The relation of the school health program to the total community health program; official and non-official health agencies are studied. Beyrer.

UG 4
School Health Education Workshop
Su. 6 wk. workshop.
Prereq.: Permission of instructor.
Repeatable to a maximum of 8 cr. hrs.
A team approach to school health education with emphasis on instruction, health services, environment, methods, materials, evaluation, interrelationships, etc.; individual and group study. Fogle.

UG 1-4
Individual Studies in Health Education
Prereq.: 4th yr. grad, standing and permission of adviser.
Investigation of selected professional problems.

G 3
Group Studies in School Health Education
Advanced problems in school health education; individual or group participation.

95.01 Curriculum in Health Education
A.
Beyrer.

95.02 Survey of Research in Health Education
W.
Beyrer.

95.03 Evaluation in Health Education
Sp.
Cushman.

G 2
Seminar in School Health Education
A. 2 cl.
Beyrer and Cushman.

G 3
Comparative Study of World Health Problems
3 cl.
Prereq.: 101, 200, or 501.
A study of world health problems, their influences on all people, the variety and magnitude of problems, and the methods being used to solve them. Kaplan.

G Arr.
Research in Health Education
Research for thesis and dissertation purposes only.

Hebrew
Office: 248 Dieter Cunz Hall of Languages, 1841 Millikin Road
Professor Bulatkin (Chairman); Assistant Professors Mashiah and Havon.

U 5
Elementary Hebrew
A, W, Sp. 5 cl.
Conversation, reading, writing, vocabulary building, phonetics, and grammar.

U 5
Elementary Hebrew
A, W, Sp. 5 cl.
Prereq.: 101.
Reading of modified passages from modern Hebrew literature supplemented with additional study of grammar.

103 U 5
Intermediate Hebrew
A, W, Sp. 5 cl.
Prereq.: 102 or 110.
Reading of passages from various periods of Hebrew literature; review of salient points of elementary grammar and introduction to elements of classical Hebrew.

104 U 5
Intermediate Hebrew
A, W, Sp. 5 cl.
Prereq.: 103.
Reading of modern Hebrew short stories, poems, and essays; special emphasis on oral practice and Hebrew idioms.

110 U 10
Intensive Elementary Hebrew
A, W, Sp. 10 cl.
Prereq.: Permission of dept.
Not open to students with credit for 101 or 102.
Elementary Hebrew for students wishing to acquire the basic language skills in one quarter; intensive drill in form, syntax, vocabulary, and idiom; equivalent to 101 and 102.

112 U 5, 10, 15
Intensive Modern Hebrew
Su. 15 cl. Enrollment limited to 25 students.
Prereq.: Permission of chairman.
Full time of student and full fees required.
Equiv. of 101, 102, 103. Students with credit for 101 or the equiv. may not register for more than 10 hrs.
Students with credit for 101 and 102 or the equiv. may not register for more than 5 hrs. Students with credit for 103 or the equiv. may not register for credit.

193 U 1-15
Individual Studies
Prereq.: Permission of dept.
Repeatable to a maximum of 30 cr. hrs.

194 U 1-15
Group Studies
Prereq.: Permission of dept.
Repeatable to a maximum of 30 cr. hrs.

271 U 3
Introduction to Modern Hebrew Literature in English
Sp. 3 cl.
Prereq.: Engl. 100 or equiv.
Modern Hebrew literature: works of major writers from the middle of the 18th century to the present; emphasis on European literary influences. Mashiah.

272 U 3
Hebrew Literature in English Translation: Ancient and Medieval Times
A. 3 cl.
Prereq.: Eng. 100 or equiv.
Hebrew literature from its beginnings to the middle of the 19th century. Mashiah.

401 U 5
Review Grammar and Composition
W. 5 cl.
Prereq.: 104.

402 U 5
Intermediate Hebrew Conversation and Composition
Sp. 5 cl.
Prereq.: 401 or permission of instructor.
Vocabulary building, practice in speaking Hebrew, conversation and composition dealing with social and everyday aspects of Israeli life. Hayon.

403 U 3
Hebrew Syntax
A. 3 cl.
Prereq.: 402 or permission of instructor.
Parts of speech, types of sentences, word order, and syntactic analysis. Hayon.

421 U 3
The Modern Hebrew Short Story
A. 3 cl.
Prereq.: 104.
Reading and discussion of masterpieces of modern Hebrew short stories in the 19th and 20th centuries. Mashiah.

422 U 3
Modern Hebrew Poetry
W. 3 cl.
Prereq.: 421 or permission of instructor.
Reading and discussion of masterpieces of modern Hebrew poetry in the 19th and 20th centuries. Mashiah.

604 U G 3
Hebrew Phonetics and Vocalization
A. 3 cl.
Prereq.: 104 or permission of instructor.
Rules of Hebrew phonetics and vocalization; lectures and abundant practical exercises. Hayon.

605 U G 5
Hebrew Morphology
W. 5 cl.
Prereq.: 604 or permission of instructor.
The morphological system of Hebrew; the interrelations between roots and forms. Hayon.
History

OFFICE: 290 West 17th Avenue

Professors Coles (Chairman), Adams, Bremner, Burnham, Chaplin, Chu, Dillon, Dorsalena, Fisher, Fullmer, Grimm, Hill (Emeritus), Li, McDonald (Emeritus), Pegues, Poitier, Ragatz (Emeritus), Roberts, Roseboom (Emeritus), Rule, Simms (Emeritus), Weisenburger (Emeritus), Woodring (Emeritus), and Young; Associate Professors Balcer, Charg, Chazan, Cooper, Curran, Kerr, Kittelson, Millett, Fogel, Rothney, and Zahniser. Assistant Professors Benedict, Bowers, Candolino (Lima), Coats (Newark), Eckes, Findley, Gates, Hedlin, Hoffer, Lynch, Reichard, Smith, Steffel (Marion), Stoo, Thyr (Lima), Van Tine, Whitaker (Marion), and Zwojdra.

110 U 5
Ancient and Medieval History

110.01 The Greco-Roman World from Homer to Augustus
A, W. 5 cl.
Development of classical Greek civilization; the decline of the polis, the Hellenistic age; the rise of the Roman state; the Roman Empire and Greco-Roman civilization.

110.02 Medieval Europe
A, W. 5 cl.
Medieval civilization in its social, economic, political, and cultural setting; the significance of the medieval world for the modern world and Euro-American society.

120 U 5
Modern Europe
Su, A, W, Sp. 5 cl.

120.01 European Civilization, 1500-1789
Not open to students with credit for 131 or 121.
An introduction to the political, social, diplomatic, economic, and intellectual history of Europe from 1500 to the outbreak of the French Revolution.

120.02 European Civilization, 1789-1914
Not open to students with credit for 102 or 122.
An introduction to the political, social, diplomatic, economic, and intellectual history of Europe from the French Revolution to the outbreak of the First World War.

120.03 European Civilization, 1914 to Present
Not open to students with credit for 122 or 215.
An introduction to the political, social, diplomatic, economic, and intellectual history of Europe from the outbreak of World War I to the present.

130 U 5
Africa and the Middle East

130.01 African History
W. 5 cl.
Not open to students with credit for Black Studies 130.01.
(Cross-listed in the Black Studies Division.)
A general introduction to the history of Africa from pre-historic to recent times, Zwojdra.
150 U 5

The Americas
Su, A, W, Sp. 5 cl.

150.01 History of the United States, 1783-1877
Not open to students with credit for 103, 121, 122, or 230.
The general political, constitutional, and economic development of the United States from the beginning of the Revolutionary era to the end of the Civil War.

150.02 History of the United States, 1877 to Present
Not open to students with credit for 104, 122, 123, or 230.
A continuation of 150.01; the two provide a sequence but either may be taken independently as an elective.

180 U 5

Thematic Courses

180.01 Technological Revolutions and Their Consequences
A. 5 cl.
Human, cultural, philosophic impact and significance of technological revolutions; analysis of representative turning points in technology affecting technical creativity and its inter-relationship with human values. Smith.

180.02 History of Scientific Revolutions
A, Sp. 5 cl.
Models of scientific innovation and study of selected examples of the great scientific revolutions: Copernican, Chemical, Darwinian, Quantum, Genetic, and others. Burnham and Fuller.

180.03 The Indian in American Civilization
A. 5 cl.
American Indian-white relations from colonial times to the present, focusing on changing conceptions of 'civilization'; formation and implementation of policies, varying Indian responses to policies. Young.

180.04 History of Mexico
A. 5 cl.
History of Mexico during pre-colonial, colonial, and independence periods with emphasis on the 19th and 20th centuries. Cooper.

194 U 5

Group Studies
Repeatable to a maximum of 30 cr. hrs.

211 U 3

Great Figures of Modern Europe
A. 3 cl.
A study of modern European history through an examination of the lives and times of great figures. Rule.

212 U 3

Great Figures in British History
W. 3 cl.
British history since 1485 as illustrated in the lives of notable figures. Roberts.

213 U 3

The History of the Medieval Church
A, Sp. 3 cl.
The rise of the Christian church and the papacy; the Church Fathers; investiture controversy; heresy and monasticism; mysticism; the crisis of the late medieval church. Lynch and Pegues.

215 U 5

Contemporary Europe, 1914 to Present
Su. A. 5 cl.
Not open to students with credit for 120.03.
World War I; political, social, and economic developments of the interwar period; Communism, Nazism; World War II; Europe between East and West; moves toward unification. Dorpelan.

220 U 5

Russian Civilization
W, Sp. 5 cl.
A survey of Russian civilization from earliest times to 1917; geography, peoples, culture, social, political and religious institutions, and the impact of Westernization. Curran and Morley.

230 U 5

American Civilization
Sp. 5 cl.
Not open to students with credit for 103, 104, 121, 122, 123, 150.01, or 150.02.
A survey emphasizing the origin and development of basic ideals and institutions, continuing problems of American democracy, and the U.S. and world affairs. Coles.

231 U 3

Great Figures in American History
A, W, Sp. 3 cl.
Main trends of American development through the medium of biography; historical background; comparison and contrast of leading figures; and analysis of motivation and character. Bowers, Coles, and Van Tine.

240 U 5

Latin America in the 20th Century
W, Sp. 5 cl.
The history of Latin America in the 20th century. Stean.

247 U 5

Africa in the 19th Century
A, Sp. 5 cl.
Not open to students with credit for Black Studies 247.
(Cross-listed in the Black Studies Division.)
Emphasis on African societies during the century of the European scramble for colonies. Zwiarda.

248 U 5

Leadership and Mass Movements in Contemporary Africa
W. 5 cl.
Not open to students with credit for Black Studies 248.
(Cross-listed in the Black Studies Division.)
A survey of modern African leaders, their philosophies, and methods, and a study of the historical, geographical, economical, and political factors that gave rise to the drive for national independence after 1945.
251 U 5
Jewish History I
A.  5 cl.
Either 251 or 252 may be taken independently.
Jewry and Judaism from remote antiquity to the 15th
century A.D. Chazan and Raphael.

252 U 5
Jewish History II
W.  5 cl.
Either 251 or 252 may be taken independently.
Jewry and Judaism from the 15th century to the present.
Chazan and Raphael.

255 U 5
The Middle East from the Time
of Muhammad to the 19th Century
W.  5 cl.
Middle East history from Muhammad to Napoleon:
preaching and spread of Islam; Arab Caliphates; the
Crusades; Turks; Mongols; rise and decline of the
Ottoman empire. Findley and Waldman.

256 U 5
The Middle East in the 19th and 20th Centuries
W, Sp.  5 cl.
Middle East history since Napoleon: reform and
modernization; nationalism, European imperialism, and
two world wars; Israel, oil, and world political systems.
Findley and Waldman.

260 U 5
Afro-American History
A.  5 cl.
The Afro-Americans in North America from the 16th
century to the present.

265 U 5
History of East Asia to 1800
W.  5 cl.
Not open to students with credit for 644.
East Asia civilization from the earliest time to 1800:
Confucianism, Buddhism, Taoism; the Chinese high
culture; the regional variations—Japan, Korea, and

266 U 5
History of East Asia Since 1800
W, Sp.  5 cl.
Not open to students with credit for 645.
The modernization of East Asia: the impact of the West;
the response of the traditional societies; nationalism,
fascism, communism. Bartholomew, Chang, and Chu.

285 U 3
Great Issues in American Constitutional History
Sp.  3 cl.
A study of selected issues that have influenced the
development of the federal constitution. Benedict.

294 U 3-5
Special Topics in History
Repeatable to a maximum of 15 cr. hrs.
Groups of students are given an opportunity to pursue
special studies not otherwise offered.

301 U 3
Major Influences in the History
of Western Civilization
W.  2 cl.
Offered by senior members of the staff and designed
to acquaint the student with problems in the
interpretation of the history of western civilization.
Rule.

537 U G 5
History of Southern Africa
A.  5 cl.
Not open to students with credit for Black Studies 537.
(Cross-listed in the Black Studies Division.)
A study of the processes and patterns of social change
from early times to the present.

533 U G 5
West African History
A.  5 cl.
Not open to students with credit for Black Studies 538.
(Cross-listed in the Black Studies Division.)
An examination of the processes of state formation,
trade, and civilization in Africa's Sudanese and
Guinean regions.

565 U G 5
The United States in the 20th Century, 1900-1933
A, W.  5 cl.
Prereq.: 104, 123, or 150.02.
An intensive study of the United States during the
progressive era and after; the adjustment of
institutions to industrialism. Kerr and Reichard.

566 U G 5
The United States in the 20th Century,
1933 to Present
A, W.  5 cl.
Prereq.: 104 or 123.
An intensive study of contemporary America in
depression, war, and prosperity. Kerr and Reichard.

599 U 3
Honors Proseminar in History
Prereq.: 15 cr. hrs. of 100-200 level Hist courses with
an average of 3.2 or better.
Students may not register for more than 2 decimal
subdivisions below in any one quarter; no more than
15 cr. hrs. may be counted toward graduation; no more
than 9 cr. hrs. may be counted toward the major
in Hist.
Repeatable to a maximum of 15 cr. hrs.
Designed to give undergraduates experience in
historical research and analysis of historical problems.
H599.01 United States History
H599.02 West European History
H599.03 East European History
H599.04 Asian History
H599.05 Other Areas
GENERAL PREREQUISITES FOR COURSES
NUMBERED 600 AND 700

Unless otherwise indicated the prerequisites for 600 and 700-level courses are four quarter courses in the social science field, of which at least two must be in history.
Not open to freshmen and sophomores except with permission of instructor.

600 U G 3
The Ancient History of the Near East
W. 3 cl.
The ancient history of Egypt, Babylonia, Assyria, and adjacent cultures; readings in the sources in translation. Baicier.

601† U G 5
Greek History
A. 5 cl.
A history of Greece from the early Minoan period to the age of Demosthenes and Philip of Macedon; readings in the Greek historians in translation.

602 U G 5
The Hellenistic World
A. 5 cl.
The history of Greece and the Hellenistic monarchies from Alexander the Great to the Roman intervention; readings in sources in translation. St. Clair.

603 U G 5
The Roman Republic
A. 5 cl.
A history of Rome from the founding to the fall of the Roman Republic; readings in ancient sources in translation. St. Clair.

604 U G 5
Roman Civilization
W. 5 cl.
The history of the Roman Empire from Augustus to the 4th century; readings in the sources in translation. St. Clair.

605 U G 3
Jewish History
605.01 The Second Commonwealth
Sp. 3 cl.
Not open to students with credit for 715.
The restoration of Jewish statehood following the first Babylonian Exile and the history of Palestinian Jewry and of the Jewish Diaspora down to the 2nd century A.D. Chazan and Raphael.
605.02* The Jewish Community under Medieval Christianity
Su. 3 cl.
Not open to students with credit for 716.
The legal, social, economic, and cultural position of the Jews in the Late Roman Empire and in Western Europe from the 4th century A.D. to 1500. Chazan.
605.03* Jewry and Judaism in the Orbit of Islam
A. 3 cl.
Not open to students with credit for 717.
The history of the Jews in the Near East and North Africa from the Arab conquests to about 1500.

605.04* Jews in the Western World in Modern Times
Su. 3 cl.
Not open to students with credit for 718.
Changing patterns of Jewish life since the Jews' struggle for emancipation, migration movements and the shift of Jewish centers in Europe and the New World.

605.05* The Jewish Settlement in Palestine from the Ottoman Conquest to Modern Times
A. 3 cl.
Not open to students with credit for 719.
The flourishing Palestinian Jewish Center in the 16th century; Jewish immigration to Palestine; rise of modern Zionism; the British Mandate, and the State of Israel.

605.06* History of Ancient Israel
W. 3 cl.
Not open to students with credit for 720.
The rise of the Jewish nation and religion in the Ancient Near East; settlement in Canaan; the Israelite and Judean monarchies until their conquest by Assyria and Babylonia.

605.07* The World of the Talmud
Sp. 3 cl.
Not open to students with credit for 721.
Development of Jewish law and institutions in Palestine and Babylonia after the destruction of the Second Commonwealth; Rabbinic Judaism and diasporic Jewish self-government. Chazan and Raphael.

605.08* Jews in the Mediterranean World
A. 3 cl.
Not open to students with credit for 722.
East Mediterranean Jewry under the Byzantine Empire, its successor states, and under the Ottoman Turks; the Jews in Italy; rise and fall of Spanish Jewry.

605.09* Jews in Eastern Europe
A. 3 cl.
Not open to students with credit for 723.
East European Jewish communities: their origin and function within medieval Polish society; self-governing institutions of Polish and Lithuanian Jewry; the "Jewish Question" in Tsarist Russia. Chazan.

605.10* Messianic and Sectarian Movements in Jewry
Sp. 3 cl.
Not open to students with credit for 724.
The history, doctrines, and polemics of the secessionist groups in medieval Jewry from the 7th to the 18th centuries.

605.11 Jews in America
A. 3 cl.
Not open to students with credit for 725.
The rise and development of the American Jewish community from colonial times to the present. Chazan and Raphael.

606 U G 5
Medieval Civilization
Su. A. 3 cl.
The decline of the Roman Empire; the rise of Christianity; analysis of feudalism and manorialism; the Great Economic Revival, and the origins of Western Society. Lynch and Pegues.
609 U G 3
The Renaissance
Su. A. 3 cl.
The literary, artistic, and intellectual achievements primarily of Renaissance Italy against the economic, political, and social developments in Western Europe. Kittelson and Peggau.

610 U G 5
The Reformation
A, Sp. 5 cl.
The rise and growth of Protestantism and the Catholic reformation of the 16th century against the economic, political, and social developments in Western Europe. Grimm.

History of Biology
(See Biol. 610.)

612 U G 5
Europe, 1600-1775
A. 5 cl.
A study of the rise of the absolute state, the changing diplomatic alignments, and the Enlightenment. Rule.

613 U G 5
The French Revolution and Napoleon
Sp. 5 cl.
The background of the Revolution; the social bases and political schisms of the first three Revolutionary governments, 1789-1795; the program and role of Napoleon. Rule.

614 U G 5
Europe, 1815-1914
Sp. 5 cl.
Nationalism, the democratic movement, economic growth, imperialism, and cultural advance from the Congress of Vienna to World War I. Rogel.

615 U G 5
France, 1815-1914
A. 5 cl.
France's transformation from a rural, traditional society to a modern, industrial society, and the relation of this transformation to 19th century political and intellectual movements. Rothney.

616 U G 5
France in the 20th Century
W. 5 cl.
The impact on France of two world wars, the depression and decolonization, with emphasis on the breakdown of the political system and the emergence of a new society from the wreckage of the old. Rothney.

618 U G 5
Modern Germany, 1815 to Present
A. W. 5 cl.
Political, social, economic, and cultural developments; the national and liberal movements; unification; Empire; Weimar Republic; Nazi Regime; present-day Germany. Darpalaen and Gates.

619 U G 5
Rise of Modern Physical Science, 1500-1778
A. 5 cl.
Prereq.: Jr. standing. The history of the physical sciences, 1500-1778. Fullmer.

620 U G 3
European Diplomacy, 1871-1939
A. 3 cl.
Imperialism and the Alliance systems leading to World War I; the Paris Peace Conference, and the political and economic diplomacy prior to World War II.

621 U G 5
The Rise of Modern Physical Science, 1779-1904
Sp. 5 cl.
Prereq.: Jr. standing. The physical sciences from the end of the Enlightenment to 1904 and their intellectual and institutional interrelationships with Western society. Fullmer.

622 U G 5
Intellectual History of 19th Century Europe
Sp. 5 cl.
Ideas and ideologies in their social and economic setting, including laissez-faire liberalism, Darwinism, and the various schools of socialism. Poirier.

623 U G 5
Economic History of Modern Europe, 1700-1840
W. 5 cl.
Factors of pre-industrial economic growth, economic policies of the European states, evolution of economic thought, the first industrial Revolution and its effects on European society. Gates.

624 U G 5
Economic History of Modern Europe, 1840 to Present
Sp. 5 cl.

625 U G 5
History of European Warfare
625.01 History of European Warfare, 1688-1789
W. 5 cl.
Not open to students with credit for 745. The major aspects of European warfare in the late 17th and 18th centuries, with emphasis on the forces of England and France, between 1688 and 1715. 625.02 History of European Warfare, 1790-1945
Sp. 5 cl.
Not open to students with credit for 746. European warfare from the French Revolutionary Wars to the surrender of Germany in 1945, with emphasis on the Napoleonic period and the Second World War.
626 UG 5
East Central Europe

626.01 The Habsburg Empire, 1740-1918
Sp. 5 cl.
Not open to students with credit for 735.
A century and a half of Habsburg history with emphasis on Austria's responses to Enlightenment ideas, the French Revolution, social change, industrialization, and emerging nationalisms. Rogel.

626.02 The Balkans from the Ottoman Conquest to World War I
W. 5 cl.
Not open to students with credit for 736.
A historical survey of the Balkan peoples; political, social, economic, and cultural development; emphasis on the emergence and expression of Balkan nationalisms. Rogel.

626.03 East Central Europe Since 1919
A. 5 cl.
Not open to students with credit for 737.
A survey of East Central Europe from the end of World War I to the present. Rogel.

628† UG 5
Africa and the Western World in the 19th and 20th Centuries
A. 5 cl.
Economic penetration, the conflict of cultures, political developments, and social advance.

630† UG 5
Medieval England
W. 5 cl.
England from the Roman conquest to 1485; Anglo-Saxon society and institutions; the Norman conquest; law and parliament; social, intellectual, and economic growth of the English people. Pegues.

631 UG 5
Tudor and Stuart England
Su. 5 cl.
The religious, political, economic, imperial, and intellectual development of the English people from 1485 to 1714, with special attention to the constitutional struggles of the 17th century. Roberts.

632 UG 5
England in the 18th and 19th Centuries
W. 5 cl.
The course of political, social, and intellectual change, of industrial and commercial growth of Hanoverian, Victorian, and Edwardian England. Polier.

633 UG 5
England in the 20th Century
Sp. 5 cl.
A study of Britain since 1900 with special emphasis on the rise of the Labour party and the development of the social welfare state. Polier.

634 UG 5
The Soviet Union and East-West Relations, 1917 to Present
Su. W. 5 cl.
Evolution of the structure, personalities, and principles of both the Russian Communist Party and the State, and their effects on the external affairs of the U.S.S.R. Hedlin.

635 UG 5
History of Russia, to 1801
A. 5 cl.
A survey from the origins of the Russian state to the end of the 18th century. Curran.

636 UG 5
History of Russia, 1801-1914
W. 5 cl.
A survey from the accession of Alexander I to the outbreak of the First World War. Morley.

637 UG 5
Soviet Russia
Sp. 5 cl.
Beginning with the background and events of the revolution of 1917, this course analyzes developments in Russian history from World War I to the present. Morley, Curran, and Hedlin.

638 UG 5
Russian Intellectual History
Sp. 5 cl.
A survey of the main currents of Russian social, political, economic, and philosophical thought in the 19th century; Liberalism, Conservatism, and Socialism. Curran.

639† UG 3
Modern Poland
Sp. 3 cl.
While several background lectures deal with the partitions of Poland and the revolutions of the 19th century, emphasis is placed on the period since 1918. Morley.

641 UG 3
The Rise of Islam and the Spread of Muslim Civilization
A. 3 cl.
Life and teachings of Muhammad; Umayyad and Abbasid empires; the Crusades, Islamic culture and learning through the ages; the decline under the Mongols; terminal date, 1517. Waidman.

642 UG 3
The Rise and Fall of the Ottoman Empire
W. 3 cl.
A study of the significance of the Middle East with respect to Europe from the 13th century to World War I. Findley.

643 UG 5
The Middle East Since 1914
Sp. 5 cl.
National and international problems following the collapse of the Ottoman empire; the Turkish Republic; the state of Israel; Arab unity; and the conflict between East and West. Findley.

647 UG 5
History of Traditional Japan
W. 5 cl.
Prereq.: 265 or permission of instructor.
Problems regarding the political, intellectual, and institutional history of Japan prior to the arrival of Perry (1851). Bartholomew.
648 U G 5
History of Modern Japan
Sp. 5 cl.
Prereq.: 286 or permission of instructor.
Political, social, and intellectual history of Japan from
the beginning of the Meiji Period (1868) to the present.
Bartholomew.

650 U G 5
History of Spain, 1469 to Present
Sp. 5 cl.
The unification of Spain under Ferdinand and Isabella;
the Golden Age; Enlightened Despotism of the 18th
century; the Napoleonic Wars; the Generation of 1898;
the Republic and the Civil War; the regime of Francisco
Franco. Stoan.

651 U G 5
Colonial Latin American History
A. 5 cl.
Mayan, Aztec, and Inca Empires; the Spanish and
Portuguese conquests and the transplanting of Iberian
institutions; the Baroque period; the Bourbon Century
and the Enlightenment. Cooper and Stoan.

652 U G 5
South America Since Independence
W. 5 cl.
Nation-building in the South American republics during
the 19th and 20th centuries with special emphasis
on Argentina and Brazil. Stoan.

653 U G 5
Northern Latin America Since Independence
Sp. 5 cl.
Survey of leading political, economic, and social
developments in Mexico, Central America, and the
West Indies in the 19th and 20th centuries. Cooper.

655 U G 5
Social and Economic History of Latin America
A. 5 cl.
Patterns in the history of race, class, land, industry,
and foreign influences; emphasis on the National
Period, and on Mexico, Argentina, and Brazil. Cooper.

(Additional Latin American History courses are
numbered 651, 652, 659, and 653.)

656 U G 5
The American Colonies
A, Sp. 5 cl.
The transplanting of European civilization to North
America, the resultant international rivalries, and the
political, social, and economic life of the English
colonies to 1763. Bowers, Chapin, and Coles.

658 U G 5
The American Revolution and New Nation,
1763-1800
Su, W. 5 cl.
A continuation of 656 but may be taken separately;
primary emphasis on social, intellectual, and economic
factors. Bowers, Chapin, and Coles.

659 U G 5
Jefferson and Jacksonian Democracy, 1800-1840
Sp. 5 cl.
A continuation of 658 but may be taken separately.
Primary emphasis on ideological, cultural, and political
factors. Bowers, Chapin, and Coles.

660 U G 5
The Westward Movement Since 1783
W. 5 cl.
The westward spread of settlement and the influence of
the westward movement on American development.
Young.

661 U G 3
The Slavery Controversy in the United States
A. 3 cl.
The social system of the Old South; the various aspects
of the controversy; secession and the impact of war.
Dillon.

662 U G 3
Reconstruction and the New South, 1863 to Present
W, Sp. 3 cl.
The controversy over Reconstruction; the social and
economic readjustments in Southern States during
and after Reconstruction. Dillon and Benedict.

663 U G 3
History of Technology in America
663.01 History of Technology in America to 1876
W. 3 cl.
From craft to "know-how"; European transfers;
sources of invention; specific patterns of technical
change; rise of professional engineering; technology
and culture. Smith.

663.02 History of Technology in America Since 1876
Sp. 3 cl.
A historical inquiry into the problems and promises
of Machine Age America with emphasis on the
nature of technological change and society's reaction
to that change. Smith.

664 U G 5
The Emergence of Modern America, 1865-1899
Sp. 5 cl.
An intensive study of the political, social, and cultural
transformation of the United States in the late
19th century. Van Tine.

668 U G 5
American Military Policy
A, Sp. 5 cl.
The development of American military policy, 1763 to
the present, in relation to its political, economic, and
social implications. Coles and Millett.

670 U G 5
American Foreign Policy to 1914
A, Sp. 5 cl.
Emphasis on these topics: the revolution, neutral rights,
the Monroe Doctrine, continental expansion, the Civil
War, overseas expansion, Far Eastern policy. Eckes
and Zahniser.
American Foreign Policy Since 1914
Su, W, Sp. 5 cl.
Emphasis on these topics: United States relations with
Europe, Far East, and Latin America since 1914. Eckes
and Zahniser.

Social and Economic History
of the United States, 1815-1865
A. 5 cl.
The development of economic institutions and their
relation to economic growth and to movements for
social and political reform. Young.

Social and Economic History
of the United States, 1865-1914
W. 5 cl.
The development of an integrated national economy
and society; its extensive and intensive expansion.
Kerr, Van Tine, and Young.

Social and Economic History
of the United States, 1914 to Present
Sp. 5 cl.
The development of social and economic institutions
for a society characterized by high mass consumption;
the increasing role of government in the economy.
Young.

The Influence of Immigrant Groups
Upon United States History
W. 5 cl.
The share of different immigrant groups in the building
of the nation, from the colonial period to the present.

Studies in the History
of Philanthropy and Social Welfare
A. 3 cl.
Prereq.: 104, 123, or 150.02 or permission of instructor.
Major influences in American philanthropy and social
welfare since the colonial period. Bremner.

American Social Thought, 1965-1919
A. 5 cl.
Prereq.: 104, 123, or 150.02.
Trends in American social thought in the late 19th and
early 20th centuries. Bremner.

American Social Thought Since 1919
W. 5 cl.
Prereq.: 104, 123, or 150.02.
A historical examination of trends in American social
thought since World War I. Bremner.

History of American Science to 1900
A. 3 cl.
Flowering of scientific inquiry in colonial America;
professionalization and expansion of science in the
19th century; Darwinism in America; positivism.
Burnham.

History of American Science Since 1900
W. 3 cl.
Pragmatism, progressivism, and science; American
scientific leadership; the impact of war and depression;
the modern scientific crisis. Burnham.

Political Parties in the United States
W. 5 cl.
The origin and growth of national parties and the
history of party struggles with emphasis upon
presidential elections. Reichard.

The History of Ohio
Su, Sp. 3 cl.
A general survey of state history—social, economic,
religious, and political—from the Indian period to the
present time. Hopkins.

History of American Medicine
Sp. 3 cl.
Disease, public health, and the profession and practice
of medicine in America from colonial times to the
present. Burnham.

United States Constitutional History:
The Federal System
Sp. 5 cl.
Historical development of constitutional powers and
functions of the federal and state governments and
intergovernmental relationships. Benedict and Chapin.

United States Constitutional History:
Rights and Immunities
A. 5 cl.
Historical development of the constitutional rights and
immunities of the citizen. Benedict and Chapin.

United States History and the Social Sciences
Sp.
Prereq.: 20 cr. hrs. of 600-level Hist. courses.
Recent developments in the theory and practice of
history as a social science using American historical
materials. Burnham.

American Urban History
Su, A, Sp. 5 cl.
688.01 American Urban History Since Colonial Times
A survey of American urban development, and its
impact on national history, from the beginning of
colonization to the present. Hopkins.
American Labor History
W. 5 cl.
689.01 History of the American Labor Movement
Evolution of trade unionism in American life from the late 19th century to the present; attention to critical evaluation of changes in labor history.
VanTine.

American Intellectual History
A. 5 cl.
690.01 American Intellectual History from Colonial Times to the Present
American thought from colonial times to the present with emphasis on the relation between dominant ideas and the behavior and beliefs of the population.
Hoffer.

Colonial Brazil, 1500-1822
W. 5 cl.
Portuguese background; discovery, exploration, and settlement; political, economic, and social development; background and achievement of independence.
Cooper.

Modern Brazil, 1822 to Present
Sp. 5 cl.
Independence from Portugal; the monarchical experiment; political, social, economic, and military developments; foreign relations; republican Brazil.
Cooper.

Individual Studies in History
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Individual study in some field of historical development; designed to allow the student to work on a problem in which he is particularly interested.

Group Studies in History
Repeatable to a maximum of 30 cr. hrs.
The investigation of particular problems in various fields of history.

Classical China, 1400 B.C. to 220 A.D.
A. 5 cl.
Prereq.: 265 or permission of instructor.
The political, economic, and cultural life of ancient China from the Shang dynasty to the end of the Han dynasty.
Chang.

Traditional China, 220 A.D. to 1800 A.D.
W. 5 cl.
Prereq.: 265 or permission of instructor.
The political, economic, and cultural life of Medieval China from the Age of Disunity to 1800 A.D.
Chang.

Modern China, 1800 to 1949
Sp. 5 cl.
Prereq.: 266 or permission of instructor.
History of modern China with emphasis on cultural contact between China and the West.
Chang.

History of Mexico
A. 5 cl.
History of Mexico during pre-colonial, colonial, and independence periods with emphasis on the 19th and 20th centuries.
Cooper.

Studies in the Age of Louis XIV
Sp.
Prereq.: 612 or permission of instructor.
Open only to grad. students and by permission to seniors majoring in Hist.
Lectures, reading, and discussion of selected topics.
Rule.

Studies in French History Since 1815
A.
Prereq.: Grad. standing or by permission to seniors majoring in Hist.
Repeatable to a maximum of 6 cr. hrs.
An intensive study, through reading and discussion of standard works and recent scholarship, of the chief interpretative problems of modern French history.
Rothney.

Studies in Jewish History
W.
Prereq.: Grad. standing or by permission to seniors majoring in Hist.
An intensive study of selected issues in Jewish history; emphasis on problems posed by available source material and by current research in the area.
Raphael.

Studies in European History, 1815 to 1914
W.
Open only to grad. students and by permission to seniors majoring in Hist.
Political and social impact of Industrial Revolution; authoritarianism vs. liberalism; Church vs. State; nationalism; imperialism; emphasis on methods of historical research and documentary analysis.
Dorpaten.

Studies in European History, 1914 to Present
A.
Open only to grad. students and by permission to seniors majoring in Hist.
Political, social, and economic developments: World Wars I and II; Communism, Nazism; present-day Europe; emphasis on methods of historical research and documentary analysis.
Dorpaten.
732 U G 3
Studies in German History
W.
Prereq.: 618 or equiv.
Open only to grad. students and by permission to seniors majoring in hist.
Exploration of selected topics of 19th and 20th century
German history; emphasis on methods of historical
research and documentary analysis. Dorpalen.

733† U G 3
Studies in German Social and Economic History
Sp. 1 cl.
Prereq.: 618 or 624, or permission of instructor.
Open only to grad. students and by permission to
seniors majoring in hist.
Exploration of selected problems in the modernization
of German society and the German economy since the
late 18th century.

738 U G 3
Studies in British History
Sp.
Prereq.: 632 or 633.
Open only to grad. students and by permission to
seniors majoring in Hist.
Selected problems in British history since 1760;
emphasis on different schools and interpretations, on
methods of research, and on analysis of documents.
Pointier.

740† U G 3
Studies in Russian History: Catherine the Great
Through the Crimean War, 1782-1855
A.
Prereq.: 6 cr. hrs. of Russ. history or permission of
instructor.
An intensive study of problems in selected periods of
Russian history. Curran and Morley.

741 U G 3
Studies in Russian History: Alexander II
through the Bolshevik Revolution, 1855-1917
Sp.
Prereq.: 5 cr. hrs. of Russ. history or permission of
instructor.
An intensive study of problems in selected periods of
Russian history. Curran and Morley.

761 U G 3
Studies in Mid-19th Century American History
W.
Prereq.: Grad. standing or by permission to seniors
majoring in hist.
Repeatable to a maximum of 6 cr. hrs.
An intensive study of selected topics with emphasis on
historiography and bibliography. Dillon.

768 U G 3
Studies in Military Thought and Strategy
W.
Prereq.: 668 or equiv.
Analysis and comparison of the most influential writers
on the theory and practice of warfare including
Machiavelli, Clausewitz, Mahan, Bloch, and Douhet.
Millett.

770† U G 3
Studies in American Foreign Policy, 1775 to 1914
Sp.
Prereq.: 670.
Studies in the main problems of American foreign
policy with primary emphasis on basic literatures and
selected primary materials. Zahniser and Eckes.

771 U G 3
Studies in American Foreign Policy, 1914 to Present
A.
Prereq.: 671.
Studies in the main problems of American foreign
policy with primary emphasis on basic literature and
selected primary materials. Eckes and Zahniser.

H783 U 3-5
Honors Course
Prereq.: 4th yr. standing and 40 cr. hrs. in hist. courses
with a grade of A in at least half of the hist. courses
and an average of B in the remainder; permission of
instructor under whose supervision the work is to be
completed and the Honors Committee of the College.
At least 2 qtrs. are required of candidates for the
degree Bachelor of Arts with distinction in hist.
Failure to receive a grade of B in this course is a
disqualification for special honors.
Repeatable to a maximum of 15 cr. hrs.
Informal conferences to allow full scope to the
initiative of the student; a special topic is assigned
and results are tested by papers and special
examinations.

785 U G 3
Constitutional and Legal History of Early America
W.
Development of constitutional concepts, indigenous
and imperial, and the reception of selected aspects of
the common law in early America. Chapin.

788 U G 3
Studies in American Urban History
W. 3 cl.
Prereq.: 688 or permission of instructor.
A detailed examination of several themes in the growth
of urban America. Hopkins.

795† U G 3
Studies in the History of
4th- and 5th-century
American Relations
W
Prereq.: Permission of instructor.
A study of the commercial, cultural, and diplomatic
relations between China and the United States in the
19th and 20th centuries. Li.

796 U G 3
Chinese Historiography
Sp. 2 cl.
Prereq.: Permission of instructor.
The development of Chinese historical writing from
ancient to modern times, with special emphasis on
great historians and their representative works. Li.
799  U G 3
Studies in Ming and Ch'ing History
W.
Prereq.: 696 or permission of instructor.
Studies in the history of China under Ming and Ch'ing from 1368 to 1911, with special emphasis on important political leaders and institutions. Li.

800  G 5
Seminar in European History
A.
Research topic to be announced. Kittelson.

801  G 5
Seminar in European History
Su, Sp.
Research topic to be announced later. Dorpalen and Gates.

802  G 5
Seminar in European History
A.
Curran and Morley.

803  G 5
Seminar in European History
W.
Poirier and Roberts.

804  G 5
Seminar in European History
A, Sp.
Research topic to be announced.

805  G 5
Seminar in European History
W, Sp.
Rule and Rothney.

806†  G 3
Late Medieval Paleography and Diplomatics
Sp.
Prereq.: Permission of instructor.
cursive hands in literature and diplomas, 1200-1500; the development of chanceries; notariats, secretariats, and the science of diplomacy; exercises with facsimiles, slides, and microfilm. Pegues.

807†  G 5
Seminar in Medieval History
Sp.
Repeatable to a maximum of 15 cr. hrs.

813  G 5
Great European Historians
W.
A study of the leading historical writers and schools of Europe, with selected readings from representative writers. Rothney.

814  G 5
Great American Historians
W. 1 cr.
A study of the leading American writers and schools of history. Hoffer.

840†  G 5
Seminar in the History of the Physical Sciences
Sp.
Prereq.: Permission of instructor.
Research topic to be announced. Fullmer.

845  G 5
Seminar in East Asian History
W.
Prereq.: Permission of instructor.
Research topic to be announced. Li, Chang.

850  G 5
Seminar in History
Prereq.: Permission of graduate chairman and department chairman.
Research topic to be announced. Coles and Pegues.

851  G 5
Seminar in Latin American History
A.
Prereq.: Reading knowledge of at least one of the following languages: Spanish, Portuguese, or French. Repeatable to a maximum of 15 cr. hrs. Cooper and Stoan.

862†  G 5
Seminar in Jewish History
W.
Chazan.

865  G 5
Two Quarter Seminar in American History
W.
Prereq.: Permission of instructor. 865 must be followed by 866. Bremner.

866  G 5
Two Quarter Seminar in American History
Sp.
Prereq.: 865 and permission of instructor. Bremner.

867  G 5
Seminar in American History
Su, A, Sp.
Research topic to be announced. Dillon and Benedict.

868  G 5
Seminar in American History
W, Sp.
Research topic to be announced. Kerr and Young.
869  G 5
Seminar in American History
Su, A, Sp.
Research topic to be announced. Chapin and Young.

870  G 5
Seminar in American History
Su, A, W.
Research topic to be announced. Coles, Van Tine, and Zahniser.

871†  G 5
Recent History of the United States, 1898-1928
A.  5 cl.

872  G 5
Recent History of the United States, Since 1928
W.  5 cl.
Continuation of 871, but may be taken separately. Prosperity and depression, the New Deal, the United States in international affairs, and the Second World War. Bremner, Burnham, and Kerr.

873  G 5
Seminar in United States Military History
Sp.
Prereq.: 668 or equiv.
Repeatable to a maximum of 15 cr. hrs. Millett.

880†  G 1
History of Psychiatric Concepts
Sp.  1 cl.
Prereq.: Permission of instructor.
Psychiatric concepts and practices in their intellectual and social milieu from the Enlightenment to the 20th century. Burnham.

Medieval and Renaissance Culture
(See Medieval and Renaissance Studies 888.)

Medieval and Renaissance Literature
(See Medieval and Renaissance Studies 889.)

899  G 1-5
Interdepartmental Seminar
(See under Interdepartmental Seminars.)

999  G Arr.
Research in History
Research for thesis or dissertation purposes only.

History of Art
Office: 240 Hopkins Hall, 128 North Oval Drive

Professors Ludden (Chairman), Cope, Melnikas, and Patton; Associate Professors J. Huntington and Odita; Assistant Professors S. Herzog, Mealy, and Rubright; Instructors C. Herzog, S. Huntington, Jensen, Keyes, Junin, Roth, and Sweet.

111  U 3
Introduction to Art
Su, A, W, Sp.  3 cl.
Not open to juniors, seniors, or students with credit for Fine Arts 210 or 111.
A study of meaning of visual form and imagery in architecture, sculpture, and painting. Fee.

210  U 3
Western Art I
Su, A, W, Sp.  3 cl.
H210 (honors) may be available to students enrolled in a college honors program or by permission of dept.
Prereq.: 2nd yr. standing.
Not open to students with credit for Fine Arts 210.
A survey of Ancient and Early Medieval Art. Fee.

211  U 3
Western Art II
A, W, Sp.  3 cl.
H211 (honors) may be available to students enrolled in a college honors program or by permission of dept.
Prereq.: 2nd yr. standing.
Not open to students with credit for Fine Arts 211.
A survey of Romanesque, Gothic, Renaissance, and Mannerist Art. Fee.

212  U 3
Western Art III
Su, A, W, Sp.  3 cl.
H212 (honors) may be available to students enrolled in a college honors program or by permission of dept.
Prereq.: 2nd yr. standing.
Not open to students with credit for Fine Arts 212.
A survey from Baroque through Contemporary Art. Fee.

213  U 3
Oriental Art
A, Sp.  3 cl.
Prereq.: 2nd yr. standing.
Not open to students with credit for Fine Arts 213.

216  U 5
Introduction to African Art and Archaeology
A.  5 cl.
Prereq.: 2nd yr. standing.
The art and archaeology of sub-Saharan Africa with emphasis on the historic cultures of the Nok (500 B.C.), Igbo-Ukwu (ca. 800 A.D.), Ife (ca. 1300 A.D.), and Benin (ca. 1400-1500 A.D.). Odita.
515 U G 5
Renaissance Art in Italy
A. 5 cl.
Prereq.: Junior standing.
Not open to students with credit for Fine Arts 515 or
hist. of art majors.
A study of architecture, sculpture, and painting in
Italy during the 14th, 15th, and 16th centuries.
S. Herzog. Fee.

520 U G 5
Modern European Art
W. 5 cl.
Prereq.: 212 or Fine Arts 212 or permission of instructor.
Not open to students with credit for Fine Arts 520.
European Art from about 1800 to the present, with
emphasis on the outstanding masters of painting and
sculpture. Kunin. Fee.

530 U 3
American Art
Sp. 3 cl.
Prereq.: 212 or Fine Arts 212 or permission of instructor.
Not open to students with credit for Fine Arts 530.
A study of architecture, painting, and sculpture in
America. Keyes. Fee.

533 U 2-5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Individual study in some field of historical
development; designed to allow the student to work on
a problem in which he is particularly interested.

584 U 2-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
The investigation of particular problems in various
fields of the history of art.

610 U G 5
African Art and Archaeology I
W. 5 cl.
Prereq.: 216 or permission of instructor.
A study of the art and culture of the Western Sudan
and Guinea Coast regions with emphasis on stylistic,
historic, and archaeological implications. Odita.

611 U G 5
African Art and Archaeology II
Sp. 5 cl.
Prereq.: 216 or permission of instructor.
The study of the art and culture of the Equatorial
Forest and Southern Savannah regions with emphasis
on stylistic, historic, and archaeological implications.
Odita.

614 U G 5
Comparative Study of African and European Art
W. 5 cl.
Prereq.: 610 or 611 or 636.
A critical study of the relationships between African
and European Art involving theory and practice.
Odita.

620 U G 5
Greek Archaeology
A. 5 cl.
Prereq.: 210 or Fine Arts 210 or 10 cr. hrs. in Classics
or permission of instructor.
Not open to students with credit for Fine Arts 620.
Minoan-Mycenaean civilization as revealed by
archaeology; Classical Greek sites with emphasis on
the arts and social, economic, and religious data
provided by the archaeological material. Rubright. Fee.

621 U G 5
The Art of Ancient Egypt and the Near East
W. 5 cl.
Prereq.: 210 or Fine Arts 210 or permission of instructor.
Not open to students with credit for Fine Arts 621.
The specialized study of the art and archaeology of
the valley of the Nile and Tigris Euphrates in ancient
times. Rubright. Fee.

622 U G 5
Ancient Greek Art
Sp. 5 cl.
Prereq.: Either 210, 10 cr. hrs. in classics, 10 cr. hrs.
in ancient history, or permission of instructor.
Not open to freshmen or sophomores.
A study of the development of Greek art: from 1000
B.C. to 146 B.C. including sculpture, architecture, vase
painting, and other minor arts. Rubright. Fee.

623 U G 5
Ancient Roman Art
W. 5 cl.
Prereq.: Either 210, 10 cr. hrs. in classics, 10 cr. hrs.
in ancient history, or permission of instructor.
Not open to freshmen or sophomores.
An examination of the architecture, sculpture, and
painting of Roman Italy and her Empire from its
beginnings down to ca. 330 A.D. Jensen.

624 U G 5
Early Christian and Byzantine Art
A. 5 cl.
Prereq.: 210 or Fine Arts 210 or permission of instructor.
Not open to students with credit for Fine Arts 624.
The Christian art of the Mediterranean region to the
8th century and the art of the Byzantine Empire to the
15th century. Fee.

625 U G 5
Romanesque and Gothic Art
W. 5 cl.
Prereq.: 210 and 211 or Fine Arts 210 and 211, or
permission of instructor.
Not open to students with credit for Fine Arts 625.
The art of Western Europe from the Carolingian period
to the 14th century. Ludden. Fee.
627 U G 5
Northern Renaissance Art
Su, Sp. 5 cl.
Prereq.: 210 or Fine Arts 210 or permission of instructor.
Not open to students with credit for Fine Arts 627.
The art of The Netherlands, France, Germany, and
England from 1400 to 1500—with emphasis on Jan van
Eyck, Rogier van der Weyden, Fouquet, Durer, Holbein,
Bosch, and Breughel. Fee.

628 U G 3
Precursors to the Renaissance Art of Italy
A. 3 cl.
Prereq.: Junior standing.
Not open to students with credit for Fine Arts 628.
The establishment of Florentine and Sienese schools of
painting during the 13th and 14th centuries as
reflected in the works of Giotto and Simone Martini.
Fee.

629 U G 5
Fifteenth Century Italian Art
W. 5 cl.
Prereq.: Junior standing.
Not open to students with credit for Fine Arts 629.
A selective study of painting and sculpture of the
Quattrocento. Cope and Melnikas. Fee.

630 U G 5
Sixteenth Century Italian Art
Su, Sp. 5 cl.
Prereq.: Junior standing.
Not open to students with credit for Fine Arts 630.
A study of the major artists of the High Renaissance
and Mannerist periods in Italy. Cope and Melnikas.
Fee.

631 U G 5
Art of the 17th Century in Europe
A. 5 cl.
Prereq.: Junior standing.
Not open to students with credit for Fine Arts 631.
Baroque Art in Italy, France, Spain, and the Lowlands—
with emphasis on the major artists. Cope. Fee.

634 U G 5
The Art of the 18th Century in Europe
W. 5 cl.
Prereq.: 212 or Fine Arts 212.
Not open to students with credit for Fine Arts 634.
The development of architecture, painting, and
sculpture from the late Baroque and Rococo to
Historicism. Kunin. Fee.

635 U G 5
Nineteenth Century European Art
W. 5 cl.
Prereq.: 212 or 520, or Fine Arts 212 or 520, or
permission of instructor.
Not open to students with credit for Fine Arts 635.
A study of European art from Neoclassicism through
Post Impressionism; emphasizing the study of the
works of the major painters. Keyes and Kunin. Fee.

636 U G 5
Twentieth Century European Art
Su, A, Sp. 5 cl.
Prereq.: 212 or Fine Arts 212 or permission of instructor.
Not open to students with credit for Fine Arts 636.
A study of the major achievements in painting,
sculpture, and architecture since 1900. Fee.

637 U G 5
American Art to 1900
Sp. 5 cl.
Prereq.: 530 or Fine Arts 530.
Not open to students with credit for Fine Arts 637.
A study of the history of art in America from Colonial
times to the end of the 19th century. Keyes. Fee.

638 U G 3
Twentieth Century American Art
Sp. 3 cl.
Prereq.: 212 or 530, or Fine Arts 212 or 530, or
permission of instructor.
Not open to students with credit for Fine Arts 638.
A study of significant developments in 20th century
American architecture, painting, and sculpture. Keyes.
Fee.

670 U G 5
Buddhist Art: Theory and History
A. 5 cl.
Prereq.: 213 or permission of instructor.
An analysis of Buddhism and its bearing on the art of
India, Nepal, Tibet, China, and Japan, and an
opportunity to examine actual objects. J. Huntington.

671 U G 5
The Art of India I
A. 5 cl.
Prereq.: 213 or Fine Arts 213 or 9 cr. hrs. in hist. of art.
Not open to students with credit for 616 or Fine Arts
617.
A cultural art history of India through classical times,
ca. 650 A.D., in terms of monuments, people, and
religious philosophies. Huntington.

672 U G 5
The Art of India II
W. 5 cl.
Prereq.: 671.
Not open to students with credit for 617 or Fine Arts
617.
A cultural art history of post-classical India, Ceylon,
Central Asia, Indonesia, and Indo-China. S. Huntington.
Fee.

673* U G 5
Art of Central Asia
W. 5 cl.
Prereq.: 213 or permission of instructor.
An analysis of the cross currents of style and
iconography that constitute the pre-Moslem art of
Central Asia. J. Huntington.
674 U G 5
Art of Nepal and Tibet
Sp. 5 cl.
Prereq.: 213 or 371 or permission of instructor.
A study and analysis of the major aspects of style, iconography, and historical sequence as found in the arts of Nepal and Tibet. J. Huntington.

677 U G 5
Chinese Art: Buddhist and Pre-Buddhist
A. 5 cl.
Prereq.: 213 or permission of instructor.
Not open to students with credit for 618 or Fine Arts 618.
An analytical study of the Pre-Buddhist and Buddhist art of China documenting both Trans-Asian influences and internal contributions. J. Huntington. Fee.

678† U G 5
Chinese Art: Painting
W. 5 cl.
Prereq.: 213 or permission of instructor.
An analytical study of the traditional schools of Chinese painting with regard to style, formal development, Chinese aesthetics and intellectual history. J. Huntington.

680 U G 3
The Art of Japan
Sp. 3 cl.
Prereq.: 213 or Fine Arts 213 or 9 cr. hrs. in hist. of art.
Not open to students with credit for 619 or Fine Arts 619.
A cultural art history of Japan in terms of monuments, people, and beliefs. J. Huntington. Fee.

693 U G 2-5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Advanced study for students in specialized programs.

694 U G 2-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Group study for students in specialized programs.

704 U G 3
Studies in African Art and Archaeology
A. 3 cl.
Prereq.: 410 or 411.
Repeatable to a maximum of 15 cr. hrs.

710 U G 3
Studies in Art Theory and Criticism
W.
Not open to students with credit for 839.
Investigations of theories of art and their applications. Ludden.

715 U G 3
Research Methods in Art History
A.
Prereq.: 20 cr. hrs. in hist. of art.
Not open to students with credit for Fine Arts 715.
Investigations of source materials, bibliography, concepts, and techniques of research. Cope.

718 U G 5
Studies in Italian Renaissance Art
A. 5 cl.
Prereq.: 515 or 629 or 630, or Fine Arts 515, 629, or 630, or permission of instructor.
Not open to students with credit for Fine Arts 718.
Repeatable to a maximum of 15 cr. hrs.
Selected problems in painting, sculpture, and architecture of Italy in the 14th, 15th, and 16th centuries. Cope and Melnikas. Fee.

722 U G 3
Studies in Ancient Greek and Roman Art
Sp. 3 cl.
Prereq.: 622 or 623 or permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Selected problems in the art of Ancient Greece and Rome, 11th century B.C. to 4th century A.D.

724 U G 3
Studies in Northern Baroque Art
Sp. 3 cl.
Prereq.: 631 or Fine Arts 631.
Not open to students with credit for Fine Arts 724.
Repeatable to a maximum of 9 cr. hrs.
Selected problems in the painting, sculpture, and architecture of Belgium, Holland, Germany, and France in the 17th and 18th centuries. Herzog. Fee.

725 U G 3
Studies in Italian Baroque Art
Su, Sp. 3 cl.
Not open to students with credit for Fine Arts 725.
Selected problems in the painting, sculpture, and architecture of the 17th century. Cope. Fee.

726† U G 3
Studies in Spanish Art
W. 3 cl.
Prereq.: Permission of instructor.
Not open to students with credit for Fine Arts 726.
A selective study of the architecture, sculpture, painting, and minor arts of Spain. Cope. Fee.

737 U G 3
Studies in Modern Art
A. 3 cl.
Prereq.: Either 635, 636, 637, 638, or permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Selected studies in the art of the United States or modern Europe. Fee.
747  
Studies in Northern Renaissance Art  
A. 3 cl.  
Prereq.: 287 or permission of instructor.  
Repeatable to a maximum of 9 cr. hrs.  
Selected problems in the art of the Low Countries,  
Germany, and France from the 14th through the 16th  
centuries.

770  
Studies in Asian Art  
Su, A, Sp. 5 cl.  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 15 cr. hrs.  
Introduction to major research problems in Asian art  
history; specialized bibliography and research  
directions as applied to selected topics. J. Huntington.

H783  
Honors Course  
Prereq.: 4th yr. standing with a grade of A in at least  
half of the hist. of art courses taken with an average  
of B in the remainder; permission of instructor under  
whose supervision the work is to be completed and the  
Honors Committee of the College. At least 2 qtrs. are  
required of candidates for the degree B.A. or B.F.A.  
with distinction in hist. of art. Failure to receive a  
grade of at least B in this course is a disqualification  
for special honors.  
Repeatable to a maximum of 15 cr. hrs.  
A program of study arranged for each student, with  
individual conferences, reports, and Honors thesis.

804  
Problems in the History of African Art  
Sp.  
Prereq.: Permission of instructor.  
Research techniques with emphasis on scholarly  
methods involving extensive search for available  
source materials on African art. Odita.

810†  
Problems in Art Theory and Criticism  
Sp.  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 15 cr. hrs.  
Ludden.

816  
Museum Problems  
W.  
Not open to students with credit for Fine Arts 816.  
An introduction to professional work in museums.

832  
Problems in American Art  
A, W.  
Prereq.: Permission of instructor.  
Not open to students with a maximum of 15 cr. hrs. in  
932 or Fine Arts 932.  
Repeatable to a maximum of 15 cr. hrs.

Medieval and Renaissance Literature  
(See Medieval and Renaissance Studies 888.)

917  
Seminar in Medieval Art  
Sp.  
Prereq.: Permission of instructor.  
Not open to students with credit for Fine Arts 917.  
Repeatable to a maximum of 15 cr. hrs.  
Ludden.

920  
Seminar in Italian Renaissance Art  
W, Sp.  
Prereq.: Permission of instructor.  
Not open to students with credit for Fine Arts 920.  
Repeatable to a maximum of 15 cr. hrs.  
Cope and Melnikas.

930  
Seminar in Modern Art  
A.  
Prereq.: Permission of instructor.  
Not open to students with credit for Fine Arts 930.  
Repeatable to a maximum of 15 cr. hrs.

933  
Individual Studies  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 15 cr. hrs.

994  
Group Studies  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 15 cr. hrs.  
Group studies for students in specialized programs.

999  
Research in History of Art  
Research for thesis and dissertation purposes only.
Home Economics

Office: 229 Campbell Hall, 1787 Neil Avenue

Professors Lund (Director) Dalrymple, Deacon, Dickey, Dirks, Firebaugh, Gilmore (Associate Director), Gorman, Green, Heya, Hubbard, Lapitsky, A. McCormick, Sarbaugh, Taylor, Vivian, and Wilson; Associate Professors Alexander, (Assistant Director), Bailey, Bardwell, Bloom, Convery, Dickerscheid, Everhart, Hunt, Lloyd, Meacham, Millican, and Tapscott; Assistant Professors Andrian, Armstrong, Bowers, Butler, Chipley, Cremer, Herr, Hock, Marshall, Montgomery, and Roush, Instructor, Brault; and Roush, Instructors, Dixon, Evans, Fowler, Linhart, and Mitchell; Adjunct Professors Axline and Bauer.

The courses in Home Economics may be grouped as follows:


Food and Nutrition—110, 310, 313, 314, 413, 589.01, 589.02, 593.01, 593.02, 594.01, 594.02, 596, 616, 616, 690.01, 690.02, 711, 793.01, 793.02, 794.01, 794.02, 797, 803, 810, 813, 816, 993.01, 993.02, 998, 999.

Home Economics Education—441, 442, 443, 445, 589.09, 599.11, 993.09, 993.11, 994.09, 994.11, 690.09, 690.11, 744, 793.09, 793.11, 794.09, 794.11, 797, 844, 844, 845, 845, 942, 946, 946, 993.09, 998, 999.

Management Housing and Equipment—228, 320, 322, 326, 327, 328, 427, 589.05, 589.06, 589.07, 593.05, 593.06, 593.07, 594.05, 594.06, 594.07, 622, 623, 624, 628, 690.05, 690.06, 690.07, 793.05, 793.06, 793.07, 794.05, 794.06, 794.07, 797, 822, 825, 826, 827, 993.05, 993.06, 993.07, 998, 999.

Food Service—320, 320, 431, 435, 589.08, 593.08, 594.08, 630, 632, 633, 634, 635, 690.08, 693.08, 694.08, 797, 830, 832, 993.08, 998, 999.

Textiles and Clothing—270, 274, 371, 374, 470, 471, 574, 589.01, 589.02, 589.03, 593.03, 593.04, 593.06, 594.01, 594.02, 594.03, 594.04, 595, 671, 672, 674, 690.03, 690.04, 792.03, 793.04, 794.03, 794.04, 797, 870, 872, 993.03, 993.04, 998, 999.

General Courses—290, 590

Extension—593.11, 594.11, 690.11, 793.11, 794.11

110  U 5  Elements of Nutrition

Not open to students majoring in home ec. nor students with more than 10 cr. hrs. of chem. Nutritional needs throughout the life cycle. Herr.

GENERAL PREREQUISITES FOR COURSES NUMBERED 200

Unless otherwise indicated, the prerequisites for 200-level courses are 45 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.; or specified course(s) numbered 100-199.

228  U 3  Home Furnishings: Furniture
A. 2-2 hr. cl., 1 2-hr. lab.

Economic factors and trends in materials, construction and finishes; some experience in reconditioning and other techniques. Everhart.

230  U 2  Introduction to Food Service Management
W. 2 cl.

Orientation to field of food service management. Cremer.

270  U 3  Clothing Selection and Costume Design
A, W, Sp. — 2 cl., 1 2-hr. lab.

Prereq.: Art 790 or equiv.

An introduction to costume design with application of aesthetic principles. Baker.

274  U 5  Clothing: Construction Techniques and Needlecrafts
W. — 2 cl., 3 2-hr. lab.

Prereq.: Major standing in Oc. Ther.

Not open to majors in Home Ec.

Experience in finishing of needlecraft and clothing construction which may have therapeutic value. Marshall.

290  U 2  Home Economics as a Profession

The nature and status of home economics as a field of study and as a profession. Alexander.

310  U 5  Fundamentals of Nutrition

Prereq.: Chem. 101 and 102 or equiv.

Not open to students with credit for 110.

Basic information in the science of nutrition as applied to man. Mitchell.

313  U 3  Food in Different Cultures
A. — 3 cl.

Prereq.: 310 or equiv. recommended; 10 cr. hrs. of social science.

Food practices of selected peoples of the world with consideration of the existing social, cultural, and economic conditions. Roush.

314  U 5  Food
A, W, Sp. — 2 cl., 3 2-hr. lab.

Prereq.: 10 cr. hrs. of chem.

Application of chemical and physical principles to food preparation and use. Green. Fee.

320  U 3  Housing

Prereq.: 360 or 10 cr. hrs in social science.

Housing as it affects family living and its in turn affected by family needs, social and economic trends and the physical environment. Everhart.
322 U 5
Household Equipment: Introduction
Su, A, W, Sp.  4 cl., 1 2-hr. lab.
Prereq.: 15 cr. hrs. of natural science.
Principles involved in the selection, construction, operation, and care of household equipment and their relation to the well-being of the family. Bloom and Coveney.

326 U 3
The Consumer and the Market
Su, A.  3 cl.
Prereq.: Econ. 201, and 10 cr. hrs. of social science.
The market from the consumer point of view; relationships of consumption to environmental quality.

327 U 5
Home Management
A, W, Sp.  5 cl.
Prereq.: 3rd yr. standing and Econ. 201 or equiv.
Management process of utilizing resource for family's well-being. Bowers and Lloyd.

328 U 5
Home Furnishings: Principles
A, W, Sp.  3 cl., 2 2-hr. lab.
Prereq.: Art 190, 290, or equiv.
Application of art principles to furnishing a home with consideration of aesthetic, economic, and social factors affecting choice. Everhart.

360 U 5
Family Development
A, W, Sp.  4 cl., 1 hr. arr.
Prereq.: 10 cr. hrs. of social science.
The dynamics of family interaction at each stage of the life cycle; emphasis on developmental tasks, socioeconomic and cultural influences and other family differences. Armstrong and Taylor.

362 U 4
Introduction to Child Development
Su, A, W, Sp.  3 cl., 2 consec. hrs. arr. for nursery school observation.
Prereq.: Psychol. 100 or equiv. recommended. Home Ec. major; non-majors with permission only.
Study of the nature, nurture, and development of children with emphasis on the preschool years. Glauser.

363 U 5
Child Development
Su, A, W, Sp.  5 cl.
Not open to students with credit for 362.
Developmental patterns of children with emphasis on physical, social, and emotional maturity, especially during the formative years; environmental influences and appropriate guidance. Heye and Hock.

374 U 5
Clothing: Design Analysis
A, W, Sp.  2 cl., 6 hrs. lab.
Prereq.: 270, 371, and skill in basic construction processes.
Adaptation of standard patterns to individual proportions; flat pattern designing, and application of principles of design and construction in making garments. Marshall.

413 U 4
Foods: Meal Management
A, W, Sp.  2 cl., 2 2-hr. lab.
Prereq.: 310 and 314.
Nutritional, aesthetic, and social aspects of planning, purchasing, preparing, and serving food to family groups at different income levels. Roush. Fee.

427 U 4
Home Management
Su, A, W, Sp.  5 cl., lab. hrs. arr.
Prereq.: 327 and senior standing in Home Ec.
Report to Room 166 E, Campbell Hall, to make application and to check for eligibility at least two qtrs. in advance.
Application and integration of management principles to operation of a household. Bowers.

430† U 3
Menu Planning for Food Service Establishments
W.  3 cl.
Prereq.: 230 and 413.
Principles and practices of menu planning for school, industrial, and commercial food units; menus planned for each type of institution.

431 U 5
Quantity Food Production and Service
A, Sp.  2 cl., 6 hrs. lab., 2 hrs. arr.
Prereq.: 230, 310, and 314.
Individual experience in application of food preparation principle to quantity producing; use and care of large equipment; standardized formulas and costs; service to the public. Cremer.

435 U 4
Principles of Teaching Applied to Food Service Management
W.  2 2-hr. cl.
Prereq.: 431, Psychol. 100, and permission of instructor.
Principles of education for students whose professional work will require knowledge of techniques for teaching others in non-school situations.

441 U 5
Principles and Methods of Teaching Applied to Home Economics
A, W, Sp.  3 cl., ½ day arr.
Prereq.: 40 cr. hrs. in Home Ec.
Consideration of curriculum, methods of teaching, management, and other problems of the home economics teacher.
Supervised Home Economics Teaching
A, W, Sp. Full time for 1 qtr. for 15 cr. hrs.
Prereq.: 441, and 35 cr. hrs. in Home Ec. and 2.06 cumulative point-hour ratio 2 qtr. immediately preceding.
For vocational certification, students must do their teaching in a vocational center.
Registration with the Teacher Placement Service of the College of Education.
Not open to students with credit for 443.
Guided participation in the responsibilities and activities of the Home Economics teacher in the regular day school and extended school program.

School-Community Problems of the Home Economics Teachers
Su. 3 cr., arr. hrs. for observation and participation.
Prereq.: 441, 442, and permission of instructor.
For vocational certification only.
Not open to students with credit for 442.
Responsibilities and activities of the home economics teacher in the extended school program with emphasis on adult education, home experience, related home economics teacher activities. Dirks.

Supervised Teaching in Home Economics Related Occupations
A, W, Sp. Full time for one quarter.
Prereq.: 431; 45 quarter-hour credits in an area of specialization; 2.25 cumulative point-hour ratio two quarters immediately preceding.
Supervised student teaching in a vocational job training program in the student's area of specialization.

Nursery School Activities
Su, A, W, Sp. 3 cr.
Prereq.: 362 or 463; concur. 463.
Application of principles of development to program planning; modification of activities for age level, ability, experience, group and individual needs. Dickerscheid and Fowler.

Nursery School Practicum
Su, A, W, Sp. 1 conf. hr., 2-2 hr. lab.
Prereq.: 362 and 462.
Repeatable to a maximum of 6 cr. hrs.
Participation in the nursery school as a student teacher apply theory covered in 462. Fowler.

Clothing: Fashion and the Ready-to-Wear Market
A, Sp. 5 cr.
Prereq.: 3rd yr. standing.
Fashion, the ready-to-wear market and current developments in the field of textiles and clothing and their relation to satisfying consumer needs. Marshall and Millican.

Advanced Textiles
A, Sp. 4 cr., 1 hr. lab.
Prereq.: 371.
Not open to students with credit for 571.

Advanced study of chemical and physical textile properties; new developments; standards and testing procedures used in evaluation of textiles. Butler and Lapinsky.

GENERAL PREREQUISITES FOR COURSES NUMBERED 500
Unless otherwise indicated, the prerequisites for 500-level courses are 15 cr. hrs. in courses in the same discipline numbered 200 or higher, or 10 cr. hrs. in courses numbered 200 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 200 or higher in specified allied disciplines; or baccalaureate degree.

Clothing
Su, A, W, Sp. 2 cr., 2-3 hr. lab.
Prereq.: 374.
Evaluation and application of design and fashion principles in relation to tailored garments; quality-price relationship; optimum utilization of materials and resources. Baker and Millican.

Field Work in Home Economics
Prereq.: Senior standing in Home Ec., 2.25 cumulative point-hour ratio, and permission of instructor.
Registration 2 qtr. before scheduling.
Limited to 5 cr. hrs., except in qtrs. and areas indicated below.

H590 Home Economics Colloquia
A. 3 cr.
Prereq.: Eligibility for Honors Program in Home Ec.
Repeatable to a maximum of 9 cr. hrs.
Subjects will be oriented in different quarters to natural science, social science, and general home economics topics.

Individual Studies
Su, A, W, Sp. 1 or more conf.
H993 (Honors) may be available to students enrolled in a College Honors Program or eligible for enrollment.
Prereq.: Minimum of 6 cr. hrs. in subject matter of problem with cumulative point-hour ratio of 2.7 in Home Ec. subjects and permission of instructor.
Repeatable to a maximum of 10 cr. hrs.

Food
3 or 5
Nutrition
3 or 5
Textiles
5
Clothing
15
Home Furnishings and Housing
3 or 5
Household Equipment
5
Home Management
3 or 5
Family Economics
Food Service
3 or 5
Home Economics Education
3 or 5
Family and Child Development
3 or 5
Home Economics Extension
3, 5, or 15
593.06 Household Equipment
593.07 Home Management and Family Economics
593.08 Food Service
593.09 Home Economics Education
593.10 Family and Child Development
593.11 Home Economics Extension

594 U 2, 3, or 5
Group Studies
Su, A, W, Sp. 3 cl.
Repeatable to a maximum of 10 cr. hrs.
594.01 Food
594.02 Nutrition
594.03 Textiles
594.04 Clothing
594.05 Home Furnishings and Housing
594.06 Household Equipment
594.07 Home Management and Family Economics
594.08 Food Service
594.09 Home Economics Education
594.10 Family and Child Development
594.11 Home Economics Extension

595 U 2
Textiles and Clothing Seminar
W, Sp. 2 cr.
Prereq.: 4th yr. standing, and major in textiles and clothing.
Special reports and readings in textiles and clothing which contribute to professional effectiveness and promote integration of information in the two fields.

596 U 2
Food and Nutrition Seminar
Sp. 2 cr.
Prereq.: 4th yr. standing, and major in food and nutrition.
Reports based on current research, recent summaries and articles which give perspective in food and nutrition.

598 U 2
Seminar in Child Development
W. 1 cl.
Prereq.: 360 and 362.
Review, interpretation, and evaluation of current literature and research in defined areas, with emphasis on recommended professional standards in group care of children.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600
Unless otherwise indicated, the prerequisites for 600-level courses are 15 cr. hrs. in courses in the same discipline numbered 300 or higher, or 10 cr. hrs. in courses numbered 300 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 300 or higher in specified allied disciplines.

610 U G 5
Nutrition
W. 5 cl.
Prereq.: 310, Zool. 232, and Biochem. 511.
Modern concepts of normal nutrition. Green.

612 U G 3
Nutrition: Diet Therapy
Sp. 3 cl., other hrs. arr.
Prereq.: 610 or equiv.
Modern concepts of clinical nutrition and abnormalities treated by modification of the diet.

615 U G 5
Experimental Work in Food Preparation
A. Sp. 3 cl., 2-3 hr. lab.
Prereq.: 314, and Chem. 231 or Biochem. 511.

616 U G 3
Nutrition of Infants and Children
Sp. 3 cl.
Prereq.: 610.
Needs of children for good nutrition from the embryonic stage through adolescence.

622 U G 5
Household Equipment: Performance Testing
A. 2 cl., 3-2 hr. lab.
Prereq.: 314, 322, and 5 cr. hrs. in Microbial.
Experimental problems on the performance of the major types of household equipment used in the preparation of food. Hunt.

623 U G 5
Household Equipment: Performance Testing
Sp. 2 cl., 3-2 hr. lab.
Prereq.: 322, 371, or equiv., 4th yr. standing, and permission of instructor.
Experience in the techniques and reporting of experimental investigations dealing with household equipment used in laundering and other cleaning processes. Bloom.

624 U G 5
Household Equipment: The Home Economist in Business
W. 2 cl., 3-2 hr. lab.
Prereq.: 360, 362, and speech communication.
Demonstrations and evaluations of procedures; qualifications for meeting professional requirements of the home economist in business related to household equipment. Bloom.

628 U G 3
Selection of Furnishings for the Home
Sp. 2 cl., 1-2 hr. lab. Field trips arr.
Prereq.: 327, 328, and 371.
Consumers' problems in the selection of home furnishings.

630 U G 5
Selection of Food and Equipment for Institutions
W. 5 cl.
Prereq.: 431 or concur. and Econ. 201.
Principles and standards for selection of food, equipment, and furnishings in institution food service, arrangement and layout. Hubbard.
632 U G 5
Institution Organization and Management
Sp. 3 cl., 6 hrs. lab. arr.
Prereq.: 431, 630 and Bus. Admin. 500.
Principles of business organization and management and principles of learning applied to the management of food service operations; supervised experience in meal management.

635 U G 3
Food Cost Analysis for Institutions
A. 2 2-hr. cl.
Prereq.: 431 and Bus. Admin. 500.
Factors and procedures involved in controlling food and beverage department costs; evaluation of data from records and reports.

662 U G 3
Child Development
W. 2 cl., 2 hrs. arr.
Prereq.: 362, Psychol. 550, and Soc. 434.
Growth and development of children from six through adolescence with emphasis on maturation patterns and individual differences.

663 U G 3
Infant Guidance and Care
A, Sp. 2 cl., 1 2-hr. lab. arr.
Prereq.: 362, Psychol. 550, and Soc. 434.
Pattern of development during infancy and the second year of life, and responsibilities of adults for providing a home environment favoring optimum development.

667 U G 3
Administration of Day Care Centers
Su, A. 3 cl.
Prereq.: 462, 463, or equiv., and permission of instructor.
Program planning to meet developmental level and needs of young children; minimum and recommended standards. Heyde.

671 U G 3
Textiles: Technology
Su, W. 1 cl., 2 2-hr. lab.
Prereq.: 471.
Experience in planning and conducting textile tests and in evaluating resulting data; development, present status, and importance of textile testing. Butler.

672 U G 5
History of Costume and Textiles
A. W. 5 cl.
Prereq.: 471.
A chronological study of costume and textiles from ancient civilization to modern times, with consideration of cultural forces that affected the development. Millican.

674 U G 5
Clothing: Advanced Design Analysis
A, W, Sp. 2 cl., 3 2-hr. lab.
Prereq.: 374 or equiv.
Creative interpretation of dress design terminating in finished garments developed through the media of flat pattern and draping.

690 U G 4
Home Economics Workshop
Su. Full time for 3 wks.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Workshops in the following phases:
690.01 Foods
690.02 Nutrition
690.03 Textiles
690.04 Clothing
690.05 Home Furnishings and Housing
690.06 Household Equipment
690.07 Home Management and Family Economics
690.09 Family Economics Education
690.10 Family and Child Development
690.11 Home Economics Extension

GENERAL PREREQUISITES FOR COURSES NUMBERED 700
Unless otherwise indicated, the prerequisites for 700-level courses are 15 cr. hrs. in courses in the same discipline numbered 400 or higher, plus additional specified courses numbered 600 or higher.

711 U G 3
Nutrition: History
W. 3 cl.
Prereq.: 610 and permission of instructor.
Persons, discoveries, and methods in the evolution of nutrition as a science and a factor in the control of human welfare. Vivian.

744 U G 3
Evaluation in Home Economics
Sp. 3 cl.
Not open to students with credit for 644.
Procedure for appraising student progress in the attainment of objectives, construction of evaluation instruments, analysis, and interpretation of data from evaluation programs.

793 U G 2, 3, or 5
Individual Studies
Su, A, W, Sp. One or more confs.
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
793.01 Food
793.02 Nutrition and Dietetics
793.03 Textiles
793.04 Clothing
793.05 Home Furnishings and Housing
793.06 Household Equipment
793.07 Home Management and Family Economics
793.08 Food Service
793.09 Home Economics Education
793.10 Family and Child Development
793.11 Home Economics Extension

794 U G 2, 3 or 5
Group Studies
Su, A, W, Sp. 3 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
794.01 Food
794.02 Nutrition
794.03  Textiles
794.04  Clothing
794.05  Home Furnishings and Housing
794.06  Household Equipment
794.07  House Management and Family Economics
794.08  Food Service
794.09  Home Economics Education
794.10  Family and Child Development
794.11  Home Economics Extension

797  U G 2-4
Interdepartmental Seminar
(See under Interdepartmental Seminars.)
a. Interdisciplinary approach to mental retardation.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 800 AND 900
Unless otherwise indicated, the prerequisites for 800 and 900-level courses are 30 cr. hrs. in courses in the
same discipline, or 20 cr. hrs. in the same discipline, plus 25 cr. hrs. in specified allied disciplines.

802  G 3 or 5
Seminar in Foods and Nutrition
Prereq.: 610 or 615 and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
a. Research Methods in Food and Nutrition—Su.
b. Energy Metabolism—Su.
Hubbard and Vivian.

810  G 3
Research Methods in Nutrition
A. 3 cl.
Organization, methods, analysis of data and reporting projects in nutrition research, Vivian.

813  G 3
Introductory Food Research
Su, Sp. 1 cl., 2-3 hr. lab.
Prereq.: 615 and Biochem. 511 or equiv.
Individual investigations in food preparation, processing in the home and food storage carried out in
laboratory, analyzed and reported.

816  G 3
Recent Developments in Food and Nutrition Research
Sp. 3 cl.
Prereq.: Biochem. 511 or equiv.
Brief survey of recent research.

822  G 3 or 5
Seminar in Management, Housing, and Equipment
Sp. 3 cl.
Prereq.: 30 cr. hrs. in Home Ec., including 622 or 623 or 825 or 826 depending on emphasis of topic, and
permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
a. Home Furnishings and Housing—A.
b. Home Management and Family Economics—W.
Deacon.

825  G 3
Home Management: Activity Analysis
W, Sp. 2 cl.
Prereq.: 10 cr. hrs. in home management and household equipment or equiv.
Advanced study in application of work principles to design of appliances, work space areas, methods of
work in the home. Maloof.

826  G 3
Family Economic Resources and Functions
Sp. 3 cl.
Prereq.: 326 or equiv.
Principles, major problems, and trends in the economics of the family.

827  G 3
Home Management: Development and Theory
A. 3 cl.
Prereq.: 327.
Historical development and present trends in home management with emphasis on theory and practices.
Deacon.

830  G 3 or 5
Trends in Food Service Management
W. 3 cl.
Prereq.: 20 cr. hrs. in quantity food production, organization and management, experience in food
service management or administrative dietetics.
Interpretation of principles and current research in relation to management of food service organizations
at the policy-making level. Hubbard.

832  G 3 or 5
Seminar in Food Service Management
Su. 1-2 cl.
Prereq.: Graduate standing in Home Ec. and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Topics to be announced. Hubbard.

840  G 3
Research Methods in Home Economics
Su. 3 cl.
Prereq.: Master's degree in home ec.
Nature of research in various areas of the field; criteria for setting up a research problem; techniques
for collecting and analyzing data. Dairymple.

841  G 3
Home Economics in American Education
A. 3 cl.
Prereq.: 441 or equiv. and permission of instructor.
An overview of home economics at the elementary, secondary, higher education and adult levels; general
trends in enrollment, curriculum and guidance, supervision, administration and research.

842  G 3
Home Economics in Higher Education
W. 3 cl.
Prereq.: 841 or equiv.
Present status and function of home economics at the college level; problems in curriculum development;
criteria for effective teaching, guidance, and testing procedures.
843  G 3 or 5
Seminar in Home Economics Education
W. 1-2 cl.
Prereq.: Grad. standing in Home Ec. and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

845  G 3
Supervision of Home Economics Teaching
Su, A. 3 cl.
Prereq.: 845.
For experienced teachers of home economics who are interested in supervising student teachers or in working with home economics teachers in service.

846  G 3
The Teaching of Home Economics
Sp. 3 cl.
Prereq.: 841 or equiv. and permission of instructor.
Home economics in integrated, core, experimental, and other special types of programs.

860  G 3
The Family: The Early Years
A. 2 1/2-hr. cl.
Prereq.: 25 cr. hrs. in sociol. and psychol., or equiv.
Relationships and adjustments in family living with emphasis on the early and expanding stages of the family life cycle. Taylor.

861  G 3
The Family: Middle and Later Years
Su, Sp. 3 cl.
The interrelationship and adjustment of families with emphasis on the middle and later years of the life cycle. Taylor.

862  G 3 or 5
Seminar in Family and Child Development
Prereq.: Grad. standing in Home Ec. and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
 b. Learning. Theory and its Relationship to Nursery Education.  W.

870  G 5
Clothing: Fashion
Su, Sp. 3 cl. plus independent study.
Prereq.: 672 and 25 cr. hrs. in courses in Sociol., Psychol., Econ., or Bus. Admin.
Fashion as a social and economic force—its influence on production, distribution, and consumption of textiles and clothing. Dickey.

872  G 3 or 5
Seminar in Textiles and Clothing
Prereq.: 672 and 870 or 671, or 842 and Ed. 845, depending on emphasis of topic and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
 a. Economics of Textiles.  W.
 b. Social-Psychological Aspect of Clothing.  W.
 Dickey, Lapitsky, and Meacham.

898  G 1
Interdepartmental Seminar
in Nutrition and Food Technology
Sp.
(See under Interdepartmental Seminars.)

899  G 1-5
Interdepartmental Seminar
(See under Interdepartmental Seminars.)

942  G 3
Administration in Home Economics
Sp. 3 cl.
Prereq.: M.S. degree in Home Ec.
Principles, trends, problems, and evaluative criteria related to home economics units in higher education administrative structure; functions, responsibilities, qualifications of home economics administrative personnel. Dalrymple.

946†  G 3
Program Analysis and Design
in Home Economics
Su. 3 cl.
Prereq.: 846 or permission of instructor.
Theoretical approach to program development; innovation and experimentation in program design in home economics at different levels; analysis and restructuring of existing programs; climate and strategies for change. Dirks.

993  G 2, 3 or 5
Individual Studies
Su, A, W, Sp. 1 or more confs.
Prereq.: Permission of instructor.
Problems in various phases of home economics chosen for individual study.
993.01 Food
993.02 Nutrition and Dietetics
993.03 Textiles
993.04 Clothing
993.05 Home Furnishings and Housing
993.06 Household Equipment
993.07 Home Management and Family Economics
993.08 Food Service
993.09 Home Economics Education
993.10 Family and Child Development

998  G Arr.
Research: Thesis
Research for master's thesis.

999  G Arr.
Research: Dissertation
Research for thesis or dissertation purposes only.
Horticulture

Office: 352 Howlett Hall, 2001 Pyfle Court

Professors Rollins (Chairman), Alban, Beattie, Cahoon, Caldwell, Geismann, Gould, Hartman, Hill (Associate Chairman, Wooster), Kawase, Kiplinger, Kretchman, Reisch, Tagama, and Wittmeyer; Associate Professors Berry, Brooks, Galland, George, and Kozel; Assistant Professors Cean, Ferree, McDowell, Peng, Smith, Staley, and Utzinger.

111 U 3
Introduction to Landscape Horticulture
A, Sp. 2 cl., 1-hr. lab.
Value of landscape horticulture to the individual and community including culture, identification, and use of plants in planting design. Kozel.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 200

Unless otherwise indicated, the prerequisites for 200-level courses are 45 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.

Plant Science in Agriculture
(See Agron. 200)
(Offered in cooperation with the Dept. of Hort.)

203 U 3
Horticultural Morphology
A, Sp. 3 cl.
A study of horticultural plant materials emphasizing the interpretation of gross plant structures and their development in relation to cultural practices and the environment. Hartman.

241 U 3
Food Preservation
Sp. 3 cl.
Introduction to the food processing industry; principles involved in the modern methods of assembling, processing, and distribution of food. Gould.

H298 U 5
Plants and Man
W. 4 cl., assigned reading 1 hr.
Prereq.: 5 cr. hrs. Biological Sciences and membership in a College Honors Program or eligibility for membership in a College Honors Program. Not open to students with credit for Agron. 200.
The influence and interaction of limiting factors on plant growth with emphasis on principles utilized by man to increase productivity and value of plant products. Geismann and Herr.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 300 AND 400

Unless otherwise indicated, the prerequisites for 300 and 400-level courses are 90 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.; or specified courses numbered 100-399.

431 U 5
Landscape Horticulture I—Herbaceous Plants
Sp. 3 cl., 2 2-hr. lab.
Prereq.: 203 and Bot. 102.
The identification, culture and landscape use of bulbs, annuals, herbaceous perennials, and garden roses; identification of lawn grasses and turf management are also covered. McDowell.

432 U 5
Landscape Horticulture II—Woody Deciduous Plants
A, Sp. 3 cl., 2 2-hr. lab.
Prereq.: 203 and Bot. 102.
A detailed study of deciduous trees, shrubs and vines, their identification, growth habits, culture, adaptation to environmental conditions, uses, combinations, and management in landscape plantings. Kozel and Reisch. Fee.

433 U 5
Landscape Horticulture III—Woody Evergreen Plants
A, W. 3 cl., 2 2-hr. labs.
Prereq.: 203.
Detailed study of narrow and broadleaf evergreens, their identification, growth habits, culture, uses, and management in landscape plantings; winter characteristics of deciduous plants reviewed. Reisch.

434 U 5
Landscape Horticulture IV—Woody Plants
Sp. 3 cl., 2 2-hr. labs.
Prereq.: 432 and 433.
Woody plant use for specific landscape functions and unusual environment situations; aesthetic features of plants are studied in detail with emphasis on selected major genera. Kozel. Fee.

441 U 5
Processing of Fruit and Vegetable Products
W. 3 cl., 2 2-hr. labs.
Prereq.: Chem. 102 or 122.

442 U 5
Quality Attributes of Fruits, Vegetables, and Related Foods
Sp. 3 cl., 2 2-hr. labs.
Prereq.: Chem. 102 or 122.
Identifying, evaluating, and controlling quality attributes of fresh and processed fruits, vegetables, and related products as to consumer acceptance, nutrition, and use. Gould.

450 U 5
Principles of Vegetable Crop Production
W. 4 cl., 2-hr. lab.
Prereq.: 203.
The production and utilization of vegetable crops, including potatoes, with emphasis on environmental factors which influence growing and handling of these crops. Alban.

461 U 5
Principles of Tree Fruit Production
A. 4 cl., 2-hr. lab.
Prereq.: 203 or equiv.
A study of the fundamental principles of pome and stone fruit production with emphasis on recognition and solution of problems according to modern scientific concepts. Hartman. Fee.
Plant breeding methods and genetic principles applied to horticultural plant improvement, including fundamentals of seed production, variety evaluation, certification, and maintenance. George.

609 U G 5 The Post-Harvest Physiology of Horticultural Crops
A. 3 lec., 2-hr. lab., 1-hr. assigned reading.
Prereq.: Bot. 431.
The basic principles of post-harvest physiology, handling, and storage, of fruits, vegetables, ornamentals, and flowers are stressed along with operation techniques of modern storages. Kretchman.
Fee.

610 U G 3 Weed Control in Horticultural Crops
Sp. 3 cl.
Prereq.: 15 cr. hr. Hort. and 10 cr. hrs. Bot.
A study of environmental and cultural factors which influence weed development in horticultural crops and a review of the principles of chemical and mechanical weed control. Alban.

611 U G 5 Tropical and Subtropical Fruit and Vegetable Production
A. 4 cl., 2-hr. lab.
Prereq.: Senior or graduate standing, minimum of 20 cr. hrs., Biological Sciences, and Agron. 543.
A study of important tropical and subtropical fruits and vegetables, with emphasis on latest technological advances to achieve optimum quantitative and qualitative yields. Hartman and Alban.

621 U G 5 Greenhouse Environment Control
A. 4 cl., 1 3-hr. lab.
Prereq.: 515; Prereq. or concur. Bot. 430.
Not open to students with credit for 422.
Principles and practices of greenhouse and growth chamber operation including construction, heating, cooling, light, photoperiodism, temperature, humidity, ventilation, moisture, soils, nutrition, and pests. Kiplinger.
Fee.

622 U G 5 Commercial Floriculture I—Potted Plants
W. 4 cl., 1 3-hr. lab.
Prereq.: 621 and Bot. 430; prereq. or concur. Bot. 431.
Physiological principles and environmental factors in production of azaleas, begonias, bulbs, chrysanthemums, cyclamen, geraniums, hydrangeas, poinsettias, roses, saintpaulias, and other potted flowering and foliage plants. Kiplinger.
Fee.

623 U G 5 Commercial Floriculture II—Cut Flowers
Sp. 4 cl., 1 3-hr. lab.
Prereq.: 621 and Bot. 430; prereq. or concur. Bot. 431.
Physiological principles and environmental factors in production of asters, carnations, chrysanthemums, orchids, roses, snapdragons and other cut flower crops; analysis of production costs of crops. Kiplinger.
Fee.

624 U G 5 Commercial Floriculture III—Design and Marketing
Sp. 3 cl., 2 2-hr. labs.
Prereq.: 621 and Econ. 201.
Fundamentals of commercial floral design; flower shop management; principles and practices in handling, packaging, and selling florists' crops and supplies through wholesale and retail outlets. Kiplinger and Reisch. Fee.

641 U G 5
Unit Operations in Processing Fruits, Vegetables, and Related Foods I
Su. 3 cl., 2 3-hr. labs.
Prereq.: 441.
Unit processes of handling, grading, cleaning, sorting, peeling, pumping, change in form, and filling as related to commercial processing of fruits, vegetables, and related products. Gould.

642 U G 5
Unit Operations in Processing Fruits, Vegetables, and Related Foods II
A. 3 cl., 2 2-hr. labs.
Prereq.: 441.
Unit processes of extracting, filtering, and emulsifying, carbonating, gassing, enrobing, compounding, forming, and fortifying as related to food manufacture. Crean. Fee.

643 U G 5
Unit Operation in Processing Fruits, Vegetables, and Related Foods III
Sp. 3 cl., 2 2-hr. lab.
Prereq.: 441.
Unit processes of milling, grinding, toasting, extruding, frying, and formulating as related to the commercial processing of potatoes, cereal strains, and related foods. Peng.

644 U G 5
Analysis of Fruits, Vegetables and Related Products
Sp. 2 1-hr. cl., 3 2-hr. lab.
Prereq.: 442 and Chem. 102.
Fundamental principles and techniques of chemical analysis of fruits, vegetables, and products derived from them. Crean.

650 U G 5
Greenhouse Vegetable Crops
A. 3 cl., 4 lab. hrs.
Prereq.: 621.
A study of the origin and development of the vegetable forcing industry and present-day cultural practices with reference to the more important greenhouse vegetable crops. Alban.

652 U G 5
Advanced Vegetable Crops
Sp. 4 cl., 1 2-hr. lab.
Prereq.: 450.
The culture of the principal vegetable crops, including history, plant characteristics, physiology, propagation, climatic and edaphic adaptations, and specialized production technology. Fee.

690 U G 2
Colloquia
A. W. Sp.
Prereq.: Senior standing.
Topic to be announced.

694 U G 2, 3 or 5
Group Studies
A. W. Sp.
Prereq.: Senior or grad. standing.
Special group studies in the fields of fruit crops, vegetable crops, florist crops, landscape horticulture, and processing and technology.

699 U G 2
Junior Seminar
A. W. Sp.
Review and interpretation of research literature.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 700
Unless otherwise indicated, the prerequisites for 700-level courses are 15 cr. hrs. in courses in the same discipline numbered 400 or higher, plus additional specified course(s) numbered 600 or higher.

731 U G 5
Arboriculture
A. 4 cl., 1 3-hr. lab.
Prereq.: 432 and Bot. 431.
Environmental factors affecting plant growth and the planting, fertilization, pruning, cabling, and diagnosis of disorders in commercial arboriculture. cty forestry, park, and industrial grounds maintenance. Reisch. Fee.

733 U G 5
Management of Nursery and Garden Store Operations
Sp. 4 cl., 3-hr. lab.
Prereq.: 433, 621, and Agron. 240.
Detailed consideration of factors involved in site selection and operation of commercial nurseries and garden centers; production and marketing of ornamental plants and related products. Reisch. Fee.

734 U G 5
Physiology of Ornamental Plants
W. 4 cl., 3-hr. lab.
Prereq.: 733 and Bot. 431 or permission of instructor.
Influence and interaction of endogenous and exogenous factors on growth and development of ornamental plants. Kozel.

741 U G 5
Food Regulations and Product Examination
W. 3 cl., 2 2-hr. labs.
Prereq.: 261 and 442.
Food laws, regulations, grade standards, and the technical control of processed foods; interpretation of laboratory analysis for control of product quality. Gould.

794 U G 2
Group Studies in the Processing of Fruits, Vegetables, and Related Food Products
Prereq.: 641, 642, and 741.
Repeatable by undergraduates to a maximum of 8 cr. hrs.
b. Processing Methodology, A. Peng.
c. Packaging Materials and Methodology, W. Geisman.
GENERAL PREREQUISITES FOR COURSES
NUMBERED 800 AND 900
Unless otherwise indicated, the prerequisites for 800 and 900-level courses are 30 cr. hrs. in courses in the same discipline, or 20 cr. hrs. in the same discipline, plus 25 cr. hrs. in specified allied disciplines.

801 G 2 or 3
Advanced Studies in Horticultural Science
Prereq.: Permission of instructor.
  b. Morphological and anatomical studies of vegetative plant parts as influenced by environment. W. Hartman.
  c. Post-harvest physiology of horticultural crops and plants. A. Kretchman.
  d. Advanced vegetable physiology. A. Alban.
  e. Advanced horticultural crop breeding. W. George.
  f. Fruit and vegetable processing and specialty products. A. Gould.
  h. Physiological studies in floriculture crops. A. Kiplinger.

804 G 2
Seminar
A, W.

805* G 4
Seminar in the Historical Literature and Current Developments of Horticulture
A.
Prereq.: 461, 652, 622, or 731.
History and literature of horticulture from the 8th Century B.C. to the present; developments during the 20th Century emphasized; current trends appraised.

811 G 5
Advanced Plant Nutrition I—Macro-nutrients
A. 3 cr., 4 lab., hrs.
Prereq.: Bot. 631 or equiv.
Effect of major nutrient elements exclusive of calcium upon development of horticultural plants; physiological and biochemical changes occurring within plants and diagnosing deficiencies and excesses.

812 G 5
Advanced Plant Nutrition II—Micro-nutrients
W. 2 cl., 2 2-hr. labs., assigned reading 1 hr.
Prereq.: Bot. 631 or equiv.
Effects of deficiencies and excesses of calcium and micro-nutrients upon growth and development of horticultural plants including techniques of detecting and correcting such condition.

887 G 1
Interdepartmental Seminar in Natural Resources
(See under Interdepartmental Seminars.)

898 G 1
Interdepartmental Seminar in Nutrition and Food Technology
Sp.
(See under Interdepartmental Seminars.)

903 G 2, 3 or 5
Individual Studies
Special studies in the fields of fruit crops, vegetable crops, florist crops, landscape horticulture, and processing and technology of fruits, vegetables, and related food products.

999 G Arr.
Research Thesis or Dissertation
Research for thesis or dissertation purposes only.

Hospital Administration
(School of Allied Medical Professions)
Office: 543 School of Allied Medical Professions
Building, 1583 Perry Street

Assistant Professor Johnson (Division Director); Professors Keller, Lechner, and Melling; Assistant Professors Caswell and Lentz; Instructors Bergman, Boisonneau, Butts, Howe, Price, Rosenberg, Sims, and Spath; Clinical Instructors Andrews, Carson, Chanaling, Farrington, Gamma, Kreshek, Pierson, Kline, Mansfield, Mendell, Newkirk, and Saathoff.

800 G 3
Medical Care Organization I
A, Sp. 3 cl.
Prereq.: Permission of instructor.
Analysis of arrangements for the organization, financing, and delivery of medical care services.

801 G 3
Medical Care Organization II
W. 3 cl.
Prereq.: 800.
Issues and problems in medical care organization, with special emphasis on the social, economic, and political environment of the health care delivery system. Johnson and Staff.

802 G 3
Economic Analysis of Health Services
Sp. 3 cl.
Prereq.: Permission of instructor.
Not open to students with credit for 826.
Applications of economic analysis to health services, with emphasis on the microeconomic behavior of decision units in the health sector. Caswell.
810  G 3
Hospital Organization and Management
A.  3 cl.
Prereq.: Permission of instructor.
Not open to students with credit for 825.
Application of organizational theory to health institutions; examination and analysis of the hospital organization in its various forms; consideration of management problems involving departmentalization. Price.

812  G 3
Field Study in Hospital Management
Sp.
Prereq.: 6 cr. hrs. in Hosp. Admin. and permission of instructor.
Methods of management decision making, with externship in a local hospital or health agency for intensive study of a management problem. Bergman, Butts, Howe, and Staff.

820  G 3
Hospital Financial Management
Sp.  3 cl.
Prereq.: Acc. 711 or equiv. and permission of instructor.
Not open to students with credit for 827.
Specialized techniques and problems of financial management in the health service enterprise. Johnson and Staff.

821  G 3
Systems Analysis of Health Services
W.  3 cl.
Prereq.: 809 or permission of instructor.
Applications of systems techniques to health services; forecasting, quality measurement and control, methods improvement, and decision making under conditions of uncertainty. Howland.

831  G 3
Planning for Health Services
A.  3 cl.
Prereq.: Permission of instructor.
Not open to students with credit for 826.
Analysis of hospital planning environment; interrelationships of government, consumers, and providers; public policy issues and legal implications; development of hospital services plan. Lentz.

832  G 3
Planning for Health Facilities
W.  3 cl.
Prereq.: 831 or permission of instructor.
Review of trends in planning, design, construction, and financing of hospitals and other health facilities. Lentz.

850  G 6
Seminar in Hospital Policy and Decision Making
Sp.  3 2-hr. cl.
Prereq.: 18 cr. hrs. in Hosp. Admin. or permission of director.
Not open to students with credit for 840.
Policy process and methods of decision making; assignment and solution of managerial problems; case studies, with emphasis on strategy and implementation. Johnson.

Humanities

294  U 1-6
Group Studies
Prereq.: Permission of Dean.
Repeatable to a maximum of 18 cr. hrs.
Interdisciplinary course under the direct auspices of the College of Humanities involving materials of an interdepartmental or intercollegiate type.

694  U G 1-6
Group Studies
Prereq.: Permission of Dean.
Repeatable to a maximum of 18 cr. hrs.
Interdisciplinary course under the direct auspices of the College of Humanities involving materials of an interdepartmental or intercollegiate type.

Industrial Engineering


Professors Morris (Chairman), Bishop, Giffin, Lebocky (Emeritus), Moore, Pepper, and Rockwell; Associate Professors Kibbee and Neuhardt; Assistant Professors Bond, Clark, Miller, Smith, Swain, and Wendel; Instructor Tait.

201  U 3
Foundry Practice
Sp.  2 cl., 4 lab. hrs.
Prereq.: Ed. 2nd yr. standing or permission of chairman.
Not open to students in College of Engineering.
(Safety glasses must be worn in laboratory.)
Lecture and laboratory coverage of casting technology; bench and machine molding, core making; pouring, cleaning, and surface finishing of castings. Fee.

202  U 5
Machine Shop Practice
A.  Sp.  10 cl. and lab. hrs.
Prereq.: Engr. Gr. 100 or equiv., Ed. 2nd yr. standing or permission of chairman.
Not open to students in College of Engineering.
(Safety glasses must be worn in laboratory.)
Laboratory practice on basic machine tools; course objective is to develop skills and knowledge that are essential for the industrial arts teacher at the secondary level. Fee.

300  U 4
An Introduction to Industrial Engineering and Operations Research
A.  Sp.  5 cl.
Prereq.: Statist. 425; prerequisite or concur. Statist. 426.
Introduction to industrial engineering and the methods of operations analysis and operations research.
301 U 4
Manufacturing Engineering I
A, W, Sp. 2 cl., 6 lab. hrs.
Prereq.: Engr. 3rd yr. 2nd yr. standing and permission of chairman; Division of Design, permission of chairman.
(Safety glasses must be worn in laboratory.)
Fundamentals and interrelationships of the principal manufacturing processes; laboratory work in the areas of foundry, machine tools, heat treating, and welding. Fee.

302 U 4
Manufacturing Engineering II
W, Sp. 3 cl., 4 lab. hrs.
Prereq.: 301 and permission of chairman.
(Safety glasses must be worn in laboratory.)
Aspects of manufacturing engineering; emphasis on economics of process choice, production planning, estimating, inspection, and scheduling in metal fabrication and assembly. Fee.

380 U 2
Junior Inspection Trip
Sp., 1 wk., at end of W. Qtr.
Prereq.: Major standing in Indus. E.
A group visit to various industrial plants; students must register for the course and pay the laboratory fee at the beginning of the Spring Quarter. Fee.

406 U 4
Industrial Quality Control
A, W. 4 cl.
Prereq.: 300 and Statist. 426.
The application of probability theory, statistics, and control theory to problems in product inspection and process control; economic evaluation of quality control techniques. Neuhardt.

485 U 4
Practical Experience in an Industrial Organization
A. 10 wks. during Sa. between 3rd and 4th yrs.
To be obtained in some engineering or industrial organization; the student shall present a satisfactory report upon the work done.

501 U G 4
Man-Machine Systems I
A, Sp. 3 cl., 1 2-hr. lab.
Prereq.: 406.
Analysis and measurement of man-machine systems.

502 U G 4
Man-Machine Systems II
A, W. 3 cl., 1 2-hr. lab.
Prereq.: 501.
Principles of experimental evaluation and prediction of production systems.

503 U G 4
Man-Machine Systems Design
W, Sp. 3 cl., 1 2-hr. lab.
Prereq.: 502.
Workplace, and control and display design; integrating models of man in man-machine systems through design problems.

504 U G 4
Engineering Economic Analysis
A, W. 4 cl.
Prereq.: Acc. 212 and Statist. 426.
Economic analysis of engineering projects and methods of operation; introduction to the analysis of engineering decisions.

505 U G 4
Production Engineering
A, Sp. 2 cl., 5 lab. hrs.
Prereq.: 302.
Fundamentals of production tooling and correlating with design and specifications of the product. Kibbey.

506 U 5
Design of Production Systems
A, Sp. 3 cl., 2 2-hr. lab.
Prereq.: 501; concur. 502.
Integration of the methods and analytical techniques of industrial engineering into the design of a complete production system. Fee.

507 U G 4
Production Programming
W, Sp. 4 cl.
Prereq.: Math. 571.
Not open to students with credit for 602. Mathematical formulation and solution of problems of scheduling, inventory control, logistics, etc.; course covers various linear models. Bishop.

531 U 3
Tool Engineering
A. 2 cl., 4 lab. hrs.
Prereq.: 301.
The design of tools, jigs, and fixtures; the basic elements of fixture design, such as form, locating points, clamping devices, and the use of standardized parts.

532 U 3
Motion and Time Study
W. 2 cl., 1 2-hr. lab.
Prereq.: Bus. Adm. 500 and 630, and Econ. 442.
Not open to students in College of Engineering. The objectives, scope, and techniques of time study and methods analysis are considered from the standpoint of the factory and office supervisor.

534 U G 4
Principles of Industrial Engineering
A, W, Sp. 4 cl.
Prereq.: 3rd yr. standing in Engr.
Not open to majors in Indus. E.
A survey of the industrial engineering phase of manufacturing with emphasis on principles and problem solving methods.
650 U G 3
Analysis for Industrial Engineers
A. 3 cl.
Prereq.: Statist. 496 or equiv.
Use of mathematical techniques; including finite
calculus, Fourier analysis, and assorted transforms in
the analysis of industrial engineering systems. Giffin.

651 U G 3
Optimization Techniques in Industrial
Engineering and Operations Research
A. 3 cl.
Prereq.: 507.
Not open to students with credit for 750.06.
Techniques for formulation and solution of single-stage
and sequential constrained optimization problems,
including substitution, Lagrange multipliers,
Kuhn-Tucker theory, quadratic forms, global extrema,
and dynamic programming. Bishop.

652 U G 3
Analysis of Inventory Systems
W. 3 cl.
Prereq.: Statist. 426 or equiv.
Mathematical analysis applied to single stage
inventory systems using both deterministic and
probabilistic models. Giffin.

653 U G 3
Engineering Data Analysis
W. 3 cl.
Prereq.: 496.
Graphical and other special techniques for estimating
parameters and testing goodness of fit of non-normal
distributions to engineering data. Bond.

654 U G 4
System Simulation with Discrete-State Models
W. 3 cl., 2 lab. hrs.
Prereq.: Statist. 426, Engr. Gr. 200, or Compu. and
Info. Sc. 240 or 241; or permission of instructor.
Analysis of system design problems via discrete-state
computer simulation models; generation of random
variables; design and programming of simulation
models; simulation experimental procedures. Clark.

655 U G 3
System Reliability and Availability
Sp. 3 cl.
Prereq.: Statist. 426 or permission of instructor.
The prediction of system reliability and availability is
studied; introduction of methods for analyzing system
design concepts from the viewpoints of reliability and
availability. Clark.

659 U G 1-6
Individual Studies in Industrial Engineering
Prereq.: 4th yr. standing and permission of instructor.
This course is intended for the advanced student
an opportunity to pursue special studies not offered in
fixed curricula.

694 U G 1-6
Group Studies in Industrial Engineering
Prereq.: 4th yr. standing and permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Advanced topics in the various phases of industrial
engineering.

750 U G 3-18
Advanced Studies in Industrial Engineering
Prereq.: 4th yr. standing and permission of instructor.
Repeatable to a maximum of 24 cr. hrs.; subdivisions
not repeatable.
The student must register for specific classes in areas
as indicated below, and may register for more than
one at a time.
750.01 Job Evaluation and Systems Performance
Measurement
750.02 Organized Labor and Industrial Methodology
750.03 Industrial Applications for Statistics
750.04 Discrete-System Analysis and Control
750.05 Decision Theory
750.06 System Programming and Optimization
750.07 Contemporary Problems in Plant Layout and
Design
750.08 Simulation of Complex Systems
with Continuous-State Models
750.09 Forecasting and Estimating
750.10 Human Factors in System Design
750.11 Organization of Industrial Engineering
Functions
750.12 Production Engineering
750.13 Environmental Stress Problems

811 G 3-12
Methods Engineering
Prereq.: 501 and 502.
Advanced work in one or more special phases of time
study, motion study, job evaluation, wage analysis and
payment systems, and speed and effort rating: the
viewpoint of unions, and problems arising from
labor-management relationships.

812 G 3
Advanced Systems Design
Sp.
Prereq.: 650 and 652, or permission of instructor.
Advanced work in the analysis and design of
production and logistic systems. Giffin.

813 G 3
Advanced Queuing Theory
Sp. 3 cl.
Prereq.: 650 and 842.
Mathematical analysis and design of waiting line
systems emphasizing transient solutions, general
arrival and service distributions, and priority queues
and networks of queues. Giffin.

814 G 3
Stochastic Processes
Used In Systems Engineering
A. 3 cl.
Prereq.: 650 or equiv. and Statist. 520.

815 G 3
Estimation of System Parameters from Time Series Data
W. 3 cl.
Prereq.: Statist. 521 or permission of instructor. Estimation of parameter values for stochastic process models used in systems engineering, analysis of trends and spectral analysis of times series data, computer methods. Clark.

821 G 3-12
Problems in Production Engineering
Prereq.: 505. Advanced work in one or more phases of production engineering involving problems in production design, equipment planning, tool design, and quality control. Kibbey.

828 G 3-12
Advanced Studies in Plant Design and Materials Handling
Prereq.: 506. Advanced work in one or more special phases of plant design and materials handling.

830 G 3
Production Programming I
A. 3 cl.
Prereq.: 842. The application of the mathematics of linear models, determinants, simultaneous equations, and linear programming to industrial engineering problems. Wendell.

831 G 3
Production Programming II
W. 3 cl.
Prereq.: 830, or Math. 571 and permission of instructor. The construction and application of linear optimization models for production, scheduling, and inventory problems. Wendell.

832 G 3
Advanced Production Programming
Sp. 3 cl.
Prereq.: 831. The construction and application of non-linear optimization models for production process design and control. Wendell.

835 G 3
Product Development Experimentation I
W. 3 cl.
Prereq.: 842 and Statist. 641 or Statist. 645 or equiv. Application of linear statistical models to industrial engineering experimentation with emphasis on resource constrained investigations. Neuhardt.

836 G 3
Product Development Experimentation II
Sp. 3 cl.
Prereq.: 835. Continuation of 835; emphasis of heavily constrained experimentation in production engineering and quality control problems. Neuhardt.

842 G 3
Operations Research I
A, W. 3 cl.
Prereq.: Calculus, probability theory and statistical methods, and permission of instructor. Introduction to the nature and problems of operations research and the study of actual case histories in the field.

843 G 3
Operations Research II
W. Sp. 3 cl.
Prereq.: 842. The position of the model in operations research and the study of the important techniques and formal approaches to research problems.

844 G 3
Operations Research III
Sp. 3 cl.
Prereq.: 843. Consideration of topics in operations research including research methodology in the various sciences, and the conduct of actual operations research investigations.

845 G 3
Design of Decision Networks
Sp. 3 cl.
Prereq.: 750.05. Design of networks involving multiple, interacting decision makers including problems of complementarity, coordination, learning, and decentralization. Morris.

851 G 3-12
Personnel Research in Engineering Industries
Prereq.: 750.01 and 750.11. Advanced work in one of the several phases of personnel management in engineering industries.

861 G 3-12
Research in Decision Processes
Prereq.: 504 and 507. Advanced work in decision theory and processes including criterion research, decision making under uncertainty and in conflict situations, and gaming techniques. Morris.

862 G 3
Decision Theory
W.
Prereq.: 750.05 or equiv. Introduction to normative decision models and their applications. Morris.
Industrial Technology
(Faculty and courses listed under Education.)

Interdepartmental Seminars

797  U G P 1-5
Interdepartmental Seminars
Repeatable by permission.
Two or more departments may collaborate in presenting seminars in subjects of mutual interest; topics to be announced.

890  G 2
Interdepartmental Seminar in Developmental Biology
A, W, Sp.  1 2-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 credit hours.
Students will present oral reports and lead discussion on research progress in specific areas of developmental biology; given cooperatively by the Depts. of Botany, Biophysics, Microbiology, and Zoology.

895  G 1-5
Interdepartmental Seminar in Radio Astronomy
Techniques of radio-astronomy; present state of knowledge of the universe as determined by radio-astronomy; given cooperatively by the Departments of Astronomy and Electrical Engineering. Ke, Kraus, and Slettebak.

896  G 1-3
Interdepartmental Seminar in Polar and Alpine Studies
Sp.  1-3 hr. cl.
Permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
A seminar on selected topics involving anthropology, biology, climatology, exploration, geology, glaciology, microbiology, and soils; given cooperatively by the Institute of Polar Studies, Biological Sciences, and the following departments: Agronomy, Anthropology, Civil Engineering, and Geography.

897  G 1
Interdepartmental Seminar in Natural Resources
Repeatable to a maximum of 9 cr. hrs.
A seminar in natural resources conservation; given cooperatively by the School of Natural Resources and the following departments: Agronomy, Agricultural Economics and Rural Sociology, Agricultural Engineering, Geography, Horticulture, and Plant Pathology.
Interdepartmental Seminar in Nutrition and Food Technology

A seminar in nutrition and in related fields of food technology; given cooperatively by the following departments: Animal Science, Dairy Science, Food Science and Nutrition, Horticulture, Physiological Chemistry, Plant Pathology, Poultry Science, and Preventive Medicine, and the School of Home Economics.

Interdepartmental Seminars
Repeatable by permission.
Two or more departments may collaborate in presenting seminars on subjects of mutual interest; topics to be announced.

International Studies

Office: 250 Welding Engineering Laboratories, 190 West 19th Avenue
Center for Undergraduate International Studies
Jan S. Adams (Director); Advisory Committee: A. E. Adams (Humanities), Burgess (Political Science), Chu (History), Hayon (Romance Languages), Kilpatrick (Social and Behavioral Sciences), McCoy (Political Science), Nemzer (Political Science), Smallwood (International Programs), and Twrog (Slavic Languages).

100†

Basic Issues in World Affairs
A, W. 3 cl.
General introduction to contemporary international problems, conducted cooperatively by members of several departments.

230

Introduction to the Soviet Union
A, W, Sp. 5 cl.
A survey of the land, people, history, politics, social institutions, literature, and arts of the Soviet Union, conducted by members of several departments.

235

Introduction to China and Japan
A, W, Sp. 5 cl.
Interdepartmental survey of contemporary Asian civilization; geographic and racial background, historical and cultural heritage, social organizations, economic and political problems, and international relations. Chu.

240

Introduction to Latin America
A, W, Sp. 5 cl.
Interdepartmental survey of Latin American societies, anthropology, economics, history, literature, geography, and agriculture.

245

Introduction to the Modern Middle East
W, Sp. 5 cl.
Interdepartmental survey of the land, people, history, politics, religions, philosophy, social institutions, economic development, and literature and the arts conducted by members of several departments.

250

Introduction to Africa
W, Sp. 5 cl.
Interdepartmental survey of the land, people, history, politics, social institutions, economic development, literature and the arts conducted by members of several departments.

501

Selected Problems in International Studies
W. 2 cl.
Open only to Internat. S. majors or students with equiv. preparation.
Panel discussions, informal conferences, and a reading and research program arranged to meet the special needs of those enrolled.

H783

Honors Course
Prereq.: Senior standing and 40 cr. hrs. in the social sciences including 15 cr. hrs. in courses acceptable for a major in Internat. S., with a grade of A in at least half of these major courses and an average of B in the remainder. Permission of instructor and Honors Committee of the College.
Repeatable to a maximum of 15 cr. hrs.
Informal conferences to allow full scope of the initiative of the student. A special topic is assigned to each student. The results are tested by conferences and special reports. Minimum grade of B required for special honors credit.

Italian

Office: 248 Dieter Cunz Hall of Languages, 1841 Millikin Road
Professors Bulatkin (Chairman), Griffin, and Keller; Associate Professor Mancini; Assistant Professors Alessia and Mattei.

101

Elementary Italian
Su, A, W, Sp. 5 cl.
Elements of Italian grammar with oral and written exercises; attention to ear training and oral practice; elementary reading based on Italian geography, history, and customs.

102

Elementary Italian
Su, A, W, Sp. 5 cl.
Prereq.: 101.
The elements of Italian grammar with abundant oral and written exercises; development of conversational skill; reading, vocabulary building, attention to Italian idioms; modern Italian prose.

103 U 5 Intermediate Italian
Su, A, W, Sp. 5 cl.
Prereq.: 102 or 110.
Review of Italian grammar; reading of short stories and plays; increased attention to development of oral and written proficiency.

104 U 5 Intermediate Italian
Su, A, W, Sp. 5 cl.
Prereq.: 103 or 112.
Intensive practice in oral and written Italian; reading of Italian plays, short stories, and nonfiction of cultural and historical importance; grammar and idiom review.

110 U 10 Intensive Elementary Italian
A, W, Sp. 10 cl.
Prereq.: Permission of dept.
Not open to students with credit for 101 or 102.
Elementary Italian for students wishing to acquire the basic skills in one quarter; intensive drill in form, syntax, vocabulary, and idiom; equivalent to 101 and 102.

112 U 5, 10, 15 Intermediate Italian
Su. 15 cl. Enrollment limited to 20 students.
Prereq.: Permission of chairman.
Full time of student and full fees required.
Equiv. of 101, 102, and 103.
Students with credit for 101 or the equiv. may not register for more than 10 cr. hrs. Students with credit for 102 or the equiv. may not register for more than 5 cr. hrs. Students with credit for 103 or the equiv. may not register for credit.
Elementary and intermediate Italian; intensive drill in forms, syntax, vocabulary, and idiom; reading of short stories and plays in Italian.

193 U 1-15 Individual Studies
Prereq.: Permission of dept.
Repeatable to a maximum of 30 cr. hrs.

194 U 1-15 Group Studies
Prereq.: Permission of dept.
Repeatable to a maximum of 30 cr. hrs.

202 U 5 Italian Conversation and Composition
Sp. 5 cl.
Prereq.: 104 or permission of instructor.

271 U 3 Italian Literature in English Translation:
14th Century
A. 3 cl.
Prereq.: Engl. 100 or equiv.
Not open to majors in Ital.
Reading and interpretation of selections from Dante's Divine Comedy, Petrarch's Canzoniere, and Boccaccio's Decameron; discussion of their relation to the Middle Ages and the Renaissance.

272 U 3 Italian Literature in English Translation:
15th and 16th Centuries
W. 3 cl.
Prereq.: Engl. 100 or equiv.
Not open to majors in Ital.
Readings in such authors as Leonardo, Castiglione, Machiavelli, Ariosto, Tasso; discussion of their place in the Renaissance. Mancini.

273 U 3 Italian Literature in Translation: Modern
Sp. 3 cl.
Prereq.: Engl. 100 or equiv.
Not open to majors in Ital.
Intellectual and literary trends from the end of the 19th century to the present; works by Verga, Svevo, Pirandello, Siface, and Moravia. Mattei.

401 U 3 Review Grammar and Composition
W. 3 cl.
Prereq.: 104 or permission of instructor.
Review of Italian grammar; composition on assigned topics and practice in translation.

402 U 5 Intermediate Italian Conversation and Composition
Sp. 5 cl.
Prereq.: 104 or permission of instructor.
Vocabulary building, practice in speaking Italian, and composition dealing with various aspects of present-day Italian life.

404 U 5 Italian Pronunciation
A. 5 cl.
Prereq.: 104 or permission of instructor.
Standard Italian pronunciation; lectures and practice with corrective exercises; use of phonetic symbols.

421 U 5 Contemporary Italian Drama
W. 5 cl.
Prereq.: 104 or permission of instructor.
Reading and analysis of representative plays of such authors as Pirandello, Betti, and DeFilippo. Mattei.
422  U 5
Contemporary Italian Poetry
Sp. 5 cl.
Prereq.: 104 or permission of instructor.
Reading and analysis of poems representing the
tendency of contemporary Italian poetry
with emphasis upon Montale, Ungaretti, and
Quasimodo. Matteis.

423  U 5
Contemporary Italian Fiction
A. 5 cl.
Prereq.: 104 or permission of instructor.
Narrative prose in Italy since the end of the Second
World War; selected readings from such authors as
Moravia, Vittorini, Pavese, and Cassola. Matteis.

601  U 5
Modern Italian Syntax
Sp. 5 cl.
Prereq.: 401 or permission of instructor.
Allaia.

603  U 5
Advanced Italian Conversation and Composition
A. 5 cl.
Prereq.: 401 or 402, or permission of instructor.
Intensive practice in speaking and writing, based on
contemporary usage.

604  U 3
Italian Phonetics
W. 2 cl., 1 hr. lab.
Prereq.: 404 or permission of instructor.
Training in auditory and oral aspects of Italian
pronunciation; analysis of the phonetic structure of
modern Italian.

621  U 5
Dante
W. 5 cl.
Prereq.: 10 cr. hrs. at the 400 level or permission of
instructor.
Introduction to the reading of the Divine Comedy;
analysis of major episodes.

622  U 5
Petrarch and Boccaccio
W. 5 cl.
Prereq.: 10 cr. hrs. at the 400 level or permission of
instructor.
Historical and aesthetic analysis of Petrarch's poetry;
Petrarchism as a European phenomenon; literary
background of Boccaccio's prose and verse; reading
from the Decameron.

623  U 5
Modern Italian Literature
A. 5 cl.
Prereq.: 10 cr. hrs. at the 400 level or permission of
instructor.
Italian literature from 1800 to 1920; Foscolo, Leopardi,
Manzoni, Verga, Svevo, Carducci, and Pascoli.

624  U 5
Contemporary Italian Literature
A. 5 cl.
Prereq.: 10 cr. hrs. in Ital. literature at the 400 level
or permission of instructor.
Intensive study of fiction, poetry, and drama from
such authors as Moravia, Pavese, Montale, Quasimodo,
Pirandello, and Betti. Matteis.

625  U 5
Italian Literature of the Renaissance
Sp. 5 cl.
Prereq.: 10 cr. hrs. in Ital. literature at the 400 level
or permission of instructor.
Readings in works of representative authors of the
15th and 16th centuries such as Leonardo,
Michelangelo, Castiglione, Machiavelli, Ariosto, and
Tasso. Mancini.

628  U 5
Italian Literature of the 17th and 18th Centuries
Sp. 5 cl.
Prereq.: 10 cr. hrs. in Ital. literature at the 400 level
or permission of instructor.
Readings in selected works of Campanella, Marino,
Galilei, Metastasio, Vico, Goldoni, Parini, and Alfieri.
Mancini.

693  U 1-15
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.

694  U 1-15
Group Studies in Italian
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.

722  U 3
Studies in Italian Literature: 14th Century
Sp. 3 cl.
Prereq.: Grad. students, and by permission of
instructor to seniors majoring in Ital., with credit for
621, 622, or equiv.
Intensive study of one author, major work, or topic
such as historiography, Jacobean poetry, the Viata Nova;
readings in relevant criticism and scholarship.

725  U 3
Studies in Italian Literature:
15th and 16th Centuries
A. 3 cl.
Prereq.: Grad. students, and by permission of instructor
to seniors majoring in Ital., with credit for 625 or equiv.
Intensive study of one author, major work, or topic
such as epic poetry, the Courtly, Poliziano; readings
in relevant criticism and scholarship. Mancini.

726  U 3
Studies in Italian Literature:
17th and 18th Centuries
A. 3 cl.
Prereq.: Grad. students, and by permission of instructor
to seniors majoring in Ital., with credit for 626 or equiv.
Intensive study of one author, major work, or topic such as baroque poetry, Tassoni, Alfieri's theatre; readings in relevant criticism and scholarship.
Mancini.

811  G 3
History of the Italian Language: Introduction
Sp. 3 cl.
Prereq.: M.A. candidates in Itali., others by permission of instructor.
Basic concepts of historical linguistics; the major factors of change in the history of the Italian language from the Roman times to the present. Griffin.

831†*  G 2-5
Seminar in Italian Literature
A.
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

832†*  G 2-5
Seminar in Italian Literature
W. 2 or 5 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

833ª  G 2-5
Seminar in Italian Literature
Sp. 2 or 5 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Mancini.

885†*  G 5
Introduction to Methods in the History and Criticism of Literature
A. 4 or 5 cl.
Selected readings in basic literary history, criticism, and theory, with practice in the use of standard bibliographical aids to scholarship. Mancini.

Medieval and Renaissance Culture
(See Medieval and Renaissance Studies 888.)

Medieval and Renaissance Literature
(See Medieval and Renaissance Studies 889.)

993  G 1-5
Individual Studies in Italian
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

994  G 1-15
Group Studies in Italian
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
Investigation of minor problems in the various fields of Italian literature and language.

999  G Arr.
Research in Italian Language or Literature
Research for thesis or dissertation purposes only.

Japanese

Office: 276 Dieter Cunz Hall of Languages, 1841 Mitchell Road
Professor Li (Chairman), Associate Professor McElrath; Instructors Akatsu and Wright.

101  U 5
Elementary Modern Japanese
A. 5 cl.
Elements of standard colloquial Japanese grammar, with intensive oral and written exercises; introduction to the Japanese writing system (hiragana, katakana, and kanji). Akatsu and Staff.

102  U 5
Elementary Modern Japanese
W. 5 cl.
Prereq.: 101.
Continuation of 102. Akatsu and Staff.

103  U 5
Elementary Modern Japanese
Sp. 5 cl.
Prereq.: 102 or 110
Continuation of 102. Akatsu and Staff.

104  U 5
Intermediate Modern Japanese
A. 5 cl.
Prereq.: 103 or permission of instructor.

105  U 5
Intermediate Modern Japanese
W. 5 cl.
Prereq.: 104 or permission of instructor.
Not open to students with credit for 405.
Continuation of 104. McElrath and Staff.

106  U 5
Intermediate Modern Japanese
Sp. 5 cl.
Prereq.: 105 or permission of instructor.
Not open to students with credit for 406.
Continuation of 105. McElrath and Staff.

110  U 5 or 10
Intensive Japanese
A. 10 cl.
Prereq.: Permission of dept.
Students with credit for 101 or the equiv. may not register for more than 5 cr. hrs. Not open to students with credit for 102.
An accelerated one-quarter course equivalent to 101 and 102.
111 U 5 or 10
Intensive Japanese
W. 10 cl.
Prereq.: 102, 110, or permission of instructor.
Students with credit for 103 or the equiv. may not register for more than 5 cr. hrs. Not open to students with credit for 104.
An accelerated one-quarter course equivalent to 103 and 104.

112 U 5, 10, 15
Intensive Japanese
Su.
Prereq.: Permission of dept.
Full time of student and full fees required.
Students with credit for 101 or the equiv. may not register for more than 10 cr. hrs. Students with credit for 101 and 102 or the equiv. may not register for more than 5 cr. hrs.
Not open to students with credit for 103 or 111. No audit.
An introductory course with emphasis on basic structure taught through oral-aural drill, hiragana, katakana, and a limited number of Japanese characters; equivalent to 101, 102, and 103.

113 U 5 or 10
Intensive Japanese
Sp. 10 cl.
Prereq.: 104, 111, or permission of instructor.
Students with credit for 105 or the equiv. may not register for more than 5 cr. hrs. Not open to students with credit for 106.
An accelerated one-quarter course equivalent to 105 and 106.

114 U 3
Elementary Japanese Conversation and Composition
Sp. 3 cl.
Prereq.: 102, 110, or permission of instructor.
Exercises in pronunciation, vocabulary and sentence patterns studied in 101 and 102, and the materials learned concurrently in 103; conducted predominantly in Japanese.

214 U 3
Intermediate Japanese Conversation and Composition
Sp. 3 cl.
Prereq.: 105 and 114, or permission of instructor.
Exercises in oral expression and composition; drill, discussion, and tape listening using various materials at the second year level; conducted predominantly in Japanese.

231 U 5
Elements of Japanese Culture
Sp. 5 cl.
Taught in English.
Not open to students with credit for 271.
A survey of literature, art, religion, philosophy, and social institutions of the Japanese people from the earliest to the most recent times. Wright.

251 U 5
Classical Japanese Literature in Translation
A. 5 cl.
A lecture and reading course in masterpieces of Japanese literature from the 6th to the 19th century. Wright.

252 U 5
Modern Japanese Literature in Translation
W. 5 cl.
Japanese literature from early 19th century Western influences to present day; emphasis on the novel from Futekichi Shime to Mishima Yukio; modern poetry and drama. Wright.

501 U 3
Classical Japanese I
A. 3 cl.
Prereq.: 105 or permission of instructor.
Not open to students with credit for 651.
A reading of classical literary works such as Hagi, Uji Shui Monogatari, as well as waka poetry McElrath and Staff.

502 U 3
Classical Japanese II
W. 3 cl.
Prereq.: 501 or permission of instructor.
Continuation of 501. McElrath.

503 U 3
Classical Japanese III
Sp. 3 cl.
Prereq.: 502 or permission of instructor.
Continuation of 502. McElrath.

507 U G 5
Advanced Modern Japanese I
A. 5 cl.
Prereq.: 106 or permission of instructor.
Not open to students with credit for 690.
Readings in modern Japanese aiming at acquisition of control of the 1850 characters in common use; translation, composition, character drill. McElrath and Staff.

508 U G 5
Advanced Modern Japanese II
W. 5 cl.
Prereq.: 507 or permission of instructor.
Not open to students with credit for 610.
Continuation of 507. McElrath and Staff.

509 U G 5
Advanced Modern Japanese III
Sp. 5 cl.
Prereq.: 508 or permission of instructor.
Not open to students with credit for 611.
Continuation of 508; supplementary readings in modern Japanese, including an introduction to basic Japanese dictionaries, encyclopedias, and other standard reference works. McElrath and Staff.
514  U 3
Advanced Japanese Conversation and Composition
Sp.  3 cl.
Prereq.: 214 and 508, or permission of instructor.
Lectures, discussion, reports; extensive use of taped materials including news broadcasts, drama, interviews, informal conversations; conducted entirely in Japanese.

621  U  G 3
Social Science Readings in Japanese I
A.  3 cl.
Prereq.: 506 or permission of instructor.
Graded readings in Japanese social science subject matter, including materials from newspapers, periodicals, and learned journals; essentially a language course intended to improve fluency.

622  U  G 3
Social Science Readings in Japanese II
W.  3 cl.
Prereq.: 621 or permission of instructor.
Continuation of 621.

623  U  G 3
Social Science Readings in Japanese III
Sp.  3 cl.
Prereq.: 622 or permission of instructor.
Continuation of 622.

661  U  G 3
Readings in Modern Japanese Literature I
A.  3 cl.
Prereq.: 509 or permission of instructor.
Selected readings in modern Japanese fiction, poetry, drama, literary history, and criticism; essentially a language course intended to improve fluency.

662  U  G 3
Readings in Modern Japanese Literature II
W.  3 cl.
Prereq.: 661 or permission of instructor.
Continuation of 661.

663  U  G 3
Readings in Modern Japanese Literature III
Sp.  3 cl.
Prereq.: 662 or permission of instructor.
Continuation of 662.

680††  U  G 3
Introduction to Japanese Linguistics
A.  3 cl.
Prereq.: 103 and Ling. 601, or permission of instructor.

681*  U  G 3
History of the Japanese Language
A.  3 cl.
Prereq.: 103 and Ling. 601, or permission of instructor.
A survey of the development of the Japanese language from early times to the present. Akatsuka.

693  U  G 1-5
Individual Studies
Prereq.: 503 and 509, and permission of chairman.
Repeatable to a maximum of 15 cr. hrs.
Not a substitute for regular language courses.
Meets individual research needs of students in area studies and East Asian programs.

694  U  G 1-5
Group Studies
Prereq.: 503 and 509, and permission of chairman.
Repeatable to a maximum of 15 cr. hrs.
Not a substitute for regular language courses.
Investigation of minor problems in Japanese language and literature.

698*  U  G 15
Study Tour of Japan
Sp.  15 cl., 2 wks. at OSU; 8 wks. in Japan.
Prereq.: 25 cr. hrs. of Japan, or permission of instructor.
Advanced work in conversation and reading in order to prepare for the tour. In Japan only Japanese will be spoken; some formal instruction will be given daily by the tour leaders.

782  U  G 3
Japanese Phonology
W.  3 cl.
Prereq.: 680, 681, or permission of instructor.
Not open to students with credit for 624.
An analysis of the phonological structure of present-day Japanese with a critical examination of traditional and contemporary works on Japanese phonology. Akatsuka.

H783†  U  3-5
Honors Course
Prereq.: 4th year standing; a record of A in at least half of the Japanese courses taken and an average of B in all courses; permission of instructor under whose supervision the work is to be completed and College Committee on Honors.
Open only to candidates for B.A. in Japanese.
Repeatable to a maximum of 15 cr. hrs.
A program of reading arranged for each student, with individual conference, reports, and honor thesis.

784  U  G 3
Japanese Syntax
Sp.  3 cl.
Prereq.: 680, 681, or permission of instructor.
Not open to students with credit for 625.
A survey of the grammatical structures of present-day Japanese; presentation of syntactic rules within the model of transformational grammar. Akatsuka.
Journalism

Office: 156 Rightmire Hall, 1060 Carmack Road

Professors Hall (Director), Maguire, Pollard (Emeritus), and Ranick; Associate Professors Clarke, Holsinger, MacDonald, Peterson, Siebert, Toran, and Underwood; Assistant Professors Bostwick, Brian, Collins, Drenten, Gauker, Harless, Hudson, Lauer, Sandman, and Schaefer; Instructors Rogers and Tillinghast.

101 U 3
Introduction to Mass Communication
Su, A, W, Sp. 3 cl.
Prereq.: Engl. 100.
Introduction to the mass media in America, especially newspapers and broadcasting; analysis of forces and institutions affecting media behavior, and the resulting quality of performance.

201 U 5
The Art of Communication
A, W, Sp. 5 2-hr. lec./labs.
Prereq.: 101; typing ability required.
Reporting and writing news and features for the print and electronic media.

202 U 3
News Writing
Su, A, W, Sp. 1 cl., 2 2-hr. labs.
Prereq.: 201.
Continuation of 201 with emphasis on more complicated reporting and news writing.

203 U 3
Photojournalism
Su, A, W, Sp. 2 cl., 1 2-hr. lab.
Prereq.: 201.
Reporting the news with a camera; how to recognize, develop, and create picture stories; experience in coordinating words and news pictures; picture editing; layout.

204 U 3
Editing
Su, A, W, Sp. 2 cl., 2-hr. lab.
Prereq.: 201.
Editing of copy, headline writing, re-writing, and general copy desk work.

211 U 4
The Graphics of Communication
A, W, Sp. 2 cl., 2 2-hr. labs.
Prereq.: 201 or permission of instructor.
An introduction to the functions of visual and graphic communication in news in the print and electronic media, involving creative typography, photography, and perception.

421 U 2
Journalism Laboratory—News Editorial
No more than a total of 4 cr. hrs. may be earned in any combination of decimal subdivisions of 421 and 422.
Reporting, editing and photojournalism, primarily for The Lantern.

421.01 Reporting
Prereq.: 202, 204, and 211.

421.02 Editing
Prereq.: 202, 204, and 211.

421.03 Photojournalism
Prereq.: 202, 203, 204, 211, and permission of instructor.

422 U 2
Journalism Laboratory—Broadcasting
Prereq.: 411 or permission of instructor.
No more than a total of 4 cr. hrs. may be earned in any combination of decimal subdivisions of 421 and 422.
Reporting and editing news primarily for broadcast news programs produced by the School of Journalism.

422.01 Radio
422.02 Television

555 U 3
Factual Writing
Prereq.: Engl. 100 or equiv.
Not open to students majoring in Jour.
Gathering and writing factual material; research interviewing, critical analysis, and rewriting are stressed.

555.01 Agriculture
555.02 Home Economics
555.03 Nursing
555.04 Dental-Medical
555.05 General

571 G 5
Basic Journalism for Beginning Graduate Students
Su, A, W, Sp. 3 cl., 2 2-hr. labs.
Prereq.: Grad. standing and permission of instructor.
Credit does not apply to the minimum hours required for graduate study.
Introduction to the literature of journalism, reporting and news writing, editing of copy for mass media, elements of photojournalism and basic typography and production processes.

602 U 3
Magazine Writing
A, W, Sp. 3 cl.
Prereq.: 202 or permission of instructor.
Non-fiction writing for publication in general, professional, trade, or Sunday magazines with emphasis on the full-length magazine article.

605 U 4
The Development of the Mass Media in America
A, W, Sp. 4 cl.
Prereq.: Junior, senior, or grad. standing.
Major currents and trends basic in the shaping of the mass media; famous personalities, foundations, and evolution of a free, responsible press.
607  U G 4
Law of the Press, Radio, and Television
Su, A, W, Sp.  4 cl.
Prereq.: Junior, senior, or grad. standing.
History, principles, and provisions of the law of libel, slander, copyright, and other statutes affecting newspapers, other publications, and broadcasting.

612  U G 3
Special Radio and Television News Programs
A, W, Sp.  2-3 hr. lec. labs.
Prereq.: 422.01 and 422.02.
Planning and production of special news programs; such as the sportscast, the interview, special events, and documentaries.

The Supervision of Journalism in Secondary Schools
(See Ed. 614.)

623  U G 3
The Writing of Reviews and Criticisms
Prereq.: Junior, senior, or grad. standing or permission of instructor.
Study of the work of the dramatic and literary critic, especially on newspapers and magazines; practice in writing reviews and criticisms.

624  U G 3
The Editorial Page
A, W, Sp.  3-1 hr. cl.
Prereq.: Jour. 4th yr. standing or permission of instructor.
Study of the purpose, form, style, and spirit of the editorial; consideration of current events, practice in news interpretation, and other editorial writing.

625  U G 3
Investigative Reporting
Prereq.: Jour. 4th yr. standing or permission of instructor.
Intensive reporting and writing.

626  U G 5
Newspaper Management, Circulation, and Advertising
A, W, Sp.  4 cl., 3-hr. lab.
Prereq.: Jour. 4th yr. standing or permission of instructor.
Consideration of the tasks and problems of newspaper management with emphasis on circulation policies and methods and those affecting advertising.

627  U G 3
Advanced Editing
A, W, Sp.  1 lec. 2-3 hr. labs.
Prereq.: Jour. 3rd yr. standing or permission of instructor.
Repeatable to a maximum of 12 cr. hrs.

Advanced theory and practice in news selection, preparation and display for newspaper, magazine, broadcast and photo-journalism media; emphasis on the responsibility of the journalist.

627.01  News-Editorial
627.02  Radio-Television
627.03  Photojournalism
627.04  Magazine

631  U G 3
Public Relations Principles
Su, A, W, Sp.  3 cl.
Prereq.: Junior, senior, or grad. standing.
Origin and development of public relations, including ethical standards and functional role in modern society; basic principles of public relations theory, philosophy, and operation.

632  U G 3
Case Studies in Public Relations
W.  3 cl.
Prereq.: Junior, senior, or grad. standing.
Specific case studies designed for internal and external audiences; organization, administration of programs and departments; analysis of techniques, channels, media, and applicable research methods.

633  U G 3
Public Relations Practice
A, Sp.  2-3 hr. cl.
Prereq.: 631 or 632.
Open only to declared Jour. seniors or grad. students.
Application of principles to specific public relations problems.

641  U G 3
Reporting Public Affairs
Su, A, W, Sp.  2 cl., 1-2 hr. lab.
Prereq.: 421.01 and junior, senior, or grad. standing in Jour.
Instruction and practice in reporting the news of government, the courts, politics, education, finance, intergovernmental relations, political public opinion, and urban affairs.

642  U G 4
The Mass Media, Society, and Basic Issues
Su, A, W, Sp.  1 cl., 1-2 hr. seminar.
Prereq.: Senior or grad. standing, or permission of instructor.
Analysis of the basic issues affecting news performance; especially ethics, news management, government control, gatekeeping, monopoly, etc.; assessment of the effects of the resulting performance.

643  U G 4
The World Press
A, W, Sp.  3 cl., conf. arr.
Prereq.: Junior, senior or grad. standing, or permission of instructor.
An analysis of newspapers, news agencies, and broadcast news outlets and their roles in the political, economic and cultural development of their nation states.
651 U G 4
Mass Media Research and Theory
Su, A, Sp. 4 cr.
Prereq.: Junior, senior or grad. standing, or permission of instructor.
Theories of mass communication, including models based on examination theory, learning theory, atti
tude theory, and sociocultural theory; field studies, experiments, and content analysis.

693 U G 1-5
Individual Studies in Journalism
Prereq.: Jour. 4th yr. or grad. standing and permission of instructor.
No more than 5 cr. hrs. for undergrad, and 6 cr. hrs. for grad. students may be earned in any combination of
decimal subdivisions.
Students make extensive and significant studies in the field of journalism.
633.01 News-Editorial
633.02 Radio and Television
633.03 Photojournalism
633.04 Magazines
633.05 Public Relations

694 U G 1-15
Group Studies
Repeatable to a maximum of 25 cr. hrs.
Regular class meetings and group discussions of specified problems.
a. Mass Media and Black America.
b. International Journalism Tour.
c. Critical Writing—Theatre, Cinema.

H783 U 3-5
Honors Course
Prereq.: Senior standing, a grade of A in half of the major courses and a B in the remainder; permission of
Director of the School of Journalism and the College Committee on Honors.
Repeatable to a maximum of 15 cr. hrs.
A program for students who are candidates for a degree with distinction in journalism.

801 G 4
Seminar in Journalism
Repeatable to a maximum of 12 cr. hrs.
Integrated reading and research in the fields of journalism.
c. Content Analysis in Mass Communication.
d. Theories of Mass Communication.

802 G 4
Seminar in Journalism
Repeatable to a maximum of 12 cr. hrs.
Integrated reading and research in the fields of journalism.
b. History of Mass Media.
c. Legal Problems in Communication.
d. Literature and Journalism.

803 G 4
Seminar in Journalism
Repeatable to a maximum of 12 cr. hrs.
Integrated reading and research in the fields of journalism.
b. Problems in Radio-Television Journalism.
c. Problems in Photojournalism.
d. Problems in Magazine Journalism.
e. Problems in Public Relations.

811 G 5
The Foreign Press
A. 2 1/2-hr. seminars.
Prereq.: Grad. standing and permission of Director of the School of Journalism and fluency in at least one
foreign language spoken in student's area of specialization.
A comparative study of news systems in the foreign mass media in major world areas, showing them as
products of specific political, economic, and social philosophies.

812 G 5
International Communications
W. 2 1/2-hr. seminars.
Prereq.: Grad. standing and permission of Director of the School of Journalism and fluency in at least one
foreign language spoken in student's area of specialization.
Practices of journalism throughout the world and their role in hindering or advancing the international
dissemination of news; manipulative communication between nations.

813 G 5
Foreign Correspondence
Sp. 2 1/2-hr. seminars.
Research for thesis purposes only.
Prereq.: Grad. standing and permission of Director of the School of Journalism and fluency in at least one
foreign language spoken in student's area of specialization.
Analysis of international developments as reported in world press media as to their origins, issues, and
likely evolution.

899 G 1-5
Interdepartmental Seminar
(See under Interdepartmental Seminars.)
W. Le Duc and Sandman (with Speech Communication).

911 G 5
Foreign Internship
Prereq.: 811, 812, 813, and permission of Director of the School of Journalism.
Repeatable to a maximum of 20 cr. hrs.
Students will spend from two to four quarters abroad, associated with newspapers, news agencies, broadcast
outlets, news magazines, or universities.

999 G Arr.
Research in Journalism
Landscape Architecture

(School of Architecture)
Office: 131 Brown Hall, 100 West 27th Avenue
Professor Tobey, Associate Professor Carpenter; Assistant Professor Dye.

200 U 5
Design of Gardens and Small Properties
A. 2 cl., 9 lab. hrs.
Landscape design for non-professional students, emphasizing the design, construction, and planting of residential properties. Tobey.

201 U 3
History of Landscape Architecture
A. 3 cl.
A critical and historical analysis of the organization of outdoor space to meet varying needs of man from ancient times to the Renaissance. Tobey.

202 U 3
History of Landscape Architecture
W. 3 cl.
A critical and historical analysis of the organization of outdoor space from the Renaissance to the present; emphasis on the landscape architect's role in public service. Tobey.

203 U 3
History of Landscape Architecture
Sp. 3 cl.
The role of the landscape architect in developing the contemporary urban and natural environment. Tobey.

300 U 3
Outlines of Landscape Architecture
A. 3 cl.
Prereq.: 4th yr. standing or permission of instructor.
Not open to candidates for the Bachelor of Land. Arch. degree.
Landscape architecture and environment; relations with other disciplines. Carpenter.

321 U 3
Landscape Construction
A. 3 cl., 6 lab. hrs.
Prereq.: Land. Arch. 3rd yr. standing.
Not open to students with credit for 221.
Application to landscape architecture of physiography, geology, hydrology, and soils. Dye.

322 U 3
Landscape Construction
W. 1 cl., 6 lab. hrs.
Prereq.: 321.
Not open to students with credit for 222.
Continuation of 321. Dye.

323 U 3
Landscape Construction
Sp. 1 cl., 6 lab. hrs.
Prereq.: 322.
Not open to students with credit for 223.
Continuation of 322. Dye.

341 U 6
Elementary Landscape Design
A. 1 cl., 15 lab. hrs.
Prereq.: Arch. 243
Not open to students with credit for 211.
Design of simple outdoor spaces as they relate to natural and cultural environment. Dye.

342 U 6
Elementary Landscape Design
W. 1 cl., 15 lab. hrs.
Prereq.: 341.
Not open to students with credit for 212.
Continuation of 341. Dye.

343 U 6
Elementary Landscape Design
Sp. 1 cl., 15 lab. hrs.
Prereq.: 342.
Not open to students with credit for 213.
Continuation of 342. Dye.

401 U 3
Landscape Architecture Seminar
Sp. 3 cl.
Prereq.: 422.
Not open to students with credit for 501.
Research, discussion, and exercises pertinent to landscape architecture and related fields.

421 U 3
Landscape Construction
A. 1 cl., 6 lab. hrs.
Prereq.: 323.
Not open to students with credit for 521.
Site analysis and planning.

422 U 3
Landscape Construction
W. 1 cl., 6 lab. hrs.
Prereq.: 421.
Not open to students with credit for 522.
Continuation of 421.

441 U 6
Intermediate Landscape Design
A. 1 cl., 15 lab. hrs.
Prereq.: 343.
Not open to students with credit for 511.
Design of complex outdoor spaces as they relate to natural and cultural environment. Tobey.

442 U 6
Intermediate Landscape Design
W. 1 cl., 15 lab. hrs.
Prereq.: 441.
Not open to students with credit for 512.
Continuation of 441. Carpenter.

443 U 6
Intermediate Landscape Design
Sp. 1 cl., 15 lab. hrs.
Prereq.: 442.
Not open to students with credit for 513.
Continuation of 442. Tobey.
Individual Studies in Landscape Architecture
Prereq.: Land Arch. 4th or 5th yr. standing or permission of division.
Repeatable to a maximum of 30 cr. hrs.
For students in the Graduate School and those who wish to pursue special studies in landscape architecture.

Latin

Office: 217 Derby Hall, 154 North Oval Drive

Professors Morford (Chairman), Abbott, Babcock, Gordon, Lamard, Forbes (Emeritus), and Titchener (Emeritus); Associate Professors Davis, Hehm, and Schlam; Assistant Professors Shumaker, Snyder and Tracy; Instructor Sweet.

Also see Classics.

Students with two years of high school Latin should enroll in Latin 103; with three years of high school Latin, including Vergil, in Latin 104; with three years of high school Latin, including Vergil, in Latin 103 and 201. Latin majors should consult the departmental statement in the College of Humanities section of the Colleges of the Arts and Sciences catalog. Placement tests are required for all matriculating (including transfer) students who continue the study of Latin in the University in courses 100, 101, 102, 103, 104, 200, 201, and 202. A placement test will be given on the first day of the quarter. For details see the departmental secretary in 217 Derby Hall.

Latin Review
A. 5 cl.
Prereq.: Placement test.
For those students whose elementary Latin will begin with a review and continue as a preparation for Latin 103.

Elementary Latin
A, W. 5 cl.

Elementary Latin
W, Sp. 5 cl.
Prereq.: 101.

Intermediate Latin
A, W, Sp. 5 cl.
Prereq.: 2 yrs. of secondary school Latin, or 102, or 050. Intermediate readings with emphasis on prose authors of the 1st century B.C.

Intermediate Latin
Su, A, W, Sp. 5 cl.
Prereq.: 3 yrs. of secondary school Latin, or 103, or 112. Intermediate readings with emphasis on the poetry of the Augustan Age.

Intensive Introduction to Latin
W. 10 cl. and 10 or more hrs. of supervised study.
Full time of student and full fees required. Equiv. of 101, 102, and 103. Students with credit for 101 or the equiv. may not register for more than 10 cr. hrs.
Students with credit for 101 and 102 or the equiv. may not register for more than 5 cr. hrs. Students with credit for 103 or the equiv. may not register for credit.

Latin Lyric
W. 5 cl.
Prereq.: 104 or equiv. in secondary school Latin.
Selections from the lyric poetry of Catullus and Horace. Babcock.

Essay and Biography
A. 5 cl.
Prereq.: 104 or equiv. in secondary school Latin.
Reading of at least one complete prose work selected from the following authors: Cicero, Nepos, Sallust, Seneca, Suetonius, or Tacitus. Sweet.

Latin Comedy
Sp. 5 cl.
Prereq.: 104 or equiv. in secondary school Latin.
Selected plays of Plautus and Terence.

Roman Historians
W. 3 cl.
Prereq.: 2 courses at 200 level, or permission of instructor.
Selected readings from at least one of the following: Caesar, Livy, or Tacitus.

Elegy and Epigram
A. 3 cl.
Prereq.: 2 courses at 200 level, or permission of instructor.

Satire
Sp. 3 cl.
Prereq.: 2 courses at 200 level, or permission of instructor.
The development of Roman satire with emphasis on Horace and Juvenal.

Grammatical Review
A. 3 cl.
Prereq.: 2 courses at 200 level.
312 U 3
Intermediate Latin Prose Composition
W. 3 cl.
Prereq.: 4 courses more advanced than 104, one of which must be 303; and at least 2 courses from 304-305-306.

339* U 3
Lucretius' De rerum natura
A. 3 cl.
Prereq.: 2 courses at 200 level, or permission of instructor.

340* U 3
Roman Oratory
W. 3 cl.
Prereq.: 2 courses at 200 level, or permission of instructor.
Readings from the speeches of Cicero or of the historians. Abbott.

344* U 3
Ovid, Metamorphoses
W. 3 cl.
Prereq.: 2 courses at 200 level, or permission of instructor.
Davis.

501 U G 5
Elementary Latin for Graduate Students
A. 5 cl.
Prereq.: Grad. standing or permission of instructor.
Basic Latin grammar and syntax for mature students proceeding to work in non-classical fields using Latin sources. Snyder.

502 U G 5
Intermediate Latin for Graduate Students
W. 5 cl.
Prereq.: Grad. standing or permission of instructor; Grade of C or above in 501 or equiv. preparation by a placement test.
Credit does not apply to the minimum hours required for the master's or doctoral degree. No audit.
Continuation of 501 with reading of longer and more difficult texts as preparation for 625. Snyder.

603† U G 3
Advanced Reading
Sp. 3 cl.
Prereq.: 4 courses more advanced than 104.

612† U G 3
Advanced Latin Prose Composition
A.
Prereq.: 312 or equiv.

615 U G 3
Roman Politics: Caesar and Cicero
A. 3 cl.
Prereq.: 4 courses more advanced than 104.
 Especially recommended for prospective secondary school teachers.

Studies of the political events leading to the collapse of the Republic based on readings from Caesar and Cicero. Hartm.

616 U G 3
Studies in Vergil
Sp. 3 cl.
Prereq.: 4 courses more advanced than 104.
Especially recommended for prospective secondary school teachers. Lenardon.

625 U G 3
Introduction to Medieval Latin
Sp. 3 cl.
Prereq.: For departmental majors, four courses more advanced than 104; for others: 2 yrs. of secondary school Latin, or Latin 112, and a reading knowledge of a modern Romance language or Ger.
Extensive reading in texts illustrating the history of Latin language and literature from the fourth through the thirteenth century. Schläm.

693 U G 1-6
Individual Studies in Latin
Prereq.: 4 courses more advanced than 104.
Repeatability to a maximum of 15 cr. hrs.
Passages for reading and topics for investigation will be selected to meet the needs of individual students.

694 U G 1-6
Group Studies in Latin
Su, A.
Prereq.: 4 courses more advanced than 104 or permission of chairman.
Repeatability to a maximum of 20 cr. hrs.
Babcock and Tracy.

699† U 3
Senior Seminar
Sp. 2 1/2 hr. cl.
Prereq.: Sr. standing or permission of chairman.
Seminar for senior majors with particular emphasis on one author or genre.

GENERAL PREREQUISITES FOR COURSES NUMBERED 800 AND ABOVE
Prerequisites for admission to courses numbered 800 and above are graduate standing and permission of the chairman.

800 G 3
Proseminar
A.
Required of all grad. students.
Students may not receive credit for both Latin 800 and Greek 800. An introduction to the materials and methods of research; the history of classical scholarship; individual assignments in bibliographical problems. Abbott.

862 G 4
Plautus and Terence
A.
Abbott.
803  G 4
Horace
W.
Babcock.

804†  G 4
Tacitus
Sp.

805  G 4
Seneca
Sp.
Abbott.

806†  G 4
Livy
W.

807†  G 4
Petronius and Apuleius
Sp.
Schlam.

808†  G 4
Lucretius
A.
Snyder.

809†  G 4
Lyric and Elegiac Poetry
Su.

810†  G 4
Sallust
A.
Morford.

811†  G 4
Juvenal
W.
Morford.

812†  G 4
Vergilian Studies
Sp.

820†  G 3
Introduction to Historical Latin Grammar
A.
Abbott.

827†  G 3
Vulgar Latin
Sp.
Prereq.: Grad. standing in Latin, or French 812, or equiv. linguistic basis.
Abbott.

850†  G 4
History of Roman Literature
A.
Lectures and assigned reading in literary histories on the development of Roman literature; required and suggested passages for translation in each author studied; weekly reports.

851†  G 4
History of Roman Literature
W.
Continuation of 850.

852†  G 4
History of Roman Literature
Sp.
Continuation of 851.

855†  G 3
Latin Epigraphy
Sp.
Babcock.

856†  G 3
Topography of Rome
Sp.
The topography and archaeology of Ancient Rome as background to Roman history and literature.
Morford.

860  G 3
Palaeography
W.
Schlam.

861†  G 3
Textual Criticism
W.
Prereq.: 860.
Abbott.

870†  G 3
Seminar in Latin Literature
A. 1-2 hr. Cr.
Prereq.: Permission of instructor.
Open only to secondary school teachers.
Repeatable to a maximum of 30 cr. hrs.
Readings and discussions around a chosen subject designed to enrich the classroom work of secondary school teachers.

Medieval and Renaissance Culture
(See Medieval and Renaissance Studies 888.)

Medieval and Renaissance Literature
(See Medieval and Renaissance Studies 889.)

993  G 1-4
Individual Studies in Latin
Repeatable to a maximum of 20 cr. hrs.
Assigned reading and individual research.
503 P 3

Contracts
A, W, Sp., 3 cr.; 3-qtr. sequence; credit given on completion of 9 cr. hrs.
Must enroll to a maximum of 9 cr. hrs.
Remedies for breach; offer and acceptance; consideration; third party beneficiaries; assignment of rights and delegation of duties; conditions; impossibility and frustration; statute of frauds. Caldwell, Cicins, Kindred, and Nordstrom.

504 P 2-4

Torts
A. 2 cr., W, Sp., 3 cr. or A, W, or W, Sp., 4 cr., 3 cr.
2-qtr. sequence; credit given on completion of 8 cr. hrs.
Must enroll to a maximum of 8 cr. hrs.
Trespass to person; negligence; misrepresentation; nuisance, strict liability; liability insurance; alternatives to the fault system; and federal and state regulation of traffic safety. Gellner and Miller.

505 P 3

Property I
A, W, 3 cr.; 2-qtr. sequence; credit given on completion of 6 cr. hrs.
Must enroll to a maximum of 6 cr. hrs.
Incidents of ownership as applied to both real and personal property; possessory interests; concurrent interests; marital interests; future interests; contractual modification of these interests. Callahan, R. Lynn, and Simmons.

506 P 3

Property II
Sp. 3 cr.
Acquisition and transfer of ownership; adverse possession; conveyances (deeds, mortgages, and leases); intestacy; wills; the recording systems; title registration. Callahan and R. Lynn.

507 P 3

Civil Procedure
A, W, Sp., 3 cr., 3-qtr. sequence; credit given on completion of 9 cr. hrs.
Must enroll to a maximum of 9 cr. hrs.
Civil procedure in state and federal courts; development of equity; abolition of common law forms of action; merger of law and equity; jurisdiction; venue. Fink, Walker, and Wells.

510 P 3

Constitutional Law
W, Sp., 3 cr., 2-qtr. sequence; credit given on completion of 6 cr. hrs.
Must enroll to a maximum of 6 cr. hrs.
Functional study of the major substantive, methodological, and federalistic limitations upon governmental power obtaining under practice of judicial review. Laughton, Rosem, and Schwarz.
511 Legal Research
A. Use of law books, both English and American; problems in the use of reports, statutes, selected annotated cases, texts, encyclopedias, digests, dictionaries, periodicals, and citation books. Pollack.

512 Introduction to Federal Income Taxation
A. 3 cl.
Basic topics in federal income taxation under Internal Revenue Code, Income Tax Regulations, administrative rulings, and cases including research problems, and consideration of tax policies. Rose, Shipman, and Slain.

600 Appellate Practice II
W, Sp. 1 or 2 qtr. sequence; 1 cr. hr.
S or U grade given on completion of second-year Moot Court Program.
Preparation of a brief and presentation of an oral argument to a panel comprising members of law faculty, bench, and bar. Herman and Moot Court Governing Board.

602 Legal Process
W. 3 or 4 cl.
Comparative evaluation of law-making by private parties, courts, legislatures, and administrative agencies; retroactivity; adherence to precedent; purposes of legislation; statutory interpretation. Pollack.

603 Evidence
A, W. 3 cl. or W, Sp. 3 cl.; 2 qtr. sequence; credit given on completion of 6 cr. hrs.
Must enroll to a maximum of 6 cr. hrs.
Survey of rules of evidence; particularly demonstrative, testimonial, and circumstantial proof; qualification and examination of witnesses; privilege; relevancy; documents; hearsay rule and its exceptions. Callahan, Rutledge, and Slagle.

604 Pleading
A, Sp. 3 cl.
Pleading under codes and Federal Rules of Civil Procedure; requirements of pleadings; variance and amendments; defenses; denials and new matter; counterclaiims; reply; demurrer; motions; interrogatories; joinder. Slagle and Wills.

605 Commercial Paper
W. 3 cl.
types of commercial or negotiable paper; transfer; purchase and payment in due course, discount and security. Clovis and Nordstrom.

606 Federal Income Taxation
Study of federal income tax; concept of taxable gross income; deductions; reporting methods; capital gains and losses; treatment of corporations and shareholders, partnerships, and trusts.

606.01 Federal Income Taxation
A. 4 cl.
Not open to students with credit for 606.02.
Traditional federal income taxation course with class time limited to one quarter. Rose.

606.02 Federal Income Taxation
A, W. and Sp. 3 cl.; 2 qtr. sequence; credit given on completion of 6 cr. hrs.
Must enroll to the maximum of 6 cr. hrs.
Not open to students with credit for 606.01.
Consideration of the basic material covered in 606.01 with extended coverage in certain areas, including practice and procedure, partnerships and corporations. Rose, Shipman, and Slain.

607 Business Associations
A, W. 2-5 cl. or W, Sp. 2-5 cl.; 2 qtr. sequence; credit given on completion of total cr. hrs.
Must enroll to maximum cr. hrs. assigned.
Not open to students with credit for 632.
Forms of business organizations; planning corporate and other relationships for commercial and industrial purposes. Schwarz and Slain.

609 Sales
A. 3 cl.

610 Secured Transactions
Sp. 3 cl.
Prereq.: 609.
Emphasis on the Uniform Commercial Code; financing of goods, intangibles, and proceeds; validity of and perfection security interests; priorities and remedies. Clovis, Lawson, and Nordstrom.

611 Administration of Criminal Justice
W, Sp. 4 cl.
Not open to students with credit for 640 or 641.
Processes of criminal justice from arrest to parole and probation; impact upon traditional practices and procedures resulting from major decisions of the Supreme Court of the United States. Herman.

612+ Admiralry Law
Su. 3 cl.
Admiralty jurisdiction, injuries to seamen and maritime workers; bills of lading; charter parties; salvage; general average; limitation of liability.

613 Labor Law
A. W. 4 cl.
Not open to students with credit for 630.
Collective bargaining processes and duty to bargain; grievance arbitration; legal limitation on economic pressures, including interferences with bargaining, strikes, picketing, and boycotts. Rutledge.
Comparative Law—Western Europe
W. 2 cl.
Substantive and procedural aspects of foreign legal systems in comparison with American law. Kindred.

Comparative Law—Latin America
W. 3 cl.

Estate-Gift Taxation
W, Sp. 3 cl.
Federal gift and estate taxation; federal tax practice; interrelationships of death and gift taxes with federal income taxes. Glander and R. Lynn.

Insurance
A. 3 cl.
Insurance law and practice with particular reference to fire, life, and automobile insurance; insurable interest; warranties and representations; waiver and estoppel; construction standard policies. Callahan.

International Law
A. or A. W. 1 or 2-qtr. sequence for the minimum of 3 cr. hrs. and the maximum of 6 cr. hrs. depending on course offering.
Current problems in international law; international agreements; status of states and individuals; recognition; jurisdiction and procedural prerequisites to assertion of international claims. Quigley.

Jurisprudence
Sp. 3 cl.
Jurisprudential thought as represented by general theories of or about law; assessment of leading jural doctrines; relationship to social control policy and to legal precepts. Pollack.

Real Property Mortgages
W. 3 cl.
Mortgages and their use as a security device in real property transactions; common mortgage provisions; methods of enforcement of rights; “equitable” mortgages. Lawson.

State and Local Taxation
Sp. 3 cl.
Legal problems arising in property, excise, income, and estate-inheritance taxation; tax administration and procedure. Glander.

Federal Antitrust Law

Federal Antitrust Law
A. 5 cl.
Not open to students with credit for 623.02 or 623.03.
Condensed and basic coverage of federal antitrust law with class time limited to one quarter.

Federal Antitrust Law—Restraint of Trade
A. 3 cl.
Not open to students with credit for 623.01.

Federal Antitrust Law—Monopolies and Mergers
W. 3 cl.
Not open to students with credit for 623.41.

Taxation of Foreign Income
Sp. 3 cl.
Taxation of individuals and business operating in United States and abroad; jurisdiction, income source, foreign tax credit; treaty structure; special statutory entities for foreign trade.

Copyright Law
A. 3 cl.
Protection of literary, musical, artistic, and commercial property under common law; the federal copyright statute and related legislation. Day.

Law and the United Nations
Sp. 3 cl.
Establishment of the United Nations, conditions of access, and performance of various functions in the decision process by Security Council, General Assembly and International Court.

American Legal History
Sp. 3 cl.
Studies in history of American law and exploration of relationship between development of the legal system and rise of an industrial society. Simmons.

Legal Problems of Financial Information
A. 3 cl.
Substantive law problems involving financial information in the basic context of partnership and corporation law and the Internal Revenue Code. Rose.

Legislation
A. Sp. 3 cl.
Roles of the lawyer in the legislative process; legislative organization, jurisdiction, and procedure; formation of legislative policy; legislative drafting, statutory interpretation. Caldwell.
630  P 1-5
Labor Law and Practice
A. W. 1-5 cr.; 1 or 2-qr. sequence; credit given on completion of 5 cr. hrs.
Must enroll to a maximum of 6 cr. hrs.
Not open to students with credit for 631.
Law and practice in labor-management and union-employee relations; self-organization; unfair labor practices; arbitration; emergency disputes; public employment and union internal affairs. Bernstein.

631  P 3
Estate Planning
A. W. or W. Sp. 3 cr., 2-qr. sequence; credit given on completion of 6 cr. hrs.
Must enroll to a maximum of 6 cr. hrs.
Creation and characteristics of trust and future interests; class gifts; powers; rules against perpetuities; techniques and restrictions suggested by estate and gift taxes. R. Lynn and Mayer.

632  P 3
Corporations
A. W. or W. Sp. 3 cr., 2-qr. sequence; credit given on completion of 6 cr. hrs.
Must enroll to a maximum of 6 cr. hrs.
Not open to students with credit for 607.
Formation; rights and duties of directors, officers, and shareholders; derivative suits; issuance and transfer of securities. Kozyris and Spitz.

633  P 3
Criminal Law
A. W. or W. Sp. 3 cr., 2-qr. sequence; credit given on completion of 6 cr. hrs.
Must enroll to a maximum of 6 cr. hrs.
Not open to students with credit for 509.
Criminal laws as means of attaining socially desirable ends, stressing criminal behavior and handling of those who engage in that behavior. Getner, Herman, and Quigley.

634  P 3
Family Law I
A. 3 cr.
The law applicable to children, including a study of agency and juvenile court treatment of dependent, neglected, abused, unruly, and delinquent children. Kindred.

635  P 3
Family Law II
W. 3 cr.
Problems of the marriage relationship, including marriage, annulment, divorce, custody, intra-family relationships, and relation of family members with others. Kindred.

637  P 3
Legal History
W. 3 cr.
Comparative studies in history of law and exploration of relationship between development of legal systems and societal structures. Murphy.

638  P 3
Legal Problems in Real Estate Financing
W. 3 cr.
Not open to students with credit for 625.
Mortgages and their use as security devices in real property transactions; emphasis upon various devices for financing real estate acquisitions and developments. Lawson and Murphy.

639  P 3
Urban Housing
A. 3 cr.
Housing needs of the urban poor considered in the light of the rights, remedies, and resources of the legal system. Simmons.

640  P 3
Criminal Justice I
A. W. 3 cr.
Not open to students with credit for 611.
Police practices including search, seizure, arrest, interrogation, line-ups, and entrapment. Herman and Jacob.

641  P 3
Criminal Justice II
Sp. 3 cr.
Study of proceedings in felonies from preliminary hearing through post-conviction remedies; double jeopardy. Herman and Rosenblatt.

642  P 2-6
Legal Problems of the Poor
2-6 cr., or 2- or 3-qr. sequence; credit given on completion of total credit given. Repeatable; decimal sequences not repeatable.
Study of law, legal institutions, and policy issues of particular relevance to selected problems of the poor.

642.01 Legal Problems of the Poor: Basic  P 2 or 3
A. W. Sp. 2 or 3 cr., 2- or 3-qr. sequence; credit given on completion of 6 cr. hrs.; must enroll to a maximum of 6 cr. hrs.
Prereq.: 639, 720, 634, 635, 613, and/or 630 recommended.
Not open to students with credit for 643.01.
Examination of the causes and effects of poverty in relation to the law, legal institutions, and public policy. Champlin and Jacob.

642.02 Legal Problems of the Poor: Remedies  P 3
Sp. 3 cr.
Prereq.: 639, 720, 733, 734, and 710 recommended.
Not open to students with credit for 643.02.
Examination of civil remedies available to redress wrongs perpetrated on the poor including parties, class actions, standing, and equitable remedies. Champlin.

642.03 Legal Problems of the Poor: Corrections  P 3
A. 3 cr.
Prereq.: 633, 640, 641, 733, and/or 734 recommended.
Not open for students with credit for 643.03.
Consideration of legal problems of prisoners in the prison-parole system. Jacob.
643  P 2-6
Legal Problems of the Poor
2-6 cr. 1-, 1-2-, or 3-tqr. sequence; credit given on completion of total cr. hrs.
Repeatable; decimal sequences not repeatable.
Extended study of law, legal institutions, and policy issues of particular relevance to selected problems of the poor.

643.01 Legal Problems of the Poor: Basic  P 2 or 3
A, W, Sp. 2 or 3 cr.; 2- or 3-tqr. sequence; credit given on completion of 6 cr. hrs.; must enroll to a maximum of 6 cr. hrs.
Prereq.: 639, 720, 634, 635, 613, and/or 630 recommended.
Not open for students with credit for 642.01.
This course is the same as 642.01, except that this number will be utilized by those who intend to enroll in 738.02.
Extended examination of the causes and effects of poverty in relation to the law, legal institutions, and public policy. Champlin and Jacob.

643.02 Legal Problems of the Poor: Remedies  P 3
Sp. 3 cr.
Prereq.: 639, 720, 733, 734, and 710 recommended.
Not open to students with credit for 642.02.
Extended examination of civil remedies available to redress wrongs perpetrated on the poor including parties, class actions, standing, and equitable remedies. Champlin.

643.03 Legal Problems of the Poor: Corrections  P 3
A. 3 cr.
Prereq.: 633, 640, 641, 733, and/or 734 recommended.
This course is the same as 642.03 except that this number will be utilized by those intending to register in 738.03.
Extended consideration of legal problems of prisoners in the prison-parole system. Jacob.

644  P 3
Agency and Employment
Sp. 3 cr.
A system-descriptive approach to the common incidents of employment, partnership, and other agencies. Slain.

694  P 1-6
Group Studies
Repeatable to a maximum of 20 cr. hrs.
Group study in selected areas of the law.

701†  P 3
Advanced Legal Research
Research techniques providing basic experience in analyzing legal questions, using appropriate publications, and in reaching competent solutions to legal problems. Pollack.

702  P 3 or 4
Restitution
Sp. 3 or 4 cr.
Restitutionary remedies available for tort, misrepresentation, breach of contract, and for benefits conferred voluntarily, under duress or mistake, or in partial performance of contract. Murphy and Nordstrom.

704  P 3
Trial Practice
Prereq.: 603 and 604.
State and federal procedures in civil or criminal causes; individual student practice in the trial to a jury of a civil or criminal case. Gettner, Rutledge, Sigle, and Walker.

705  P 3
Bankruptcy
A. 3 cr.
Methods used for the liquidation of debtors' estates, emphasizing first seven chapters of the Bankruptcy Act. Cavendish and Shipman.

706  P 3 or 4
Conflict of Laws
A. 3 or 4 cr.
Private law pertaining to jural relations containing one or more foreign elements; jurisdiction; foreign judgments; domicile; choice of law; torts; workmen's compensation acts; contracts; property; family law; decedents' estates. Kozyris and Miller.

707  P 3
Administration of Decedents' Estates
W. 3 cr.
Probate and contests of wills; jurisdiction; effect and necessity of administration; inventory and assets; contracts; sales and investments by personal representatives; claims; accounting and distribution. Wills.

708  P 4
Arbitration Law and Practice
A. 4 cr.
Commercial and labor arbitration under Ohio and federal arbitration statutes; drafting arbitration clauses; conduct of proceedings; arbitrable issues; court enforcement or impeachment of awards. Bernstein.

709  P 3
Regulation of Security Distributions
A. 3 cr.
Prereq.: 607 or 632.
Analysis of Security Act of 1933 and pervasive effects upon issuance of securities and transfers; study of exemptions and restrictions on transfer and value. Shipman and Slain.

710  P 3 or 4
Federal Courts
A. 3 or 4 cr.
The Federal judicial system; jurisdiction of the district courts, courts of appeals, and United States Supreme Court. Fink.

712  P 3
Local Government Law
W. 3 cr.
Types and organizations of local government units; intergovernmental relations; "home rule" power of Ohio municipalities; personnel; lawmaking; community planning; taxing and finance; contracts; legal liability. Fink and Simmons.
713 P 2
Appellate Practice IV
A. Sp.
Procedural and substantive aspects of appellate practice; perfection of appeals, preparation of briefs, and oral argument. Herman.

714 P 3
Receivership and Reorganization
W. 3 cl.
Prereq.: 607 or 632.
Equity receivership and corporate reorganization under Chapter X of the Bankruptcy Act; arrangements under Chapter XI of the Act. Kozyris and Shipman.

715 P 3
Advanced Federal Income Taxation
Sp. 3 cl.
Prereq.: 606.01 or 606.02.
Advanced study of federal income taxation dealing with corporations and shareholders. Rose.

716 P 3
International Trade Regulation
Sp. 3 cl.
Prereq.: 623.01, 623.02, or 623.03.
Extraterritorial application of United States trade regulation law, international treaties, and conventions, and trade regulation in European Common Market. Day.

718 P 3
Unfair Trade Practice
A. 3 cl.
Unfair trade practices of common law and statutes, trademarks, trade names, misappropriation of ideas, false advertising, disparagement, resale price maintenance, and price discrimination. Day.

719 P 4
Natural Resources
A. 4 cl.
The nature and incidents of public and private interests in water, minerals, oil and gas; conveyancing of natural resources, and mineral, oil, and gas leasing. Murphy.

720 P 4
Social Legislation
Sp. 4 cl.
Characteristics of statutory devices and their utility in effectuating social policy with emphasis upon acts and bills dealing with employment, but including related private plans and nonemployment programs. Bernstein.

721 P 3
Urban Development
Sp. 3 cl.
Not open to students with credit for 725 or 730.
The inner city and regional planning through zoning, condemnation, and other legal devices. Fink and Simmons.

722† P 3
The Federal System
W. 3 cl.
Allocation of authority between federal and state law and courts; congressional power over the jurisdiction of courts; litigation involving the government or its agents.

723 P 3
Food and Drug Law
W. 3 cl.
Study of the development, administration and application of federal and state laws which regulate the manufacture, advertising, and sale of food, drugs, and cosmetics. Caldwell and Day.

724 P 3
Comparative Criminal Law and Procedure
Sp. 3 cl.
Comparison of U.S. and Soviet criminal procedures, codes and case law, and resulting criminal justice. Quigley.

725 P 3
Land Use Planning I
W. 3 cl.
Not open to students with credit for 725.
Techniques and consequences of limitations imposed upon use of private land by private covenant and public action; nuisance; covenants; zoning, and subdivision controls. Simmons.

727 P 4
Regulated Industries
Sp. 4 cl.
Explanation of legal principles relevant to the rate regulation process and an analysis of other regulatory problems in the television, transportation, and atomic industries. Kozyris and Schwarz.

728 P 3 or 4
International Transactions
Sp. 3 or 4 cl.
Legal problems in transnational context: arising from doing business abroad; investments; establishment; exchange controls; trade, licensing; extraterritoriality of regulatory legislation; international agreements; European Common Market. Kozyris and Rosenn.

729 P 4
Administrative Practice
A. 4 cl.
Types of action before administrative boards and commissions, primary jurisdiction defining policy, judicial jurisdiction, right to trial hearing, obtaining judicial review, scope of review, evidence, decision-making. Rutledge.

730 P 3
Land Use Planning II
Sp. 3 cl.
Prereq.: 721 or 725.
Study of public regulatory devices for land use and development; eminent domain; planned unit development; urban renewal; official maps; new towns; open space. Simmons.
731 P 3  
**Business Planning**
A, W, or W, Sp. 3 cr.; 2-qtr. sequence; credit given on unification of 6 cr. hrs. Must enroll to a maximum of 6 cr. hrs. Prereq.: 607 or 632, 606.01 or 606.02; 628 recommended. Advanced study in corporations and taxation of corporations and shareholders. Shipman.

732 P 3  
**Conservation Law**
W. 3 cr. Legal problems relating to the living environment; legal problems of conservation of resources such as forest, wildlife, soil, and parks. Murphy.

733 P 3  
**Political and Civil Rights I**
A. 3 cr. Advanced study of constitutional guarantees in contemporary social milieu; freedom of expression, association; academic freedom; advocacy and symbolic expression. Laughlin.

734 P 3  
**Political and Civil Rights II**
W. 3 cr. Advanced study of civil rights and legal problems of race relations in contemporary social milieu; segregation; discrimination; equal protection; separatism. Laughlin.

735 P 3  
**Law Journal**

736 P 3 or 4  
**Legal Profession**
A, Sp. 3 or 4 cr. Legal and ethical problems of the legal profession and the practicing lawyer, including: unauthorized practice, bar admission, group legal services, malpractice, professional organization, and discipline. Kirby.

737 P 3  
**Patent Law**
Sp. 3 cr. Fundamentals of substantive patent law relating to standards of patentability, patent claim interpretation, licensing, and enforcement presented in reference to patent litigation. Ladd.

738 P 1-15  
**Study and Practicum in Legal Problems of the Poor**
1-15 cr. 1-, 2-, or 3-qtr. sequence; credit given on completion of total cr. hrs. Repeatable; decimal sequences not repeatable. Advanced study and training in performance of legal services for the poor under supervision of clinical faculty and staff attorney.

739 P 3  
**African Law**
Sp. 3 cr. Study of selected fundamental problems of legal development in context of evolving African countries, relationship between legal change and policies of social and economic development. Kindred.

740 P 1-6  
**Individual Studies**
By special arrangement with the Dean’s office, special problems or projects may be taken for credit under the supervision of members of the faculty. The credit granted varies in proportion to the magnitude of the project. In general, assignment of special problems will be limited to instances of exceptional student specialization, scheduling difficulties, and curricular irregularity.

742 P 1-6  
**Group Studies**

756 P 1-4  
**Seminars**
A, W, Sp. 1-4 cr.; 1 or 2-qtr. sequence; or sequence seminar, credit given on completion of total cr. hrs. assigned. Small group study and training in legal and non-legal research, expository writing, and various litigious and non-litigious functions of the practicing lawyer.
796.01 Antitrust Law and Economics
Prereq.: 623.
Evaluation of domestic antitrust law on the basis of current economic theories. (In-person seminars).
Seminar of the Department of Economics and the College of Law.)

796.02 Antitrust Law and International Cartelization
Prereq.: 623.
Application of domestic antitrust policy to foreign operations of American corporations.

796.03 Constitutional Problems
Advanced constitutional questions, involved in evaluation of judicial review, intergovernmental relationships, protection of civil liberties, special problems under Ohio Constitution.

796.04 Social Legislation
Federal wage and hour legislation, including: nature of employment relation; Fair Labor Standards Act; exemptions; compensable time; overtime on fluctuating workweek; child labor.

796.05 Legal Problems of Foreign Trade and Investment
Problems encountered by American business enterprises engaged in foreign trade or investment.

796.06 Legal Regulation of Business Practice
Regulation of competitive practices through legislative, administrative, and judicial action; equality of opportunity for small business; the Robinson-Patman Act.

796.07 Legal Regulation of Devolution of Property
Socio-legal problems raised by devolution of wealth through such arrangements as public welfare programs, union welfare funds, insurance, foundations, charitable trusts, and pension trusts.

796.08 Problems in the Law of Evidence
Prereq.: 603.
Advanced evidentiary questions involved in preparation for and trial of cases.

796.09 Problems in Local Government Finance
Taxes and financing of local governmental units, including power of and procedure for taxing, expending funds, financing improvements or services.

796.10 Problems in Public Contracts
Types of government contracts; governmental authority to make contracts; limitations; advertising, bids and awards; formal requisites; standard clauses; contractors' bonds; performance and termination; liabilities.

796.11 The Functional Approach to Law
Analysis of certain rules and situations to which they relate; evaluation of rules and of assumptions of cause and effect made as to those rules.

796.12 Legal and Economic Problems in State and Local Taxation
Prereq.: 622.
State taxation and intergovernmental tax relations in terms of law and fiscal economics. (Offered in cooperation with the Department of Economics.)

796.13 Medical-Legal Problems
Conflict in concept between disciplines of law and medicine in matters of causation, injury, disability, prognosis, aggravation and re-injury related to their use in proof of such elements in litigation.

796.14 The Individual and His Government
Government powers in democratic and totalitarian countries; relation of power to will of people; justice and fair hearing; personal freedoms surviving legislative and executive encroachment.

796.15 Comparative Labor Law
Prereq.: 613 or 630.
Problems in American labor law viewed from the standpoint of both American and foreign laws; collective bargaining; the use of economic force, internal and inter-union affairs.

796.16 Right of Privacy
Individual's interests in freedom from publicity and in physical seclusion; particularly legal response to social and technological changes which threaten these interests.

796.17 Regulated Industries
Principal regulatory agencies, both federal and state, with respect to licensing, rate-making, mergers, and general supervision of business practices.

796.18 International Law of Sharrable and Strategic Resources
Processes of interaction, claim, and decision with respect to resources largely open to use by all states, including the ocean, "outer" space, air space, international rivers, canals, and polar areas.

796.19 Selected Problems in Criminal Law and Procedure
Purposes and effects of punishment; wiretapping; Uniform Arrest Act; right to counsel; habeas corpus and other postconviction remedies; treatment of criminal cases by mass communications.

796.20 Research Seminar in Law
Repeatable to a maximum of 6 cr. hrs.
Topics will change as specially scheduled in any quarter.

796.21 Legal Controls of the Economy
Study of State and Federal legislation affecting economic activity, including employment acts, antipoverty legislation, tariffs, financing laws, and legal basis of the Federal Reserve System.

796.22 The Legal Implementation of Social Policy
Interdisciplinary research and field work in institutions protective of children.

796.23 Jurisprudential Approaches to Decision Making
Considerations of conceptions of the role of law and lawyers in decision processes, with emphasis upon clarification of goal values, drawing on contemporary behavioral and communications sciences, in order to develop problem-solving tools and procedures.

796.24 Syntactic Analysis and Other Tools in Statutory Drafting and Interpretation
A study of the role of the legislature in authoritative law-making with emphasis upon the need for a contextual approach to problems of interpretation, and the consideration of modern syntactic analysis in statutory drafting and interpretation.

796.25 Problems of Administration Law
Prereq.: 729 recommended.
An examination in detail of some of the more troublesome aspects of contemporary executive and administrative operations at federal and state levels.

796.26 Jury Trial
An examination of the role of juries including jury selection, standard instructions, special verdicts, law and fact, myths of jury trial and powers of juries vis-a-vis powers of administrative bodies.

796.27 International Criminal Law
Jurisdiction of tribunals over individuals committing acts considered criminal under international law but not local law; defenses urged; examination of piracy and war crimes.
796.28 Socio-Economic Environment of Law
An examination of selected aspects of the socio-economic environment which affect the scope, content, and effectiveness of legal practice, rules and institutions.

796.30 Urban Studies
Legal problems confronting inhabitants of major urban cities; effect on urban redevelopment; legal rights of services for poor.

796.31 Housing and Urban Development
Operation of and legal problems confronting governmental agencies concerned with housing and urban development in local communities.

796.32 Insurance
Organization and regulation of insurance carriers and marketing arrangements; rate-making; investment practices; reinsurance; solvency, rehabilitation and liquidation of companies.

796.33 Jurimetrics
Study of the use of mathematical techniques and computer systems in legal analysis, legal research, and judicial administration.

796.34 International Legal Problems of Community Health
Prereq.: 619 or 626.
Policy alternatives of United States and/or international organizations for the solution of selective health problems, e.g., population explosion, famine, medical brain drain, and environmental pollution.

796.35 Law and Economic Development
Study of the relationship between legal institutions and economic development; comparison of economic growth of the United States and developing nations.

796.36 Institutions of Legal Change
Examination and analysis of public and private institutions which play significant role in change of law in United States.

796.38 Legal Aspects of Totalitarian Government
Study of restrictions and impact of citizens' human, civil, political rights in totalitarian regimes; comparison with U.S. theory and practice; analysis of international agreements, policy.

796.39 Business Planning
Planning and drafting in field of business association; principally concerned with problems in general and limited partnerships, business trusts, and closely held corporations.

796.40 Estate Planning
Planning an effective and economical gift distribution of property interests; consideration of techniques and restrictions suggested by law of property, wills, future interests, insurance, and taxation.

796.41 Federal Tax Planning
Prereq.: 606.
Tax problems in business organizations, corporations, partnerships, and individual estates.

796.42 General Legal Planning
Representative types of personal and business transactions which confront general practitioner, including contracts, partnership agreements, purchase agreements, sales agreements, deeds, wills, and trusts.

796.43 Planning Through Negotiation
Planning negotiations; weighing legal, economic, and social factors and use of techniques for attainment of objectives.

796.44 Legislative Planning
Prereq.: 629.
Repeatable to a maximum of 6 cr. hrs.
Role of lawyer in drafting or opposing state and federal legislation; problems selected from past and current proposals before legislature.

796.45 Planning Seminar in Law
Repeatable to a maximum of 6 cr. hrs.
Topics will change as specially scheduled in any quarter.

796.46 Legal Administration of Natural Resources
Prereq.: 719 or 732 recommended.
Study of administration techniques for control and conservation of natural resources; consideration of problems of regulation, finance, management, and taxation.

796.47 Securities Regulation
Must enroll to a maximum of 4 cr. hrs.
Prereq.: 789.
Study of recent legal developments affecting security trading market, brokers, exchanges and NASD, investment companies, and other institutional investors.

796.48 Trade Regulation
Must enroll to a maximum of 6 cr. hrs.
Prereq.: By designation of instructor.
Study of current problems of trade regulations, e.g. antitrust, unfair trade practices, patents, food and drug law.

796.49 Problems in Torts and Other Deprivations
Must enroll to a maximum of 6 cr. hrs.
Study in frontier areas of torts (no-fault compensation plans and related areas of remedies for deprivations of well-being and respect.

796.50 Legal Profession
Selected topics on the study of the legal profession with emphasis on behavioral sciences approaches including comparisons with other occupations and professions.

796.51 Social and Environmental Litigation
Prereq.: 710 and 719 recommended.
Study of impact of law on social and environmental problems with emphasis on procedure and choice of remedies.

796.52 Federal Criminal Law
The relationship of federal and state criminal law; historical role and specialized problems of federal criminal law.

796.53 Law in the Soviet Union
Comparison of Soviet and United States law and legal institutions in selected areas, such as personal freedoms; regulation of commerce.

796.54 The Mentally Retarded and the Law
Study and interdisciplinary research into special and legal problems of the mentally retarded.

797 P 1-5
Interdepartmental Seminars
(See under Interdepartmental Seminars.)
Linguistics

Office: 236 Lieler-Conn Hall of Languages, 1841 Millikin Road
Associate Professor Geis (Chairman); Professors Lehiste and Zwicky; Associate Professors Callaghan and Drachman; Assistant Professors Jeffers and Stampe.
See also the course listings in English, the foreign languages, Romance Linguistics.

261  U 5
Introduction to Language
A, W, Sp. 5 cl.
H201 (honors) may be available to students enrolled in a college honors program or by permission of dept.
A general survey of language and languages, and the ways available to study them, with English as the local language.

221  U 5
Elementary Hindi
A. 5 cl., 3 lab, hrs.
Sound and writing systems, morphological patterns, basic sentences with brief dialogues and texts.

222  U 5
Elementary Hindi
W. 5 cl., 3 lab, hrs.
Prereq.: 221.
Continuation of 221; reading of simple materials.

223  U 5
Intermediate Hindi
Sp. 5 cl.
Prereq.: 221 and 222.
Oral and written practice; reading of contemporary prose and poetry.

224  U 5
Intermediate Hindi
A. 5 cl.
Prereq.: 221 or one yr. of elementary Hindi.
Oral and written practice; continuation of Hindi grammar and reading of contemporary literary texts.

600  U 5
Phonetics
A. 5 cl.
Prereq.: 601, concur. registration in 601, or an equiv. course in linguistics or phonetics.
Principles of articulatory phonetics, with some discussion of acoustic phonetics; practice in the production, recognition, and transcription of sounds in various languages of the world.

601  U 5
Introduction to Linguistics
Su, A, W, Sp. 5 cl.
A broad introduction to general linguistics; survey of phonological, morphological, syntactic, and semantic analysis, and of historical and comparative linguistics.

602  U G 4
Introduction to Syntax
W, Sp. 3 cl., 2 lab. hrs.
Theorie of Syntax: principles of syntactic description.
602.01 Introduction to Syntax I
W.
Prereq.: 601.
602.02 Introduction to Syntax II
Sp.
Prereq.: 602.01.

603  U G 4
Introduction to Phonology
W, Sp. 3 cl., 2 lab. hrs.
Introduction to phonological analysis and the principles governing the structure, acquisition, and change of phonological systems; survey of major phonological theories.
603.01 Introduction to Phonology I
W.
Prereq.: 600 and 601.
603.02 Introduction to Phonology II
Sp.
Prereq.: 603.01.

609  U 3
Morphology
A. 3 cl.
Prereq. or concur.: 601, or permission of instructor.
Designed to give students a structural approach to grammatical analysis, and to delineate the evolution from structural to transformational analysis.

611  U 5
Introduction to Historical Linguistics
Sp.
Prereq.: 601.
Introduction to the methods and principles of historical linguistics.

621+  U 5
Elementary Sanskrit
A.
Prereq.: 601 and permission of instructor.
Introduction to Indo-European, Indic, and Sanskrit; reading of introductory texts.

622+  U 5
Classical Sanskrit
W.
Prereq.: 621 or permission of instructor.
Reading of classical Sanskrit texts.

623+  U 5
Topics in Indic Linguistics
Sp.
Prereq.: 622 or permission of instructor.
Repeatable to a maximum of 15 cl. hrs.
Possible topics include advanced Classical Sanskrit, introductory Vedic Sanskrit, Indo-Iranian or Indo-Aryan linguistics, or studies in the ancient Indian grammarians.
650
Field Methods in Linguistics
650.01 Field Methods I
W. 4 cl.
Prereq.: 600 or permission of instructor.
Methodology for determining the phonological system of a previously unknown language through the use of a native informant.

650.02 Field Methods II
Sp. 3 cl.
Prereq.: 650.01.
Methodology for determining the morphological system of a previously unknown language through the use of a native informant.

671
Psycholinguistics
Sp. 4 cl.
Prereq.: 603.02.
The contribution of linguistic theory to the study of the acquisition, maturation, and functioning of language skills. Drachman.

672
Language Description
A, W. Sp. 3-5 cl.
Prereq.: 601.
Repeatable to a maximum of 30 cr. hrs.
Informant techniques and (if available) textbooks and published linguistic analyses are employed in analyzing and describing a language.

673
History of Linguistics
A. 5 cl.
Prereq.: 601.
Historical survey of views on language; examination of linguistic thought in historical periods, or of writings on single topics in diverse periods and traditions.

681
Algebraic Linguistics
W. 5 cl.
Prereq.: 601 and permission of instructor.
Formal properties of grammar and automata; relations between linear, context-free and context-sensitive grammars and finite, pushdown-storage and linear-bounded automata; properties of transformational grammars. Recker.

685
Languages in Contact
W. 3 cl.
Prereq.: 601.
Study of the effects of language contact on the structure of the involved languages; of the characteristics of the individuals and communities involved in language contact.

693
Individual Studies in Linguistics
Prereq. or concur.: 601 or permission of instructor.
Repeatable to a maximum of 40 cr. hrs.

694
Group Studies in Linguistics
Prereq.: 601.
Repeatable to a maximum of 30 cr. hrs.
Study of topics not regularly scheduled for seminars in linguistics, under the direction of a staff member.

695
Seminar in Anthropological Linguistics
A.
Prereq.: Anthro. 575 or permission of instructor.
Repeatable to a maximum of 20 cr. hrs. Callaghan.

702
Practicum in Syntax
Sp. 5 cl.
Prereq.: 602.02.
Argumentation and methodology in syntax; extensive critical reading accompanied by grammar construction and problem solving.

795
Seminar in Linguistics
A, W, Sp. 3-5 cl.
Prereq.: 602 and 603 or permission of instructor.
A selected group study, with emphasis on individual writing and presentation.

801
Historical Linguistics I
W. 5 cl.
Prereq.: 601.
An introduction to the methods, conventions, and literature of comparative-historical linguistics with primary attention to the comparison and reconstruction of Indo-European phonological systems.

802
Historical Linguistics II
Sp. 5 cl.
Prereq.: 801.
Advanced work in the comparison and reconstruction of morphological, and syntactic systems, primarily Indo-European; detailed examination of some of the results of past and current scholarship.

803
Topics in Indo-European
A, W, Sp. 5 cl.
Prereq.: 802.
Repeatable to a maximum of 30 cr. hrs.
Study of various Indo-European languages and language families and exploration in depth of specific problems in Indo-European grammar.
812 G 5
Seminar in Semantics
Sp. 5 cl.
Prereq.: 602.02; a course in symbolic logic recommended. Accounts of semantic judgments in languages, especially within the theory of generative grammar, relationships between syntax, semantics, and language use.

820 G 5
Seminar in Syntax
A.
Prereq.: 602.02.
Repeatable to a maximum of 15 cr. hrs.
Advanced topics in syntactic analysis. Zwicky.

821 G 5
Seminar in Phonology
W.
Prereq.: 603.02.
Repeatable to a maximum of 15 cr. hrs.
Advanced topics in phonological analysis. Zwicky.

822 G 5
Seminar in Historical Linguistics
Sp.
Prereq.: 802 or permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Advanced topics in methods and principles of diachronic analysis. Stampe.

825 G 5
Seminar in Advanced Phonetics
W. 3 cl., 2 lab. hrs.
Prereq.: 600, 601, and permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Study of specific problems in articulatory and acoustic phonetics at an advanced level.

993 G 1-5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
Assigned reading and individual research.

999 G Arr.
Research in Linguistics
Research for thesis purposes only.

Mathematics

Office: 150 Mathematics Building, 231 West 18th Avenue


101 U 5
Basic Mathematics
Su, A, Sp. 5 cl.
Prereq.: Placement on basis of OSU Math. test.
Programmed instruction used to improve algebraic computation; lectures contain selected advanced topics.

105 U 5
Principles of Mathematics I
Su, W, Sp. 5 cl.
Development of basic ideas on arithmetic, algebra, and geometry through a study of the structure of selected mathematical systems.

106 U 5
Principles of Mathematics II
A, Sp. 5 cl.
Prereq.: 105 or permission of dept.
Continuation of 105.

107 U 5
Geometry for Elementary Teachers
Su, A. 5 cl.
Prereq.: 105 or permission of department.
Selected topics in geometry appropriate for prospective elementary school teachers.

108 U 5
Introduction to Mathematics I
A. 5 cl.
Prereq.: Open to freshmen who qualify for Level I in English Placement, but who do not qualify for Math. 151 or higher on the basis of the OSU Math. test. Exceptions may be made by special permission of the Department of Mathematics.
Introduction to basic ideas of mathematics for students in humanities, life, and social sciences.

109 U 5
Introduction to Mathematics II
W. 5 cl.
Prereq.: 108.
110 U 5
Introduction to Mathematics III
Sp. 6 cl.
Prereq.: 109.

115
Mathematics for the Behavioral, Economic, and Social Sciences
Topics in mathematics with applications to the non-physics sciences, including analytic geometry, calculus, linear algebra, and linear programming; applications.

115.01 Algebra
Prereq.: 101 or at least Level 3 placement on OSU Math. Test or permission of instructor.
Not open to students with credit for 116, 120.01, 120.02, 121, 150, 159.01, or 159.02.
Basic properties of real numbers, graphing, functions, and relations.

115.02 Elementary Linear Algebra
Prereq. or concurs.: 115.01, 120.01 or 159.01, or permission of instructor.
Not open to students with credit for 116.
Basic topics from linear algebra and linear programming.

115.03 Calculus with Economic Applications I
Prereq.: 115.02 or permission of instructor.
Not open to students with credit for 117.
The derivative, economic applications of the derivative.

115.04 Calculus with Economic Applications II
Prereq.: 115.03 or permission of instructor.
Not open to students with credit for 117.
Logarithmic and exponential functions, the integral, economic applications of the integral.

116 U 5
Mathematics for the Behavioral, Economic, and Social Sciences I
Su, A, W, Sp. 5 cl.
Prereq.: 103 or satisfactory score on OSU Math. test.
Not open to students with credit for 115.01, 115.02, 121, or 150, or Math. courses having these as prereq.
The sequence 116, 117 treats topics in mathematics with applications to the non-physical sciences. Topics will include analytic geometry, calculus, linear algebra, linear programming, and graph theory; applications.

117 U 5
Mathematics for the Behavioral, Economic, and Social Sciences II
Su, A, W, Sp. 5 cl.
Prereq.: 116.
Not open to students with credit for 115.03 or 115.04.
A continuation of 116.

118 U 5
Mathematics for the Behavioral, Economic, and Social Sciences III
Sp.
Prereq.: 117 and permission of instructor.
Continuation of 117.

120
Mathematics for the Business, Social, and Biological Sciences
Introduction to calculus, probability, and statistics.

120.01 Algebra
Prereq.: At least Level 2 placement on OSU Math. Test or at least a grade of C in 101, or permission of instructor.
Not open to students with credit for 115.01, 121, or 159.01.
Basic properties of real numbers, graphing, functions, and relations.

120.02 Calculus I
Prereq. or concur.: 115.01, 120.01, or 159.01, or permission of instructor.
Not open to students with credit for 121.
Introductory differential calculus.

120.03 Calculus II
Prereq.: 120.02 or permission of instructor.
Not open to students with credit for 122.
Differential calculus, series.

120.04 Calculus III
Prereq.: 120.03 or permission of instructor.
Not open to students with credit for 122.
Integral calculus.

120.05 Descriptive Statistics and Finite Probability
Prereq.: 120.04 or permission of instructor.
Not open to students with credit for 123.
Descriptive statistics, random variables, and probability in the discrete case.

120.06 Probability and Statistics
Prereq.: 120.05 or permission of instructor.
Not open to students with credit for 123.
Probability, random variables, distribution functions, estimation of parameters, tests of hypotheses and nonparametric statistical inference.

121 U 5
Mathematics for the Business, Social, and Biological Sciences II
Su, A, W, Sp. 5 cl.
Prereq.: Satisfactory score on OSU Placement Test or at least a C in Math. 101.
Not open to students with credit for 115.01, 116, 120.01, 120.02, or 156 or Math. courses having these as prereq.
Algebra, introductory differential calculus.
150 U 5
Algebra and Trigonometry
Su, A, W, Sp. 5 cl.
Prereq.: SAT or satisfactory score on OSU Math. test.
Not open to students with credit for 115.01, 116, 121, 159.01, or 159.02 or Math. courses having these as prerequisites.
Inequalities, functions, graphs, exponential, logarithmic and trigonometric functions and their graphs, complex numbers, inverse functions.

151 U 5
Calculus and Analytic Geometry
Su, A, W, Sp. 5 cl.
H151 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq.: 150 or Level I Placement on OSU Math. test.
Not open to students with credit for 159.03 or 159.04.
Lines, slopes, derivatives, limits, differentiation, rules, mean-value theorem, applications of derivatives to: curve sketching, maxima and minima, linear motion, related rates, approximations, conics.

152 U 5
Calculus and Analytic Geometry
Su, A, W, Sp. 5 cl.
H152 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq.: 151.
Continuation of 151. Approximating areas, the integral, integration, formulas, applications of integration, inverse functions, logarithmic and exponential functions, hyperbolic functions, and integration techniques.

153 U 5
Calculus and Analytic Geometry
Su, A, W, Sp. 5 cl.
Prereq.: 152.
Continuation of 152. Polar coordinates, rotation of axes, vectors, velocity, acceleration, space vectors and three dimensional analytic, geometry, cylindrical, and spherical coordinates; linear systems, matrices, and characteristic values.

159 U 5
Calculus and Analytic Geometry
Topics include functions, limits, differential calculus, conics and integral calculus, applications.

159.01 U 3
Algebra
Prereq.: 101 or Level 2 placement on OSU Math. test or permission of instructor.
Not open to students with credit for 115.01, 120.01 or 150.
Basic properties of real numbers, graphing, functions, and relations.

159.02 U 3
Elementary Functions
Prereq. or concur.: 115.01, 120.01 or 159.01, or permission of instructor.
Not open to students with credit for 150.
Exponential, logarithmic, trigonometric and inverse trigonometric functions, and complex numbers.

159.03 U 3
Calculus and Analytic Geometry I
Prereq.: 159.02 or permission of instructor.
Not open to students with credit for 151.
Limits and continuity and the derivative.

159.04 U 2
Calculus and Analytic Geometry II
Prereq.: 159.03 or permission of instructor.
Not open to students with credit for 151.
Basic properties of differentiable functions and applications of the derivative.

159.05 U 3
Calculus and Analytic Geometry III
Prereq.: 159.04 or permission of instructor.
Not open to students with credit for 152.
Approximating areas, the integral, integration, applications of the integral, and exponential and logarithmic functions.

159.06 U 2
Calculus and Analytic Geometry IV
Prereq.: 159.05 or permission of instructor.
Not open to students with credit for 152.
Inverse trigonometric functions, hyperbolic functions, and techniques of integration.

H163 U 5
Calculus
Sp.
Prereq.: 152 and permission of dept.
163, 264, 265, substitute for 153, 254, 550, and 551.
A rigorous treatment of vector spaces and limits, continuity and differentiability of multi-variable functions.

180 U 5
Insights into Mathematics
A, W, Sp. 5 cl.
Prereq.: Permission of dept.
Not open to students who need mathematics as a tool.
This is a liberal arts course intended to involve students with mathematics; topics covered will vary with the instructor.

H190 U 5
Elementary Analysis I
A. 5 cl.
Prereq.: Permission of dept.
This sequence substitutes for Math. 151, 152, 153, and 550.
Special course sequence for superior students.

H191 U 5
Elementary Analysis II
W. 5 cl.
Prereq.: Permission of dept.
Continuation of 190.

H192 U 5
Elementary Analysis III
Sp. 5 cl.
Prereq.: Permission of dept.
Continuation of 191.

194 U 2-5
Special Topics in Mathematics
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Designed to give groups of students an opportunity to pursue special studies not otherwise offered.
Applications of Mathematics
W, Sp. 5 cl.
Prereq.: Ed. standing and 152 or Statistics 441.
Approximately half of the course will be devoted to a
study of probability and statistics; other topics will
be chosen to illustrate applications of mathematics.

Mathematics for the Business, Social,
and Biological Sciences IV
A.
Prereq.: Permission of instructor.
Continuation of 123.

Calculus and Analytic Geometry
Su, A, W, Sp. 5 cl.
Prereq.: 153.
Continuation of 153. Partial derivatives, multiple
integrals, infinite series.

Differential Equations and Their Applications
Su, A, W, Sp. 5 cl.
Prereq.: 254.
Not open to students with credit for 556.
Ordinary differential equations with particular
emphasis on linear differential equations, systems of
differential equations, applications to electrical,
mechanical, and chemical systems.

Calculus
A.
Prereq.: 163.
A rigorous treatment of differentials, Jacobians, line
integrals, multiple integrals, and Fubini's theorem.

Calculus
W.
Prereq.: 264.
Stokes' theorem, Green's theorem, changes of variables,
imPLICIT and inverse function theorems.

Linear Algebra
A, Sp. 5 cl.
Prereq.: 192.
Vector spaces, linear transformations, quality,
multilinear functions, determinants, exterior products,
matri ces, eigenvalues, eigen vectors, canonical forms,
linear manifolds, quadratic forms, inverse product
spaces.

Functions of Several Variables I
W. 5 cl.
Prereq.: 230 and permission of dept.
Topology of n-space; convexity, differentiation,
maxima and minima, inverse and implicit function
theorems.

Functions of Several Variables II
Sp. 5 cl.
Prereq.: 291 and permission of dept.
Lebesgue integral; manifolds and forms in n-space;
integration on manifolds; stokes and divergence
theorem.

Special Topics in Mathematics
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cl. hrs.
Designed to give groups of able students an
opportunity to pursue special studies not otherwise
offered.

Ordinary and Partial Differential Equations
W, Sp. 5 cl.
Prereq.: 254.
Ordinary, partial, linear, and non-linear differential
equations, fourier series, boundary value problems,
eigen-value theory, and Bessel functions.

Vector Analysis and Complex Variables
A, Sp. 5 cl.
Prereq.: 254.
Vector algebra and vector operators, line integrals,
analytic functions, complex integral theorems, power
series, residues, and conformal mapping.

Intermediate Analysis
A, Sp. 5 cl.
Prereq.: 254.
Open only to students enrolled in secondary education.
Introduction to analysis; development of the real
numbers, limits, sequences and series, derivatives,
integrals.

Matrices and Linear Algebra
W, Sp. 4 cl.
Prereq.: 153.
Not open to students with credit for 290 or 571.
Matrices, systems of equations, R^n, determinants,
vector spaces; applications.

Fundamentals of Mathematics I
A. 4 cl.
Prereq.: Permission of instructor.
Not open for graduate credit to majors in Math.
Emphasizes fundamentals of mathematics and
designed for advanced students from areas not
requiring intensive mathematical training. Topics
include algebra, the number system, induction, theory
of equations, progressions, combinations, and
permutations, probability, determinants and matrices,
inequalities, analytic geometry, differential and
integral calculus.
502 U G 4
Fundamentals of Mathematics II
W. 4 cl.
Prereq.: 501.
A continuation of 501.

503 U G 4
Fundamentals of Mathematics III
Sp. 4 cl.
Prereq.: 502.
A continuation of 502.

504 U G 5
History of Mathematics
A, W. 5 cl.
Prereq.: Ed. standing and 505 or 507 or permission of instructor.
Development of mathematics from primitive origins to present form; topics include: development of arithmetic, algebra, geometry, trigonometry, and calculus.

505 U G 5
Elementary Linear Algebra for Secondary School Teachers
A, W. 5 cl.
Prereq.: Ed. standing and 254.
Fundamentals of linear algebra with emphasis on matrix algebra determinants, systems of linear equations, rank, vector spaces, and linear transformations.

506 U G 5
Elementary Abstract Algebra for Secondary School Teachers
W, Sp. 5 cl.
Prereq.: 505.
An introduction to abstract algebra with topics from number theory; elementary ring, field, and group theory.

507 U G 5
Advanced Geometry I
A, W. 5 cl.
Prereq.: 152.
Advanced topics from Euclidean Geometry.

512 U G 3
Partial Differential Equations and Boundary Value Problems
A, W. 3 cl.
Prereq.: 255 or 556.
Not open to students with credit for 412 or 557.
Among the topics considered are: Fourier series, orthogonal relations, vibrating string, steady state heat, Laplace transform, and applications.

513 U G 3
Vector Analysis for Engineers
A, W. 3 cl.
Prereq.: 255 or 556.
Not open to students with credit for 413 or 551.
Vector algebra, vector operators, line integrals, vector integral theorems, curvilinear coordinates; applications.

514 U G 3
Complex Variables for Engineers
W, Sp. 3 cl.
Prereq.: 513 or permission. or concur. Elec. E. 510.
Not open to students with credit for 414.
Introduction to complex variables, analytic functions, complex integral theorems, power series, residues, conformal mapping.

530 U G 5
Probability I
A. 5 cl.
Prereq.: 254.
Combinatorial probability, examples of distributions, expectation, variances, generating functions, laws of large numbers, central limit theorem.

531 U G 5
Probability II
W. 5 cl.
Prereq.: 530.
Continuation of 530; markov chains, stochastic processes.

545 U G 5
Mathematical Logic I
W. 5 cl.
Prereq.: 253 or permission of instructor.
A first course in the study of formal logical systems and their applications to the foundations of mathematics; topics include: definition of mathematical proof; number theory, set theory, and analysis formalized within the predicate calculus; theorems of Godel and Church; recursive function theory and idealized digital computers.

546 U G 5
Mathematical Logic II
Sp. 5 cl.
Prereq.: 545.
A continuation of 545.

550 U G 5
Advanced Calculus I
Su, A, W, Sp. 5 cl.
Prereq.: 254 or permission of chairman.
A rigorous presentation of limits, derivatives, mean value theorems, definite integrals, sequences, and series.

551 U G 5
Calculus of Several Variables
551.01 Vector Analysis
A, Sp. 5 cl.
Prereq.: 254.
Not open to students with credit for 416, 513, 551, or 551.02.
Not recommended for Math. majors.
Vector operations in three dimensions, vector operators, surface area, the theorem of Green and Stokes, the divergence theorem; applications.

551.02 Advanced Calculus II
Su, A, W, Sp. 5 cl.
Prereq.: 550.
Not open to students with credit for 513 or 551.
A continuation of 550 for functions of several variables and vector analysis.
552 U G 5  
Introduction to the Theory of Functions of a Complex Variable I  
Su, W.  5 cl.

552.01 Complex Variable I  
HS52.01 (Honors) may be available to students enrolled in a college Honors program; others by permission of dept.  
Prereq.: 254.  
Not open to students with credit for 416, 514, 552 or 552.02.  
Not recommended for Math. majors.  
Topics discussed include power series expansions, the formula of Cauchy, residues, conformal mappings, and elementary functions in the complex domain.

552.02 Complex Variable I  
HS52.02 (Honors) may be available to students enrolled in a college Honors program; others by permission of dept.  
Prereq.: 500.  
Not open to students with credit for 552 or 552.01.  
The Cauchy integral theorem and its consequences, elementary functions and mappings, representation theorems, residue theory.

553 U G 5  
Introduction to the Theory of Functions of a Complex Variable II  
Sp.  5 cl.  
Prereq.: 552.  
A continuation of 552.

556 U G 5  
Differential Equations  
A, W.  5 cl.

556.01 Differential Equations  
HS56.01 (Honors) may be available to students enrolled in a college Honors program; others by permission of dept.  
Prereq.: 254.  
Not open to students with credit for 255, 415, or 556.02.  
Equations of first order and second order, linear equations, series solutions, approximate solutions, systems of ordinary equations; Legendre and Bessel equations.

556.02 Differential Equations  
HS56.02 (Honors) may be available to students enrolled in a college Honors program; others by permission of dept.  
Prereq.: 254 and 571.  
Not open to students with credit for 556.01.  
First order equations, first order linear systems, functions of matrices, series solutions, existence and uniqueness theorems.

557 U G 5  
Orthogonal Systems and Differential Equations  
W, Sp.  5 cl.  
Prereq.: 556.01 or 556.02, or 255 and permission of instructor.  
Fourier series, orthogonal systems; Sturm-Liouville problems; integral transforms, generalized functions; applications to ordinary and partial differential equations.

560 U G 5  
Topology  
Sp.  5 cl.  
Prereq.: 254 or permission of chairman.  
Sets and functions, metric spaces, completeness, Baire's Theorem, continuous mappings, Euclidean spaces, compactness, connectivity, topological spaces.

570 U G 5  
Elementary Modern Algebra  
W, Sp.  5 cl.  
Prereq.: 571 and 573.  
An introduction to abstract algebra with topics from elementary ring, field, and group theories; special emphasis on ring of integers, congruences, polynomial domains, permutation groups.

571 U G 5  
Introduction to Linear Algebra  
Su, W.  5 cl.  
HS71 (honors) may be available to students enrolled in a college honors program; others with permission of dept.  
Prereq.: 153 or permission of chairman.  
Not open to students with credit for 250 or 471.  
Vector spaces, linear maps, matrices, inner product spaces, systems of equations, determinants, and spectral theory.

573 U G 5  
Elementary Number Theory  
A, W.  5 cl.  
Prereq.: 153 or permission of chairman.  
Utilization of concrete examples to introduce concepts of modern algebra; prime numbers, congruences, Diophantine equations, elementary combinatorial analysis.

574 U G 5  
Geometry  
Sp.  5 cl.  
Prereq.: 570 and 571.  
Euclidean and non-Euclidean geometry, emphasizing algebraic connections; affine and projective planes, duality. Topics from: geometry of groups, finite planes, Hilbert's postulates, n-dimensional spaces, continuous geometry.

575 U 5  
Combinatorial Mathematics and Graph Theory  
Sp.  
Prereq.: 571 or permission of instructor.  
Some classical puzzles of recreational mathematics; matching theory, graph theory, network flows, and optimization; enumeration techniques; combinatorial designs and coding theory.

577 U G 5  
Discrete Algebraic Structures  
A, Sp.  5 cl.  
Prereq.: 571.  
Not open to students with credit for Math. 570.  
An introduction to discrete and finite algebraic structures with applications to computer and information science.
Algebra I
A. 5 cl.
Prereq.: 254 and permission of instructor.
Not open to students with credit for 570.
The sequence 580, 581, 582 is an alternative to 570, 571, 573; an integrated sequence of topics from elementary number theory and algebraic structures.

Algebra II
W. 5 cl.
Prereq.: 580.
Not open to students with credit for 570.
Continuation of 580.

Algebra III
Sp. 5 cl.
Prereq.: 581.
Not open to students with credit for 570.
Continuation of 581.

Algebraic Structures I
A.
Prereq.: 290.
The sequence 590, 591, substitutes for 570, 573. Integers, congruence relations, structure preserving maps, topics from groups, rings, modules, vector spaces, fields.

Algebraic Structures II
W.
Prereq.: 590.
Continuation of 590.

Algebraic Structures III
Sp. 5 cl.
Prereq.: 591.
Continuation of 591; further topics in group and field theory and their interrelation; Galois theory.

Individual Studies in Mathematics
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

Group Studies in Mathematics
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

Mathematical Methods in Science I
A. 5 cl.
Prereq.: 15 cr. hrs. of Math. at the 400-500 level or permission of instructor. The recommended preliminary courses are 550, 551, 552.
Theory of determinants and matrices, real quadratic and Hermitian forms, groups and vector spaces, applications to physics and engineering.

Mathematical Methods in Science II
W. 5 cl.
Prereq.: 601.
Linear differential equations, solutions about singular points; Fourier series; Sturm-Liouville problems; Bessel functions and Legendre polynomials; boundary value problems associated with Laplace's equation.

Stability Problems in Differential Equations
Sp. 3 cl.
Prereq.: 255 or 556.
Existence and uniqueness of solutions; initial conditions; periodic solutions; Kryloff-Bogoliuboff method; graphical and numerical methods; applications to vibrational problems, relaxation theory, and nonlinear mechanics.

Advanced Geometry II
Sp. 5 cl.
Prereq.: 597 and permission of instructor.
Continuation of 597; selected topics.

Principles of Mathematics for Science and Mathematics Teachers
Su. 5 cl.
Prereq.: Permission of instructor.
(NSF students only).
Introduction to modern mathematics, sets, functions, topology.

Modern Geometry for High School Teachers
Su. 5 cl.
(NSF students only).
Coordinate geometry use of vectors in geometry, matrices and coordinate transformations, matrix-vector operations, characteristic values, diagonalization of quadratic forms.

Modern Algebra for High School Teachers
Su. 5 cl.
(NSF students only).
A basic modern algebra course for teachers of algebra; topics will include: groups, rings, integral domains, fields, an axiomatic approach to high school algebra.

Analysis for High School Teachers
Su. 5 cl.
(NSF students only).
Extension of the rational number concept to the real number concept, functions, limit concept, sequences, continuous functions, derivative, integral series, applications of the calculus.
635 U G 3
Game Theory
Sp. 3 cl.
Prereq.: 571 or permission of instructor.
Concept of a game, minimax theorem, linear programming.

651 U G 4
Introduction to Real Analysis I
A. 4 cl.
H651 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq.: Permission of instructor.
Real numbers, infinite sequences and series.

652 U G 4
Introduction to Real Analysis II
W. 4 cl.
H652 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq.: 651.
Classes of functions, Riemann-Stieltjes integral.

653 U G 4
Introduction to Real Analysis III
Sp. 4 cl.
H653 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq.: 652.
Measurable sets and functions, elementary theory of the Lebesgue integral.

654 U G 3
Complex Variables
A. 3 cl.
Prereq.: Permission of instructor.
Recommended primarily for graduate students in science and engineering.
Not open to students with credit for 514 or 552.
Complex arithmetic, geometry, conformal mapping, analytic functions, and residues.

655 U G 3
Elementary Topology I
A. 3 cl.
Prereq.: Permission of dept.
Continuity, compactness, connectedness in metric and general topological spaces; product and quotient spaces; fundamental group and covering spaces.

656 U G 3
Elementary Topology II
W. 3 cl.
Prereq.: 655.
Continuation of 655.

657 U G 3
Elementary Topology III
Sp. 3 cl.
Prereq.: 656.
Continuation of 656.

662 U G 5
Calculus of Variations
A. 5 cl.
Prereq.: 255 or 534; 531.
Variation of a functional; Euler-Lagrange equations; Hamilton-Jacobi theory; second variation Theory of field; Noether theorem; direct methods; applications to geometry and physics.

670 U G 4
Algebra I
A. 4 cl.
H670 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq.: Permission of instructor.
Elementary number theory, polynomials, Euclidean domains; elementary theory of groups and fields, vector spaces and modules over a ring, linear transformations, determinants, normal form of matrices, quadratic forms.

671 U G 4
Algebra II
W. 4 cl.
H671 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq.: 670.
Continuation of 670.

672 U G 4
Algebra III
Sp. 4 cl.
H672 (honors) may be available to students enrolled in a college honors program; others with permission of dept.
Prereq.: 671.
Continuation of 671.

674 U G 5
Topics in Combinatorial Mathematics
A. 5 cl.
Prereq.: 672 or permission of instructor.
Permutations, combinations, partitions, Latin squares, finite geometries.

680 U G 5
Projective Geometry
Su. A. 5 cl.
Prereq.: 672.
The combinatorial and algebraic aspects of projective geometry, including non-Desarguesian and finite projective planes, coordination, the theory of collineations, incidence matrices, Latin squares.

693 U G 1-5
Individual Studies in Mathematics
Individual conferences, assigned readings, and reports on minor investigations.

694 U G 2-5
Group Studies in Mathematics
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Designed to give groups of students an opportunity to pursue special studies not otherwise offered.
701 * U G 5
Mathematical Methods in Science III
Sp. 5 cl.
Prereq.: 571, 601, or permission of instructor.
Introduction to tensor analysis with applications to
gometry; elements of the calculus of variations with
lications to physical problems.

702 * U G 3
Integral Equations and Eigenvalue Problems I
A. 3 cl.
Prereq.: 601 and 602.
Orthogonal functions, linear, integral equations of
first and second kinds, relations to ordinary
differential equations, Volterra's equation, boundary
value problems, practical methods of solution.

703 * U G 3
Integral Equations and Eigenvalue Problems II
W. 3 cl.
Prereq.: 702.
Distribution of eigenvalues, self-adjointness,
definiteness, Green's functions, minimal properties,
approximation of eigenvalues, eigenfunction
expansions, Ritz method, iteration method, matrix
eigenvalue problems, finite differences.

704 * U G 3
Operational Calculus
Sp. 3 cl.
Prereq.: 601 and 602.
Laplace transformation in real domain, applications in
physics and engineering; differential equations; Laplace
transformation in complex domain, application to
partial differential equations; Fourier transform,
aplications.

705 * U G 3
Special Functions
W. 3 cl.
Prereq.: 601 and 602.
Power series developments, asymptotic expansion,
gamma functions, cylinderical functions, spherical
harmonics, orthogonal polynomials, hypergeometric
functions, theta functions, elliptic functions and
integrals, numerical techniques.

706 * U G 5
Applied Complex Analysis
Sp. 5 cl.
Prereq.: 414, or 552 and 556. Students are urged to
fulfill the prereq. with 552.
Basic facts of complex analysis; conformal mapping
properties of elementary functions, Schwartz—
Christoffel formulas; distortion theorems; uniformization;
aplications to electromagnetic fields, fluid dynamics,
heat flow.

710 * U G 5
Projective Geometry I
A. 5 cl.
Prereq.: Permission of instructor.
Desarguesian spaces; lattice-theoretic characterization;
introduction of coordinates; fundamental theorem on
collineations; correlations.

711 * U G 5
Projective Geometry II
W. 5 cl.
Prereq.: 710 or permission of instructor.
Non-Desarguesian planes; collineations; coordinates;
Lenz-Barlotti theorem; Bruck-Ryser theorem; existence
and non-existence results; selection of related topics.

722 * U G 4
Theory of Probability I
A. 3 cl., 1 lab. hr.
Prereq.: 653.
Fundamentals of measure theory, general probability
distributions, Lebesgue integral, and conditional
expectations.

723 * U G 4
Theory of Probability II
W. 3 cl., 1 lab. hr.
Prereq.: 722.
Characteristic functions, limit theorems, Markov
processes, and stationary processes.

724 * U G 4
Theory of Probability III
Sp. 3 cl., 1 lab. hr.
Prereq.: 723.
Continuation of 723.

730 * U G 4
Mathematical Foundations of Probability Theory
A. 3 cl., 1 lab. hr.
Prereq.: 724 or permission of instructor.
Martingales; selected topics from stochastic processes.

737 * U G 3
Mathematical Information Theory I
W. 3 cl.
Prereq.: Either 522, 722, 830, or permission of instructor,
Probabilistic coding theory and coding theorems.

738 * U G 3
Mathematical Information Theory II
Sp. 3 cl.
Prereq.: 570, and 522 or 722 or 830.
Algebraic coding theory: group codes.

741 * U G 3
Mathematical Foundations of the Design
and Use of Automatic Systems I
A. 3 cl.
Prereq.: Grad. standing or permission of instructor.
Boolean operations; reduction of systems of Boolean
functions; Turing machines and general recursive
functions; application to problems relating to design
and use of automatic systems.

742 * U G 3
Mathematical Foundations of the Design
and Use of Automatic Systems II
W. 3 cl.
Prereq.: 741 and grad. standing or permission of
instructor.
Continuation of 741.
743 U G 3
Mathematical Foundations of the Design and Use of Automatic Systems III
Sp. 3 cl.
Prereq.: 742 and standing or permission of instructor.
Continuation of 742.

749† U G 5
Advanced Mathematical Logic I
A. 5 cl.
Prereq.: 545 or 670.
A study of the axiomatic method: the classical theorems of Skolem and Godel; some modern results about model classes and the theory of definability; axiomatic number theory and set theory.

750 U G 5
Real Analysis I
Su. A. 5 cl.
Prereq.: 653.
Relative extremes in partial orders; additive and countable additive set functions; extensions of set functions; integration differentiation, applications.

751 U G 5
Real Analysis II
W. 5 cl.
Prereq.: 750.
Continuation of 750.

752 U G 5
Real Analysis III
Sp. 5 cl.
Prereq.: 751.
Continuation of 751.

753 U G 5
Introduction to Complex Analysis I
A. 5 cl.
Prereq.: 653.
Families of holomorphic and meromorphic functions, geometrical methods of the theory of functions, conformal transformations; including the Cauchy integral theorem, Runge's theorem, Riemann mapping theorem.

754 U G 5
Introduction to Complex Analysis II
W. 5 cl.
Prereq.: 753.
Analytic continuation, general analytic functions, algebraic, entire, elliptic, the gamma and zeta function, Dirichlet's series, Picard's theorems, Mittag-Leffler's theorem, Stirling's formula.

755 U G 5
Introduction to Point Set Topology I
A. 5 cl.
Prereq.: 653.
Topographical spaces, convergence; metric, complete, compact, connected, uniform, and function spaces.

756 U G 5
Introduction to Point Set Topology II
W. 5 cl.
Prereq.: 755.
Continuation of 755.

759 U G 5
Graduate General Analysis I
A. 5 cl.
Prereq.: Grad. standing or permission of instructor.
Integrated examination, from an advanced standpoint, of fundamentals of pure and applied analysis; topics may include: several variable calculus, complex variables, measure and integration theory.

760* U G 3
Ordinary Differential Equations I
A. 3 cl.
Prereq.: 571 and 653.
Introduction to theory of linear and non-linear ordinary differential equations; equations with singular points; stability theory, boundary value problems.

761* U G 3
Ordinary Differential Equations II
W. 3 cl.
Prereq.: 760.
Continuation of 760.

762* U G 3
Ordinary Differential Equations III
Sp. 3 cl.
Prereq.: 761.
Continuation of 761.

763* U G 3
Partial Differential Equations and Their Applications I
A. 3 cl.
Prereq.: 653.
First order partial differential equations, theory of characteristics; second order partial differential equations; elliptic, parabolic, hyperbolic equations; standard method of solution, Green's function; integral equations.

764* U G 3
Partial Differential Equations and Their Applications II
W. 3 cl.
Prereq.: 763.
Continuation of 763.
767 UG 5
Introduction to the Theory of Approximation I
A. 5 cl.
Prereq.: 653.
Approximation by polynomials and trigonometric polynomials, Chebyshev's theory of best approximation and its generalizations; interpolation processes and mechanical quadrature; orthogonal polynomials and elements of harmonic analysis.

768 UG 5
Introduction to the Theory of Approximation II
W. 5 cl.
Prereq.: 550 and 767.
A continuation of 767.

770 UG 5
Higher Algebra I
Su. A. 5 cl.
Prereq.: 672.
Fields, extensions, normal extension, algebraic closure, Galois group of a polynomial, theory of equations, topics in ideal and valuation theory, rings with minimum conditions crossed products.

771 UG 5
Higher Algebra II
W. 5 cl.
Prereq.: 670.
A continuation of 770.

772 UG 5
Higher Algebra III
Sp. 5 cl.
Prereq.: 771.
A continuation of 771.

775 UG 5
Combinatorial Analysis and Graph Theory I
A.
Prereq.: 672.
Ramsey's theorem, systems of distinct representatives, zero-one matrices, orthogonal Latin squares, combinatorial designs, and difference sets.

776 UG 5
Combinatorial Analysis and Graph Theory II
W.
Prereq.: 775.
Mobius inversion principle, Polya theory of counting, planar graphs, connectivity, coloring min cut max flow, integer programming and combinatorial extrema, graphs and adjacency matrices.

777 UG 5
Combinatorial Analysis and Graph Theory III
Sp.
Prereq.: 776.
Totally unimodular matrices, matroids, combinatorial problems of coding theory, probabilistic fluctuation theory, and other selected topics.

779 UG 2-5
Experimental Number Theory
A, W, Sp. 3 cl., 2 labs.
Prereq.: Permission of instructor.
Topics from elementary and/or algebraic number theory; number theoretical explorations utilizing high-speed digital computers.

780 UG 5
Number Theory I
A. 3 lec., 2 seminars.
Prereq.: 672.
Diophantine equations, Congruences, p-adic numbers, algebraic number theory, class numbers, distribution of primes, continued fractions.

781 UG 5
Number Theory II
W. 3 lec., 2 seminars.
Prereq.: 780.
Continuation of 780.

782 UG 5
Number Theory III
Sp. 3 lec., 2 seminars.
Prereq.: 781.
Continuation of 781.

794 UG 2-5
Group Studies in Mathematics
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
When students' need is sufficient, the Department will offer under this number a course on some phase of mathematics not covered in its regular offerings.

830 G 3-5
Advanced Probability I
A. 3 cl., 1 lab. hr.
Prereq.: 751 and permission of instructor.
Selected topics from foundations, martingales stochastic processes.

831 G 3-5
Advanced Probability II
W. 3 cl., 1 lab. hr.
Prereq.: 830.
Continuation of 830.

832 G 3-5
Advanced Probability III
Sp. 3 cl., 1 lab. hr.
Prereq.: 831.
Continuation of 831.

844 G 5
Advanced Mathematical Logic II
W. 5 cl.
Prereq.: 749.
Continuation of 749.

846 G 2-5
Topics in Discrete Mathematics
W. 2-5 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
847†
Transfinite Arithmetic I
A.
Prereq.: 750 and 770.
Axiomatic Set Theory; ordinal numbers and Transfinite functionalities; polynomial representation; normal forms; number classes; inequalities for cardinal numbers; consequences of the continuum hypothesis; inaccessible numbers.

848†
Transfinite Arithmetic II
W.
Prereq.: 847.
Continuation of 847.

851
Differential Geometry I
A. 3 cl.
Prereq.: 751, 756, and 771.
Curves, surfaces, fundamental forms, tensors, and connections.

852
Differential Geometry II
W. 3 cl.
Prereq.: 851.
Continuation of 851.

854
Differentiable Manifolds and Lie Groups I
W. 5 cl.
Prereq.: 751, 756, and 771.
Tensors, exterior differential forms, connections; Lie Groups.

855
Differentiable Manifolds and Lie Groups II
Sp. 5 cl.
Prereq.: 854.
Continuation of 854.

857
Introduction to Functional Analysis I
A. 3 cl.
Prereq.: 552 and 751.

858
Introduction to Functional Analysis II
W. 3 cl.
Prereq.: 857.
Continuation of 857.

859
Introduction to Functional Analysis III
Sp. 3 cl.
Prereq.: 857 and 858.
Banach Algebras, spectral theory, harmonic analysis, fixed-point theorems; applications to analysis.

860
Algebraic Topology I
A. 3 cl.
Prereq.: 751, 756, and 771.
Metric space topology, complexes in Euclidean spaces, singular homology theory.

861
Algebraic Topology II
W. 3 cl.
Prereq.: 860.
Continuation of 860.

862
Algebraic Topology III
Sp. 3 cl.
Prereq.: 861.
Continuation of 860 and 861.

863* Potential Theory I
A.
Prereq.: 552 and permission of instructor.

864* Potential Theory II
W.
Prereq.: 863.
Continuation of 863.

865
Topics in Mathematical Physics
Su. A. 2-5 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

866
Mathematical Problems in Engineering
Sp. 2-5 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

867
Dimension Theory
Sp. 3 cl.
Prereq.: 751, 756, and 771.
Dimension in separable metric spaces with application of Euclidean spaces; covering theorems, imbedding theorems, and approximation theorems; relationships between the concept of dimension and measure.

869
Mathematical Theory of Communication and Control
Sp. 2-5 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
870  G 2.5
Topics in Graph Theory
Prereq.: 777 and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Topics of current research interest.

873  G 5
Group Theory I
A. 5 cr.
Prereq.: 771.
Properties of groups, extensions, transfer, generators and defining relations.

874  G 5
Group Theory II
W. 5 cr.
Prereq.: 873.
Continuation of 873.

876  G 5
Analytic Number Theory
A, W. 5 cr.
Prereq.: Permission of instructor.
The distribution of prime numbers; Waring's problems, and selected topics.

877  G 5
Theory of Algebraic Numbers
A, W, Sp. 5 cr.
Prereq.: Permission of instructor.
Ideals in algebraic number fields, unique decomposition theorem, different, discriminant, ideal classes, applications of Galois theory and analytical methods.

931  G 3
Ergodic Theory I
A. 3 cr.
Prereq.: 751.
Measureable transformations, mixing and ergodicity, existence of invariant measures, contraction operations on function spaces, ergodic theorems.

932  G 3
Ergodic Theory II
W. 3 cr.
Prereq.: 931.
Continuation of 931.

933  G 3
Sums of Independent Random Variables I
A. 3 cr.
Prereq.: 830 or 722 and 751.
Limit theorems for sums of independent random variables, infinitely divisible distributions, stable laws.

934  G 3
Sums of Independent Random Variables II
W. 3 cr.
Prereq.: 933.
Continuation of 933.

935  G 3
Random Walks and Brownian Motion I
W. 3 cr.
Prereq.: 930 or 722 and 751.
Recurrence, periodicity, hitting probabilities, potential theory, recurrent and transient random walks, Brownian motion.

936  G 3
Random Walks and Brownian Motion II
Sp. 3 cr.
Prereq.: 935.
Continuation of 935.

937  G 3
Semi Groups and Markov Processes I
W. 3 cr.
Prereq.: 751.
Sample functions and semi groups generated by Markov processes; general potential theory including Green's Function and generalized capacity.

938  G 3
Semi Groups and Markov Processes II
Sp. 3 cr.
Prereq.: 937.
Continuation of 937.

949  G 2.5
Seminar in Logic
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

950  G 2.5
Topics in Real Analysis
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

951  G 2.5
Topics in Complex Analysis
Su, A, W, Sp. 2-3 cr.
Prereq.: 751.

953  G 2.5
Topics in Topology
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

954  G 2.5
Topics in Algebraic Topology
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

957  G 2.5
Topics in Differential Geometry
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
959 G 4  
Measure and Integration I  
A.  4 cl.  
Prereq.: 751.  
Topics will be chosen from current research papers.

960 G 4  
Measure and Integration II  
W.  4 cl.  
Prereq.: 959.  
Continuation of 959.

961 G 2-5  
Topics in Functional Analysis  
Su, A, W, Sp.  2-5 cl.  
Prereq.: 959.  
Topics to be chosen from current research papers.

970 G 5  
Representation Theory I  
A.  5 cl.  
Prereq.: Permission of instructor.  
Topics to be chosen from current research papers.

971 G 5  
Representation Theory II  
W.  5 cl.  
Prereq.: 970.  
Continuation of 970.

972 G 5  
Combinatorial Analysis  
Sp.  5 cl.  
Prereq.: 771.  
Topics selected from current research papers.

973 G 5  
Homological Algebra I  
A.  5 cl.  
Prereq.: 772.  
Introduction into the basic concepts of homological algebra.

974 G 5  
Homological Algebra II  
W.  5 cl.  
Prereq.: 973 or permission of instructor.  
Continuation of 973.

975 G 5  
Topics in Geometry  
Su, A, W, Sp.  5 cl.  
Prereq.: Permission of instructor.  
Topics to be chosen from current research papers.

978 G 5  
Theory of Rings  
Su, A, W, Sp.  5 cl.  
Prereq.: 772.  
Topics selected from current research papers.

979 G 5  
Theory of Matrices  
Su, A, W, Sp.  5 cl.  
Prereq.: 771.  
Topics selected from current research papers.

980 G 5  
Lattice Theory  
Su, A, W, Sp.  5 cl.  
Prereq.: 771.  
Topics selected from current research papers.

981 G 2-5  
Topics in the Theory of Groups  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 20 cr. hrs.

982 G 5  
Topics in Algebra  
Su, A, W, Sp.  5 cl.  
Prereq.: Permission of instructor.  
Topics selected from current research papers.

983 G 2-5  
Topics in Number Theory  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 20 cr. hrs.

984 G 5  
Topics in Algebraic Geometry  
Su, A, W, Sp.  5 cl.  
Prereq.: Permission of instructor.  
Topics to be chosen from current research papers.

985 G 2-5  
Seminar in Group Theory  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 20 cr. hrs.

986 G 2-5  
Seminar on Algebra  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 20 cr. hrs.

987 G 2-5  
Seminar on Commutative Algebra  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 20 cr. hrs.

988 G 2-5  
Seminar on Number Theory  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 20 cr. hrs.
999  G 2-5
Seminar on Geometry of Numbers
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

990  G 2-5
Seminar on Geometry
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

996  G 2-5
Seminar in Analysis
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

997  G 2-5
Seminar in Topology
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

998  G 2-5
Seminar in Applied Mathematics
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

999  G Arr.
Research
Research for thesis or dissertation purposes only.

308  U 3
Thermodynamics
Sp.  3 cl.
Prereq.: Math. 254 and Physics 133.
Not open to students majoring in Mech. E.
Not open to students with credit for 301.
A study of engineering thermodynamics.

309  U 3
Thermodynamics
A, W, Sp.  3 cl.
Prereq.: Math. 415 and Physics 133.
Not open to students majoring in Mech. E.
Not open to students with credit for 301.
Study of macroscopic and microscopic thermodynamics.

311  U 3
Heat Transfer and Fluid Flow
A, W, Sp.  3 cl.
Prereq.: 309.
Not open to students majoring in Mech. E.
Not open to students with credit for 511.
Study of the fundamental principles of heat transfer and fluid flow with applications to electrical machinery and apparatus.

350  U 5
Machine Design
W, Sp.  5 cl.
Not open to students majoring in Mech. E.
Not open to students with credit for 550.
A study of the application of the general principles and empiricisms of mechanics of solids to the creative design of mechanical equipment.

382  U 4
Mechanical Engineering Analysis
A, W.  3 cl., 1 2-hr. lab.
Prereq.: 281.
Continuation of 281 with additional analytical techniques of general usefulness in mechanical engineering.

501  U G 4
Thermodynamics I
A, W.  4 cl.
Prereq.: Chem. 205 and Math. 254.
A study of basic engineering thermodynamics.

502  U G 4
Thermodynamics II
W, Sp.  4 cl.
Prereq.: 501, or permission of instructor.
Continuation of 501.

503  U G 4
Fluid Dynamics I
W, Sp.  4 cl.
Prereq.: 501.
A study of the basic concepts, fundamental equations, and applications of fluid mechanics to engineering problems.

Mechanical Engineering

Office: 2075 Robinson Laboratory, 206 West 18th Avenue

Professors Glower (Chairman), Beittler (Emeritus), Bolz, Dreibelin, Han, Hornung, C. Jones, Marco, McLarnan, Moffat (Emeritus), Redmond, Semy, Smith, Starkey, Stinson (Emeritus), Velkoff, and Zimmerman; Associate Professors Buxton, Engleman, Foster, and Moran; Adjunct Associate Professor Epstein; Assistant Professors Bridge, Davidson, Faulkner, Houser, J. Jones, Jordan, Krakowski, Kulacki, Miller, Mosher, and Nakamura; Adjunct Assistant Professor Stucky.

281  U 4
System Dynamics
A, Sp.  3 cl., 1 2-hr. lab.
Theoretical and experimental study of the dynamics of linear, lumped-parameter models of mechanical, electrical, fluid, thermal, and mixed systems.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>
| 504        | U G 4 | Fluid Dynamics II  
A. Sp. 4 cl.  
Prereq.: 502 and 503.  
Continuation of 503. |
| 505        | U 1  | Hydraulic Laboratory  
A. 1 3-hr. lab.  
Concur.: Civil E. 512.  
A study of incompressible fluid flow through various primary elements and through a centrifugal pump. |
| 510        | U G 4 | Heat Transfer  
A. W. 4 cl.  
Prereq.: 503.  
Not open to students with credit for 611.  
A study of the fundamental laws of heat conduction, radiation, and convection, including an introduction to transient conduction. |
| 526        | U G 3 | Energy Release and Conversion Processes  
A. W. 3 cl.  
Prereq.: 504; concur. 510.  
Not open to students with credit for 520.  
Energy release in combustion, nuclear, electrical, and direct conversion devices. |
| 527        | U G 3 | Energy Conversion in Turbomachinery  
W, Sp. 3 cl.  
Prereq.: 526.  
Not open to students with credit for 624.  
Energy conversion in power-producing, absorbing, and transmitting turbomachinery. |
| 528        | U G 3 | Energy Conversion in Positive Displacement Machinery  
A, Sp. 3 cl.  
Prereq.: 527.  
Not open to students with credit for 621.  
Energy conversion in power-producing, absorbing, and transmitting positive displacement machinery. |
| 533        | U G 5 | Kinematics and Dynamics of Machinery  
A. W. 5 cl.  
Prereq.: 261.  
Not open to students with credit for 551-552.  
Motion and force analysis in mechanisms such as plane linkages, cams, and gears; introduction to the synthesis of plane linkages and simple cam systems. |
| 561        | U G 4 | Principles of Mechanical Design  
W, Sp. 4 cl.  
Not open to students with credit for 561.  
A study of the application of the general principles and empirisms of mechanics of solids to the creative design of mechanical equipment. |
| 562        | U G 4 | Principles of Mechanical Design  
A. Sp. 4 cl.  
Prereq.: 561 or 661.  
Not open to students with credit for 662.  
Continuation of 561. |
| 563        | U G 4 | Principles of Mechanical Design  
A. W. 4 cl.  
Prereq.: 561 or 661.  
Not open to students with credit for 663.  
Continuation of 561. |
| 564        | U G 3 | Mechanical Engineering Design I  
A. W, Sp. 3 2-hr. lab.  
Prereq.: 561 and 562.  
The methodology of intermediate design and practice in the design of a specific system which may utilize principles of any or all mechanical engineering disciplines. |
| 570        | U G 3 | Mechanical Engineering Measurements  
A. W. 1 cl., 1 4-hr. lab.  
Prereq. or concur.: 510, and 552 or 553.  
Not open to students with credit for 670.  
A theoretical and experimental study of the principles of operation and performance characteristics of measuring instruments used in mechanical engineering. |
| 571        | U G 4 | Principles of Automatic Control  
W, Sp. 3 cl., 1 2-hr. lab.  
Prereq.: 510, 552 or 553, and 570 or 670; or permission of instructor.  
Not open to students with credit for 771.  
A theoretical and experimental study of the principles of operation of feedback control systems, including servomechanisms and process control. |
| 581        | U G 3 | Mechanical Engineering Laboratory  
A. W, Sp. 2 2-hr. lab. and 5 hrs. lab. Planning and report writing.  
Prereq.: 570 or 670.  
Not open to students with credit for 781.  
The study and application of methods of experimental analysis. |
| 588        | U 1  | Professional Aspects of Mechanical Engineering  
A. 1 cl.  
Prereq.: 3rd yr. standing in Mech. E.  
A study of the code of ethics, licensing law, responsibilities to professional societies, and the relationships to labor and management of the professional engineer. |
503 U G 1-5
Individual Studies in Mechanical Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Provides the opportunity to pursue special studies in mechanical engineering not otherwise covered.

504 U G 1-5
Group Studies in Mechanical Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Special topics in Mechanical Engineering; the particular topic, credit hours, and the instructor will be announced in the quarter preceding the one in which the course will be offered.

612 U G 3
Principles of Heat Exchangers
A. 3 cl.
Prereq.: 510.
A study of principles of heat and mass transfer as applied to the design of heat exchangers. Jones.

613 U G 3
Cryogenic Systems
Sp. 3 cl.
Prereqs.: 311, 503, and 510.
Study of low-temperature processes and equipment; physical properties at low temperatures; practical application of low-temperature techniques and processes in engineering systems.

625 U G 3
Vapor Power Cycles
A. 3 cl.
Prereq. or concur.: 510 and 526.
A descriptive and analytical study of elementary and advanced power plant cycles.

630 U G 3
Internal Combustion Engines
A. 3 cl.
Prereq. or concur.: 526 or permission of instructor.
Not open to students with credit for 720.

631 U G 3
Internal Combustion Engines
W. 3 cl.
Prereq. or concur.: 526 or permission of instructor.
Not open to students with credit for 721.
Force analysis as related to the design of engine components such as pistons, bearings, valve springs, and crankshafts. Engelman.

632 U G 3
Diesel Engines
Sp. 3 cl.
Prereq. or concur.: 526 or permission of instructor.
Not open to students with credit for 722.
An advanced study of Diesel engine operation, and economics. Engelman.

634 U G 3
Gas Turbine Power Plants
W. 3 cl.
Prereq. or concur.: 526 and 527; or permission of instructor.
Not open to students with credit for 724.
A study of the principles, performance, and design of gas turbine power plants. Engelman.

636 U G 3
Nuclear Power Plants
Sp. 3 cl.
Prereq.: 510 or permission of instructor.
Not open to students with credit for 726.
A study of the thermal and mechanical design aspects of nuclear power plants and processes. Clower.

640 U G 3
Principles of Environmental Control
A, Sp. 3 cl.
Prereq.: 502.
A study of the principles of the control of environments for human occupation, occupation by other living beings, the operation of mechanical and electrical equipment, and for the storage and processing of materials. Sepsy.

641 U G 4
Heating, Ventilating, and Air Conditioning
A. 4 cl.
Prereq.: 510.
Not open to students with credit for 741.
A study of practices, components, and systems for conventional and unique air conditioning equipment used to control the environment for human occupancy, storage, and industrial processes. Sepsy.

642 U G 3
Refrigeration and Air Conditioning
W. 3 cl.
Prereq.: 502.
Not open to students with credit for 742.
A study of fundamentals, processes, and equipment associated with refrigeration systems using vapor compression, air cycle, absorption, magnetic, and thermo-electric cooling. Sepsy.

664 U G 3
Mechanical Engineering Design II
Sp. 3 2-hr. lab.
Prereq.: 564.
Not open to students with credit for 762.
The methodology and practice in the preliminary design of an optimum system to fulfill a specified need utilizing principles of several mechanical engineering disciplines. Foster.

685 U G 3
Lubrication and Bearing Design
A. 3 cl.
Prereq.: 504 or permission of instructor.
Analysis and design of hydrodynamic and hydrostatic bearings using liquid or gas lubricants. Hornung.
666 UG 3
Acoustic Problems in Engineering
W. 3 cl.
Prereq.: 503 or 504, 552 or 553, and 562; or permission of instructor.
Preparation for design problems involving noise sources in mechanical systems. Marco.

671 UG 4
Measurement System Application and Design
W. 3 cl., 1 2-hr. lab.
Prereq.: 570 or equiv.
Not open to students with credit for 770.
A theoretical and experimental study of measurement instrumentation; emphasis on both principles of operation and analysis and design techniques for measurement systems of a mechanical and electromechanical nature. Doebelein.

672 UG 4
Control Systems Design
Sp. 3 cl., 1 2-hr. lab.
Prereq.: 571 or permission of instructor.
Not open to students with credit for 772.
A study of the theoretical and experimental procedures involved in the design of feedback control systems including servomechanisms and process control. Doebelein.

682 UG 3
Mechanical Engineering Laboratory
Sp. 2 2-hr. lab. and 5 hrs. lab. planning and report writing.
Prereq.: 581.
Not open to students with credit for 782.
Continuation of 581. Buxton.

687 UG 3
Introduction to Design in Biomedical Engineering
W. 3 cl.
Prereq.: Elec. E. 670 or permission of instructor.
Introduction of engineering students to design problems in biomedical engineering; analysis in biomechanics, bio-fluid mechanics, diffusion, and elementary physiology. Bridge.

693 UG 2-10
Individual Studies in Mechanical Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 24 cr. hrs. with a maximum of 10 cr. hrs. in any one topic.
This course is intended to give the advanced student opportunity to pursue special studies not otherwise offered; work undertaken will be selected from automotive and internal combustion machinery, combustion and fuels, heat transfer, heating, ventilating, air conditioning, industrial hydraulics, machine design, refrigeration, steam power plants, and thermodynamics.

700 UG 3
Transport Processes
Su, A. 3 cl.
Prereq.: 510 and Math. 255; or equiv.
A parallel, systematic study of the three transport processes of mass, momentum, and energy from the continuum viewpoint. Moran.

751 UG 3
Kinematic Synthesis and Analysis
A. 3 cl.
Prereq.: 551 or 553, and 350 or 501.
Not open to students with credit for 851.
A study of fundamental methods for the synthesis and analysis of motions in mechanical systems. Davidson.

794 UG 3-5
Group Studies in Mechanical Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Advanced topics in the various phases of mechanical engineering; the particular topics, the number of credit hours, and the instructor will be announced in the quarter previous to the one in which the course is offered.

801 G 3
Gas Dynamics
Sp. 3 cl.
Prereq.: 504 and Math. 255, or equiv.
An analytical study of one and two dimensional steady flow and one dimensional unsteady flow.

802 G 3
Fundamentals of Thermodynamics I
W. 3 cl.
Prereq.: 502 and Math. 255, or equiv.
A study of thermodynamics fundamentals from the classical viewpoint.

8031* G 3
Fundamentals of Thermodynamics II
Sp. 3 cl.
Prereq.: 802 and Statist. 421, or equiv.
Introduction to the fundamentals of thermodynamics from the microscopic viewpoint.

804* G 3
Advanced Applied Thermodynamics
Sp. 3 cl.
Prereq.: 700 and 802.
A study of thermodynamics as applied to property interrelationships and to irreversible phenomena. Moran.

807 G 3
Advanced Heat Transfer
W. 3 cl.
Prereq.: 510; and 881 or Math. 512 or 557.
A study of the general heat transfer equations and their applications to heat transfer in solids and through fluids the use of numerical and graphical analysis will be included. Han.

809* G 3
Advanced Heat Transfer
A. 3 cl.
Prereq.: Math. 255 or equiv.
A study of phase change and radiative heat transfer processes. Han.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>810</td>
<td>G 3</td>
<td>Dynamics in Inviscid Fluids</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. 3 cl. Prereq.: 503, and 811 or Math. 512, or equiv. Three-dimensional, compressible, and incompressible inviscid flows, including irrotational and rotational motion with and without flow discontinuities. Han.</td>
</tr>
<tr>
<td>811</td>
<td>G 5</td>
<td>Laminar Flow and Heat Transfer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W. 5 cl. Prereq.: 510 and 810. Laminar boundary layers and fluid flow with and without heat transfer, fully established entrance flows, free convection, and extensions to compressible flows. Han.</td>
</tr>
<tr>
<td>812</td>
<td>G 5</td>
<td>Turbulent Flow and Heat Transfer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sp. 5 cl. Prereq.: 811. Turbulent boundary layers and flows with and without heat transfer for internal and external flows including laminar instability, Reynolds stresses, and mixing length theory. Bridge.</td>
</tr>
<tr>
<td>820†</td>
<td>G 3</td>
<td>Internal Combustion Power Plants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W. 3 cl. Prereq.: 528 or equiv. An advanced study of reciprocating internal combustion power plants. Engelmann.</td>
</tr>
<tr>
<td>821†</td>
<td>G 3</td>
<td>Advanced Principles of Energy Conversion in Turbomachinery</td>
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<tr>
<td></td>
<td></td>
<td>Sp. 3 cl. Prereq.: 527 or equiv. An advanced study of power-absorbing, generating, and transmitting turbomachinery. Jones.</td>
</tr>
<tr>
<td>822</td>
<td>G 1-18</td>
<td>Preliminary Design of Power Systems</td>
</tr>
<tr>
<td>823†</td>
<td>G 3</td>
<td>Advanced Steam Power Cycle and Turbine Analysis</td>
</tr>
<tr>
<td>824†</td>
<td>G 3</td>
<td>Advanced Combined Vapor Power Cycle Analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sp. 3 cl. Prereq.: 823 or permission of instructor. A study of conventional and novel binary vapor cycles and combined vapor-gas power cycles. Buxton.</td>
</tr>
<tr>
<td>825</td>
<td>G 1-18</td>
<td>Advanced Vapor Power Cycle and Component Studies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A, W, Sp. Conf. Prereq.: 823 or 824, or permission of instructor. Repeatable to a maximum of 18 cr. hrs. Courses to be conducted on a conference basis with problems assigned to each student based on his needs and area of interest. Buxton.</td>
</tr>
<tr>
<td>826</td>
<td>G 3</td>
<td>Combustion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sp. 3 cl. Prereq.: 700 or permission of instructor. A study of chemical thermodynamics and kinetics, the basic equations of change, and application of fundamentals to combustion in engineering systems. McDonald.</td>
</tr>
<tr>
<td>830†</td>
<td>G 3</td>
<td>Introduction of Electro and Magnet Fluid Mechanics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W. 3 cl. Prereq.: 510 and Math. 513, or permission of instructor. A study of the interactions of electric and magnetic fields with liquids and gases. Velkoff.</td>
</tr>
<tr>
<td>840†</td>
<td>G 3</td>
<td>Advanced Environmental Control Refrigeration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W. 3 cl. Prereq.: 641 or equiv. Advanced study of conventional and novel processes including thermoelectric, magnetic, and gas systems. Sepasy.</td>
</tr>
<tr>
<td>841†</td>
<td>G 3</td>
<td>Advanced Environmental Control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sp. 3 cl. Prereq.: 640 or equiv. An advanced study of conventional and unique systems used to control the environment for occupancy by people, equipment, and material. Sepasy.</td>
</tr>
<tr>
<td>842</td>
<td>G 1-18</td>
<td>Advanced Environmental Control Problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A, W, Sp. Conf. Prereq.: Permission of instructor. Repeatable to a maximum of 18 cr. hrs. A study of methods of synthesis and analysis pertaining to the creative design of environmental control systems, involving conferences and theoretical and/or experimental investigations. Sepasy.</td>
</tr>
<tr>
<td>850</td>
<td>G 3</td>
<td>Dynamics of High Speed Machinery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W. 3 cl. Prereq.: 562 or 563, and Math. 255, or equiv. An advanced study of the interrelationships among forces, motions, and masses as related to rigid or elastic machine members. Starkey.</td>
</tr>
<tr>
<td>860</td>
<td>G 3</td>
<td>Advanced Mechanical Design</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. 3 cl. Prereq.: 561 and Math. 255, or equiv.</td>
</tr>
</tbody>
</table>
A study of concepts, principles, and phenomenological theories related to the failure-prevention aspect of mechanical design. Starkey.

**381**  
**G 3**  
Stress Analysis of Machinery  
Sp., 3 cl.  
Prereq.: 350, 562, and 563; 881 or Math. 512, or equiv.  
A study of concepts, principles, and procedures related to the analysis of stresses and strains in machine parts. Starkey.

**380**  
**G 4**  
Modeling of Dynamic Systems  
Sp., 3 cl., 1 2-hr. lab.  
Prereq.: 880 or permission of instructor.  
A study of theoretical, experimental, and computer methods for characterizing the dynamic behavior of complex systems.

**388**  
**G 3**  
Lumped Parameter System Analysis  
A., 3 cl.  
Prereq.: Math. 255 or equiv. or permission of instructor.  
Lumped parameter system analysis of mechanical, thermal, hydraulic, pneumatic, and electromechanical systems; system response to periodic, transient, and random excitation; computer and physical system demonstrations. Doebelin.

**381**  
**G 3**  
Distributed Parameter Systems  
A., 3 cl.  
Prereq.: 510 and Math. 255, or equiv.  
Not open to students with credit for 807.  
Numerical and analytical methods for obtaining solutions to engineering problems in heat transfer, fluids mechanics, and other field problems. Moran.

**388**  
**G 1**  
Mechanical Engineering Seminar  
A., W., Sp., 1 cl.  
Prereq.: Mech. E. grad. standing.  
Repeatable to a maximum of 3 cr. hrs. for M.S. degree and 3 additional cr. hrs. for Ph.D. degree.  
Lecture and discussion of current topics related to mechanical engineering presented by graduate students, staff, and guest speakers. Starkey.

**999**  
**G Arr.**  
Research in Mechanical Engineering  
Su., A., W., Sp.  
Research for thesis or dissertation purposes only.

**Medical Communications**

(School of Allied Medical Professions)  
Office: 243 School of Allied Medical Professions Building, 1583 Perry Street  
Burke (Division Director); Associate Professor Schoen; Instructors Kreutzfeld, Potts, and Schweikert.

**550**  
**U 8**  
Medical Communications Media I  
W., 5 1-hr. cl., 3 2-hr. clinical experience.  
Prereq.: Senior standing in Med. Commu. and permission of instructor.  
Study and application of educational uses of communication processes and media in a health setting. Burke and Staff.

**550**  
**U 8**  
Medical Communications Media II  
Sp., 3 1-hr. cl., 5 2-hr. clinical experience.  
Prereq.: 550.  
Diagnosis and planning for communication services in various health environments. Burke and Staff.

**Medical Dietetics**

(School of Allied Medical Professions)  
Office: 516 School of Allied Medical Professions Building, 1583 Perry Street  
Professor Molleson (Division Director); Professor Lewis (Emeritus); Associate Professors Allred, Anderson, Casberque, Mason, and Scobie (Emeritus); Assistant Professors Breeze, Herrick, Sharp, and Seubert; Instructors Gordon, Griesen, Johnson, Kram, Pyles, and J. White; Clinical Instructors Behm, Bethel, Brantford, Cox, Gerns, Jones, and S. White.

**201**  
**U 1**  
Introduction to Medical Dietetics  
W., 2 cl.  
Basic knowledge and experience in functional and sociological aspects of responsibilities of the medical dietitian. Molleson and Staff.

**410**  
**U 6**  
Introduction to Patient Dietary Care  
A., 4 cl., 6-hr. clinical study.  
Prereq.: Home Ec. 310.  
Not open to students with credit for 310.  
Principles and practice in the dietary care of the hospital patient. J. White and Staff.
411 U 1
Electronics Data Processing in Dietetics
A. 1 cr., cl. clinical experience.
Prereq.: Enrollment in Med. Diet. or permission of instructor.
Introduction to basic computer concepts and the
application of these concepts to dietetic systems.
Casbergue.

421 U 6
Management in Dietetics
A. 4 cr., 1 4-hr. lab.
Prereq.: Home Ec. 314,
Management in food service systems emphasizing
quality of food, production planning, work organization,
financial control in quantity food preparation for
regular and modified diets. Casbergue, Gordon, and
Pyles.

422 U 6
Management in Dietetics
Sp. 3 cr., 3 3-hr. lab.
Prereq.: 421.
Principles and recent trends in menu planning and food
procurement in food service systems; responsibility
for writing and implementing menus in hospital food
services. Casbergue, Gordon, and Pyles.

521 U 6
Nutrition and Human Metabolism
W. 4 cr., 5-hr. clinical study.
Prereq.: Home Ec. 310, Physiol. Chem. 312 or concur.,
Physiol. 312 or equiv.; Junior standing or permission
of instructor.
Metabolism of essential nutrients at cellular and
intact levels of the body; causes, results, and dietary
management of alterations in metabolism of these
nutrients. Steuben and J. White.

522 U 6
Nutrition and Human Metabolism
Sp. 4 cr., 5-hr. clinical study.
A continuation of 521.

523 U 6
Nutrition and Human Metabolism
Su. 4 cr., 5-hr. clinical study.
Prereq.: 522.
Continuation of 522.

636 U 3
Dietitian as a Teacher
Su. 2 cr., 3-hr. clinical study.
Prereq.: Med. Diet. senior standing.
educational principles and practices as applied to the
teaching responsibilities of the dietitian. Johnson.

637 U 5
Community Nutrition
A. 2 cr., 6-hr. clinical study.
Prereq.: Senior standing or permission of instructor.
Public health nutrition programs and their services
to the community, with particular reference to
nutrition problems of special groups of the population.
Anderson.

638 U G 5
Pediatric Nutrition
A. 3 cr., 4-hr. clinical study.
Prereq.: Grad. or senior standing in Med. Diet. and
permission of instructor.
The nutrition of children: the influence of physical,
psychological, and social growth and development from
infancy through adolescence. Anderson and Pediatric
Staff.

645 U 10
Advanced Medical Dietetics I
W. 4 cr., 2-hr. conf., 20-hr. clinical study.
Prereq.: Senior standing and permission of instructor.
Advanced study and evaluation of disturbed metabolic
processes affecting human nutrition and solution of
the complex dietetic problems accompanying them.
Breese and Staff.

646 U G 10
Advanced Medical Dietetics II
Sp. 4 cr., 2-hr. conf., 20-hr. clinical study.
Prereq.: 645, senior or grad. standing and permission
of instructor.
Continuation of 645. Breese and Staff.

693 U G 1-5
Individual Studies in Nutrition or Dietetics
Prereq.: Grad. or senior standing in Med. Diet. and
permission of instructor.
Problems in various phases of nutrition or medical
dietetics not included in current course offerings.
Molleson and Staff.

830† G 3
World Nutrition
Su. 2 1½-hr. cl.
Prereq.: Permission of instructor.
Not open to students with credit for Prev. Med. 830.
A multidisciplinary approach to the study of nutrition
in developing countries; emphasis on food supply,
nutritional status, infant and child nutrition and
nutrition survey methods. Mason.

856 G 3
Nutrition in Systemic Disease
W. 2 1½-hr. cl.
Prereq.: Permission of instructor.
Not open to students with credit for Prev. Med. 856.
The physiopathological background of systemic disease
and the rationale of specific diets in their prevention
and treatment. Molleson and Medical Staff.

858 G 3
Community Nutrition
Sp. 2 1½-hr. cl.
Prereq.: 638 and 856, or permission of instructor.
Not open to students with credit for Prev. Med. 858.
Methods of discovering problems in public health
nutrition and practical application of nutrition
information for improvement of nutritional status at
various age levels. Anderson.

898 G 1
Interdepartmental Seminar in Nutrition
and Food Technology
(See under Interdepartmental Seminars. University
Academic Policies and Course Offerings catalog.)
Medical Illustration
(School of Allied Medical Professions)
Office: 206 School of Allied Medical Professions Building, 1583 Perry Street
Instructor: Krueckfeld (Division Director); Assistant Professor Shepard (Emeritus); Instructors Keating, O'Neill, and Prosser; Clinical Instructor Kramer.
100 U 0
Medical Illustration Field Experience
Prereq.: Permission of instructor.
Practical application of medical illustration techniques in a functioning hospital department of medical illustration.
640 U 5
Techniques
Prereq.: Permission of instructor.
Repeatable to a maximum of 45 cr. hrs.
Advanced study for students in medical illustration including preparation of charts, graphs, medical and surgical illustrations, exhibits and general work for a medical center.
683 U 5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 45 cr. hrs.
Advanced study in scientific illustration as related to medicine.

Medical Microbiology
Office: 5072 Medical Basic Science Building, 333 West Tenth Avenue
Professors Cramblett (Chairman), Hampsarian, Kapral, Macpherson, Saslaw, and Somerson; Associate Professors Bowman, Haynes, Kleiner, Lang, Ottenenghi, and Perkins; Assistant Professors Azimi, Fass, Hilty, Pollack, and Thomas.
624 P G 3
Medical Microbiology
A. 3 2-hr. lab.
Prereq.: Permission of instructor.
Morphologic, physiologic, and serologic characteristics of pathogenic microorganisms; the epidemiology and pathogenesis of infectious diseases; methods of diagnosis, prevention, and treatment. Cramblett and Staff.
625 P G 4
Medical Microbiology
W. 40-hr. lec. during 7 wks.
Prereq.: 624.
Continuation of 624. Staff.
626 P G 5
Medical Microbiology
Sp. 20-hr. lec., 70-hr. discussion and lab. during 7 wks.
Prereq.: 625 or permission of instructor.
A more extensive and intensive application of basic principles of medical microbiology to infectious diseases.
701 P G 3
Fundamentals of Medical Immunology
A. 3 cr.
Prereq.: Permission of instructor.
Fundamentals of immunologic phenomena in the normal and diseased state, with primary emphasis on application of immunology in medicine. Lang.
744* P G 3
Clinical Medical Mycology
A. 2 cr. I, 3-hr. lab.
Prereq.: 624, 625, and permission of instructor; Bot. 662.01 recommended.
An advanced course in medical mycology with emphasis on isolation of human pathogenic fungi from patients; comprehensive laboratory diagnosis; serology; microscopic pathology; staining; and animal applications. Pollack.
754 P G 3
Medical Virology
W. 3 1-hr. lec.
Prereq.: 625; Biochem. 613 or 709 and 623 or 710, or Physiol. Chem. 611 and 612, or permission of instructor.
Primary emphasis on viruses important to man; fundamental properties of viruses, host cell-virus interaction, pathogenesis, and immunity. Hamparian, Thomas, and Cramblett.
755 P G 4
Medical Virology
Sp. 1 1-hr. lec. and 3 2-hr. lab.
Prereq.: Permission of instructor.
The fundamental principles of methods commonly used for handling and studying viruses in the laboratory.
764 P G 4
Bacteriophagy
Sp. 2 1-hr. lec., 2 2-hr. lab.
Prereq.: 625 or permission of instructor.
Various phage-bacterium systems used to study and to exemplify basic mechanisms involved in virus infections. Bowman.
793 P 3, 6, 12, 18 G 3-15
Individual Studies in Medical Microbiology
Prereq.: Enrollment in the College of Medicine or permission of instructor.
(When registration is for 3 professional cr. hrs., arr. additional 3 hr. professional course must be taken.)
793.01 Diagnostic and Clinical Virology
1, 2, or 3 months.
793.02 Problems in Virology
Su, A, W, Sp. 3 months.
Must repeat to 18 cr. hrs. for professional credit.
793.03 Problems in Experimental Bacterial Viruses
1, 2, 3, or 4 months.
Repeatable to a maximum of 24 cr. hrs. for professional credit.

793.04 Problems in Mycoplasma Research
3 or 4 months.
Must repeat to 18 or 24 cr. hrs. for professional credit.

793.05 Medical Immunology
1, 2, 3, or 4 months; offered all months.
Repeatable to a maximum of 24 cr. hrs. for professional credit.

793.06 Problems in Medical Microbiology
1, 2, 3, or 4 months; offered all months.
Repeatable to a maximum of 24 cr. hrs. for professional credit.

Clinical Microbiology
(See Path. 793.07)

Infectious Diseases
(See Ped. 793.03)

794
Group Studies
1 month, offered all months.
Prereq.: 624 and 625, or equiv.; permission of instructor.
(When registration is for 3 professional cr. hrs., an additional 3 hr. professional course must be taken.)

794.01 Immunological Diseases
Directed reading and discussion of human diseases with immunological features; primary attention is directed toward the immunological phenomena underlying connective tissue and specific organ diseases. Lang.

814
G 1
Seminar in Medical Microbiology
Prereq.: Med. Microbiol. grad. standing or permission of instructor.
Repeatable with permission of instructor to a maximum of 9 cr. hrs.

8341*
G 5
Experimental Medical Microbiology
Sp. 2 cl., 2 4-hr. lab.
Prereq.: 624, 625, and permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
An advanced course in the theory, practice, and analysis of current experimental procedures used in the study of human microbial pathogens. Lang, Pollack, and Thomas.

8441+
G 2
Mycoplasma, Rickettsiae, and Chlamydia
A. 2 1-hr. lec.
Prereq.: 625 or Microbiol. 607.
Mycoplasmas and L-forms, members of the Bedsonia group, Rickettsia and Trachoma agents. Somerson and Pollack.

8541* G 3
Molecular Basis of Antibiotic and Chemotherapeutic Action
Sp. 3 1-hr. lec.
Prereq.: 625; Physiol. Chem. 612; or Biochem. 612 or 707 and 622 or 708; or Microbiol. 761; or permission of instructor.
Action of antibiotic and chemotherapeutic agents on specific sites in the metabolism and/structures of cells stressing the comparative biochemistry of bacterial and animal cells. Ottolenghi.

864
G 3
Dynamic Aspects of Bacterial Infections
A. 3 1-hr. lec.
Prereq.: 625 or Microbiol. 625 or equiv. or permission of instructor.
An analysis of the dynamic interrelationships between the host's and parasite's inherent physiological capabilities and how these expressions (other than specific immunity) are mutually modified. Kapral and Ottolenghi.

994
G 2-6
Group Studies in Medical Microbiology
Prereq.: Permission of instructor.
Repeatable to a maximum of 24 cr. hrs.
Investigation of special areas of medical microbiology.

999
G Arr.
Research in Medical Microbiology
Research for thesis or dissertation purposes only.

Medical Record Administration
(School of Allied Medical Professions)
Office: 231 School of Allied Medical Professions Building, 1583 Perry Street
Instructor Pae (Acting Division Director).

501
U 5
Medical Record Science I
A. 5 cl.
Prereq.: Permission of instructor.
An orientation to medical records including a history of medical records, uses, types, component parts of the record, numbering and filing systems, and the responsibilities of the medical record administrator.

502
U 5
Medical Record Science II
W. 4 cl., 1 3-hr. lab.
Prereq.: 501.
Classification, coding, and indexing of diseases and surgical procedures; orientation and development of indexes in the medical record department.
Medical Technology

(School of Allied Medical Professions)

Office: 535 School of Allied Medical Professions Building, 1583 Perry Street

Professor Macpherson (Division Director); Associate Professor Sutton (Assistant Division Director); Professor Stevenson; Assistant Professors Brunner, Grannis, Gregory, and Lott; Instructors Anderson, Ayers, Baker, North, Torbet, and Wilson; Clinical Instructors Aros, Bittel, Cost, Frank, Kern, Palkuti, Royhans, and Sherman.

For related courses see Pathology.

480  U 5
Introduction to Medical Technology
W, Sp. 3 cl., 6 lab. hrs.
Prereq.: 15 cr. hrs. in biological sciences, Chem. 211, and admission to the Med. Tech. division; or permission of instructor.
Introduction to the medical laboratory, its organization, functions, responsibilities, opportunities, instruments, and methods. Brunner, Anderson, and North.

508  U 3
Medical Technology Laboratory
Su. 2 cl., 1 3-hr. lab.
Prereq.: Admission to Med. Tech.
Laboratory techniques in parasitology. Wilson and Sutton.

511  U 9
Medical Technology Laboratory
Su. 27 lab. hrs.
Prereq.: Admission to Med. Tech.
Laboratory techniques in hematology, coagulation, and urinalysis. Anderson, Baker, and North.

512  U 9
Medical Technology Laboratory
A. 27 lab. hrs.
Prereq.: Admission to Med. Tech.
Laboratory techniques in clinical bacteriology and mycology. Wilson, Anderson, and Baker.

513  U 9
Medical Technology Laboratory
W. 27 lab. hrs.
Prereq.: Admission to Med. Tech.
Laboratory techniques in clinical immunology and immunohematology. Anderson and Gregory.

514  U 9
Medical Technology Laboratory
Sp. 27 lab. hrs.
Prereq.: Admission to Med. Tech.
Laboratory techniques in chemical laboratory. Brunner, Anderson, and Baker.

515  U 10
Clinical Practice in Medical Technology
Su, A, W, Sp. 5 8-hr. labs.
Prereq.: 511, 512, 513, and 514.
Application of medical laboratory techniques under supervision in the clinical laboratories of University Hospital. Macpherson and Staff.
Medicine

Office: N-1013 University Hospital, 410 West Tenth Avenue


661 P 2 Principles of Medicine
Sp. 2 cl.
Prereq.: Dent. 3rd yr. standing.
A survey course in medicine to dental students considering the infectious, deficiency, and systemic diseases; representative diseases are selected for detailed consideration and demonstrations.

714 P 6 Ward Clinics in Infectious Diseases
1 month, offered all months except June.
Prereq.: Permission of instructor.
(Daily formal instruction from 8 a.m. to 5 p.m.; student on call throughout 24 hours daily.)
Clerkship and seminars on common and unusual infectious diseases. Saslaw.

715 P 6, 12, or 18 Clinical Medicine
4 months, offered July, Nov., Mar.
Prereq.: Med. 3rd yr. standing.
Must repeat to 24 cr. hrs.
(Daily formal instruction from 8 a.m. to 6 p.m.; student on call throughout 24 hours daily.)
Four months' clerkship in medicine; experience in Outpatient Department and on Inpatient Services.

716 P 6 Ward Clinics in Pulmonary Disease
1 month, offered all months except June.
Prereq.: Permission of instructor.
(Daily formal instruction from 8 a.m. to 6 p.m.; student on call throughout 24 hours daily.)
Clerkship and seminars on pulmonary diseases.

740 P 6, 12, 18 Ambulatory Clinics in Medicine
1 month, offered all months except June.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 hr.
The diagnosis and treatment of ambulatory patients with general and special medical problems.

751 P 6, 12, 18 Medical Clerkships
1 month, offered all months except June.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 hr.
(Daily formal instruction from 8 a.m. to 6 p.m.; student on call throughout 24 hours daily.)
Ward clerkship in the following subspecialties of medicine, with bedside, didactic, and seminar instruction.
751.01 Allergy
751.02 Cardiology
751.03 Dermatology
751.04 Endocrinology
751.05 Gastroenterology
751.06 Genetics
751.07 Hematology
751.08 Neurology
751.09 Renal Diseases
751.10 Rheumatology
751.11 Advanced Clinical Clerkships

770 P 3 Basic Science Review
1 month, May.
Prereq.: Permission of instructor.
Didactic review of new basic science developments; practice in electrocardiographic and phonocardiographic interpretation; elements of office practice and community relations.

793 P 6, 12, 18 G 1-5 Individual Studies in Medicine
All months, 1 or more months to be elected.
Prereq.: Permission of instructor.
Research on a minor problem under faculty supervision in the following specialties of medicine:
793.01 Allergy
793.02 Cardiology
793.03 Dermatology
793.04 Endocrinology
793.05 Gastroenterology
793.06 Genetics
793.07 Hematology
793.08 Infectious Diseases
793.09 Neurology
793.10 Pulmonary Diseases
793.11 Renal Diseases
793.12 Rheumatology
Group Studies in Medicine

Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Group studies of special topics in medicine.

Developmental Disabilities
(Mental Retardation)
Full time—5 days a week
Interdisciplinary comprehensive exposure to medical, allied medical, epidemiological, psychological, social, sociological, educational, and legal aspects and problems of mental retardation with a community health orientation.

Interdepartmental Seminar
(See under Interdepartmental Seminars.)
a. Neuroscience

Internship in Medicine
12 months full time, beginning July 1.
Prereq.: Appointment as Intern, University Hospital.
Repeatable to a maximum of 216 cr. hrs.
Rotation through medical ward services and hospital emergency room; primary responsibility for patient care; attending and work rounds; staff conferences.

Residency in Medicine
12 months full time, beginning July 1.
Prereq.: Appointment as Resident, University Hospital.
Repeatable to a maximum of 216 cr. hrs.
Rotation through medical subspecialty, clinical, and outpatient services; consultative activities, supervisory and teaching responsibilities in patient-care teams; rounds; conferences.

Seminar in Medicine
Prereq.: Permission of instructor.
Discussion of pertinent literature and research projects in various subspecialty areas with emphasis on basic science concepts. Warren and Staff.

Allergy
Cardiology
Dermatology
Endocrinology
Gastroenterology
General Medicine
Genetics
Hematology
Infectious Diseases
Neurology
Pulmonary Diseases
Renal Diseases
Rheumatology

Research in Medicine
Research for thesis or dissertation purposes only.

Medicine, College of

Office: 209 Medical Science Administration Building,
370 West Ninth Avenue

The Development of Medicine and the
Medical Profession
A, W, Sp. 10 cr.
Prereq.: Enrollment in the College of Medicine.
The evolution of the theory and practice of medicine and of the social role of the physician from earliest times. Burnham.

Introduction to Medicine
Su.
Prereq.: Enrollment in the College of Medicine.
Introducing basic concepts of major disease mechanisms, with patient centered learning; study of the health care delivery systems and the resources of medical informational services.

Nature of Life Processes in Medicine I
Su.
Concur.: 651.
Macrostructure, microstructure, and function of the human body including biochemical reactions and normal defense mechanisms; study of human behavior, growth, and development; introduction to the tools of physical diagnosis.

Nature of Life Processes in Medicine II
A.
Prereq.: 652.
Repeatable to a maximum of 36 cr. hrs.
Continuation of 652.

The Pathophysiology and Manifestation of
Disease I
W.
Prereq.: 653.
Multidisciplinary presentation of disease mechanisms and pharmacodynamics correlating structure and function with its cardinal manifestations; elective experience in basic science fields; clinical learning in outpatient setting.

The Pathophysiology and Manifestation of
Disease II
Sp.
Prereq.: 654.
Continuation of 654.

The Pathophysiology and Manifestation of
Disease III
Prereq.: 655.
Repeatable to a maximum of 54 cr. hrs.
Continuation of 655.
671  P 6, 12, 18
Clinical Medicine I
Su, A. W. Sp.
Prereq.: 656.
Didactic and clinical instruction in medicine, obstetrics and gynecology, pediatrics, psychiatry, and surgery; experience in outpatient, community, and inpatient services.

672  P 6, 12, 18
Clinical Medicine II
Su, A. W. Sp.
Prereq.: 671.
Continuation of 671.

673  P 6, 12, 18
Clinical Medicine III
Su, A. W. Sp.
Prereq.: 672.
Continuation of 672.

674  P 6, 12, 18
Clinical Medicine IV
Su, A. W. Sp.
Prereq.: 673.
Continuation of 673.

675  P 6, 12, 18
Clinical Medicine V
Su, A. W. Sp.
Prereq.: 674.
Continuation of 674.

676  P 6, 12, 18
Clinical Medicine VI
Su, A. W. Sp.
Prereq.: 675.
Continuation of 675.

677  P 6, 12, 18
Clinical Medicine VII
Su, A. W. Sp.
Prereq.: 676.
Continuation of 676.

797  P G 1-5
Interdepartmental Seminars
Su, A. W. Sp.
Repeatable by permission of College Secretary.
(See under Interdepartmental Seminars, University Academic Policies and Course Offerings catalog.)
- Professional Responsibilities and the Great Issues of Our Time.

Medieval and Renaissance Studies

Office: 320 Main Library, 1858 Neil Avenue
Professor Kahrl (Director); Advisory Committee, Professors Boh (Philosophy), Cope (History of Art), Hoppin (Music), and Utley (English); Associate Professors Mancini (Romance Languages), Matejic (Slavic Languages), Morrow (Theatre), and Schiam (Classics); Assistant Professors Frantz (English), Lynch (History), and Vredeveeld (German).

210  U 5
The Court of Charlemagne
A. 3 cl., 2 hr. arr.
The Carolingian Renaissance: a unified interpretation of a crucial period in the transition of Europe from the classical age to the early Middle Ages.

211  U 5
Idealism and Scepticism in the 12th and 14th Centuries
W. 3 cl., 2 hr. arr.
Characteristic expressions of idealism in the art, literature, and philosophy of 12th century Europe contrasted to the scepticism of the later medieval period.

212  U 5
The Culture of a City State in the Renaissance
Sp. 3 cl., 2 hr. arr.
Florence, 1200-1550: the study of an Italian Renaissance city-state with attention to its political, social, and economic structure; its religious, intellectual and artistic activity.

213  U 5
Medieval Slavic Civilization
W. 4 cl., 1 hr. arr.
Prereq.: Sophomore standing. Interpretative and analytical study of the major social, religious, ethical, and literary ideas and events of medieval Slavic civilization.

214  U 5
The Golden Age of Islamic Civilization
Sp. 4 cl., 1 hr. arr.
The Baghdad Caliphate of Harun ar-Rashid from 786 to 809 A.D.

888  G 5
Medieval and Renaissance Culture
W. 4 cl.
Prereq.: One or more 600-level courses or equiv. in subject offered, appropriate to student's field of specialization, or permission of instructor. Repeatable to a maximum of 15 cr. hrs. Selected topics in medieval culture and civilization, offered cooperatively by two or more departments in the Colleges of the Arts and Sciences.
889  G 5
Medieval and Renaissance Literature
Sp.  4 cl.
Prereq.: One or more 600-level courses or equiv. in subject offered, appropriate to student's field of specialization, or permission of instructor. Repeatable to a maximum of 15 cr. hrs. Interdisciplinary seminar directed by two or more teachers from separate departments. Topic to be announced.

Metallurgical Engineering

Office: 141A Metallurgical Engineering Building, 115 West 19th Avenue

Regents Professor Fontana (Chairman), Professors Beck, Hirth, Hopkins (Battelle Visiting), Meyrick, Powell, Rapp, Speiser, Spretnak, St. Pierre, Staehle, and Williams; Associate Professors Boorstein and Rigney.

200  U 3
Introduction to Metallurgical Engineering
A.  3 cl.
Prereq.: 2nd yr. standing in Met. E.
Substantive survey of the profession of metallurgy and metallurgical engineering; science versus engineering; the design function and professional responsibilities; historical heritage of metallurgical engineering. Boorstein.

300  U 4
Materials Science
Sp.  4 cl.
Prereq.: Chem. 204.
The structure of materials and the correlation of structure to physical and mechanical behavior; advanced materials and environmental effects. Boorstein.

301  U 3
Materials Science
W, Sp.  3 cl.
Prereq.: Chem. 204.
The atomic and microscopic structure of materials and the control of structure to affect the physical and mechanical properties.

330  U 4
Metallurgical Thermodynamics
Sp.  4 cl.
Prereq.: Chem. 205.
Fundamental concepts of thermodynamics and their application to systems of metallurgical interest; introduction to the laws of thermodynamics, principles, of chemical equilibrium, and solution behavior. St. Pierre.

430  U 4
Chemical Metallurgy I
A.  3 cl., 1 3-hr. lab.
Prereq.: 330 or equiv.
Metallurgical calculations; energy and mass balances; analysis of steady and non-steady state processes; heat and mass transfer applied to metallurgical processes. Boorstein.

431  U 4
Chemical Metallurgy II
W.  3 cl., 1 3-hr. lab.
Prereq.: 430.
Graphical representation of phase equilibria including important M-D-C and M-O-S systems; treatment of gas-solid reaction kinetics including oxidation, reduction, evaporation, retorting, etc.; electrochemical metallurgy processes. St. Pierre.

440  U 3
Physical Metallurgy I
Sp.  3 cl.
Crystallography; bonding; physical properties of single crystals, polycrystals; defects in crystals, diffusion; recovery and recrystallization. Rigney.

450  U 3
Physical Metallurgy II
A.  3 cl.
Prereq.: 440 and concur. 480.
Grain growth; partitioning of solute to defects and grain boundaries, nucleation theory, phase diagrams. Powell. Fee.

480  U 1
Physical Metallurgy Laboratories
A, W.  1 3-hr. lab.
Prereq. or concur.: 450 and permission of instructor. Repeatable to a maximum of 4 cr. hrs. The student must register for specific studies in the areas indicated below, and may not register for more than one at a time. Courses must be scheduled in the order listed.
   a. Furnace design and temperature measurement. Meyrick.
   c. Isothermal transformation, quenching and tempering, and hardening. Powell.

489  U 5
Industrial Experience
A.  5 cr. hrs. for each summer's work.
Repeatable to a maximum of 10 cr. hrs.
Register for course and submit report on experience during the Autumn Quarter following the summer in which industrial experience was obtained; one summer or 10 weeks of approved work in metallurgical industries. Williams.

502† U G 3
Advanced Structure of Materials
W.  3 cl.
Prereq.: 300, 301, or equiv.
Not open to students majoring in Met. E.
Means of obtaining and controlling microstructure; relationship of structure to properties; survey of alloy systems; environmental limitations of materials. Meyrick.

510 U G 4
Foundry Technology
Sp. 3 cl., 1 2-hr. lab.
Prereq.: 451 or equiv. and permission of instructor. Safety glasses must be worn in laboratory. Introduction to the manufacture of engineering components by metal casting processes involving molding, gating, risering, melting, and solidification. Williams. Fee.

520 U G 4
Chemical Metallurgy III
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 431 or permission of instructor. Structure and properties of liquid metals and alloys; thermodynamics of liquid metallic solutions; liquid metal-gas and slag reactions; solidification and zone refining. Boorstein. Fee.

550 U G 3
Physical Metallurgy III
W. 3 cl.

551 U G 3
Physical Metallurgy IV
A, Sp. 3 cl.

553 U G 3
Physical Metallurgy V
A. 3 cl.

560 U G 3
Mechanical Metallurgy
A. 3 cl.

589 U 2
Inspection Trip
Sp. Taken between W. and Sp. Qtrs.
One week trip to visit industrial plants and laboratories; report required; maximum expense, $90.00. Williams.

610 U G 3
Foundry Molding Materials
A. 3 cl.
Prereq.: 510. A study of materials used in compounding of sand mixtures and the effect of thermal shock upon the properties of molded masses. Williams.

611 U G 3
Foundry Molding Methods, Gating, and Risering
W. 3 cl.
Prereq.: 510. The manufacture of sand molds by various methods; gating and risering—a study of fluid flow and solidification to produce sound castings. Williams.

615 U G 4
Mechanical Forming of Metals
W. 3 cl., 1 2-hr. lab.
Prereq.: 560. Fundamental aspects of deformation of metals by forging, rolling, wire drawing, tube drawing, extrusion, piercing, and deep drawing. Sprentak.

620 U G 3
Process Metallurgy
A. 3 cl.

635 U G 3
Corrosion
A. 2 cl., 1 2-hr. lab.
Prereq.: Engr. 4th yr. standing. Fontana. Fee.

670 U G 3
Engineering Metallurgy I
W. 3 cl.
Prereq.: 551. Basic properties of metals and alloys, cost structure, design factors, specifications, and statistical methods; selection of metals and alloys, service failures. Staehle.

671 U G 3
Engineering Metallurgy II
Sp. 3 cl.

675* U G 3
Materials of Nuclear Technology
A. 3 cl.
Prereq.: 300, 301, or equiv. The physical metallurgy of reactor materials; the effects of reactor environment on the structure, and on the physical and mechanical properties of these materials. Staehle.

693 U G 1-6
Individual Studies in Metallurgical Engineering
Prereq.: Permission of dept. Repeatable to a maximum of 9 cr. hrs.
All studies (library and/or research investigations) are under the close direction of instructors; comprehensive report required.
- The properties of metals and alloys.
- Production and refining of metals.
- Metallurgical equilibrium.
- Corrosion engineering.
- Foundry.

694 U G 2-6
Group Studies in Metallurgical Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.

710 U G 3
Casting Control
Sp. 3 cl.
Prereq.: 610 or 611.
A study of the factors involved in the elimination of defective products. Williams.

714 U G 5
Environmental Pollution Abatement
W. 5 cl.
Prereq.: Senior or grad. majors in engineering or sciences.
Not open to students with credit for Agr. E. 714, Chem. E. 714, and Civil E. 714.
(Cross-listed in the Depts. of Agr. E., Chem. E., and Civil E.)
Problems, philosophies, principles, and methods of pollution abatement in the total environment; quantitative approaches to waste management in air, water, and land systems.

730 U G 3
Thermodynamics of Alloys
A. 3 cl.
Prereq.: 520 and 550, or equiv.
Thermodynamics of liquid and solid alloy systems; numerous problems. St. Pierre.

735 U G 3
Advanced Corrosion
W. 3 cl.
Prereq.: 635.
Theories and mechanisms of corrosion. Staehler.

736 U G 3
The Behavior of Materials
at Elevated Temperatures
Sp. 3 cl.
Prereq.: 330.
The mechanical and chemical properties of materials at elevated temperatures; creep, superalloys, dispersion strengthening, composites, and oxidation. Hirth.

740 U G 3
Theory and Properties of Metals
A. 3 cl.
Prereq.: 551; Chem. 521 and Math. 415; or permission of instructor.
Dependence of physical properties on structure; regularities in the structure of alloy systems; stability of alloy system; transplant phenomena in metals and alloys; magnetic phenomena. Speiser.

745 U G 3
Advanced Physical Metallurgy I
A. 3 cl.
Prereq.: 551.
Diffusion in metals. Powell.

750 U G 3
Advanced Physical Metallurgy II
W. 3 cl.
Prereq.: 745.
Nucleation theory in phase transitions, formal nucleation and growth theory, recovery, recrystallization and grain growth, allotopic phase transitions, early stages of precipitation from solid solution. Meyrick.

793 U G 2-6
Individual Studies in Metallurgical Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.

794 U G 2-6
Groups Studies in Metallurgical Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.

800 G 3
Theoretical Metallurgy
A. 3 cl.
Prereq.: Met. E. grad. standing or permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Current topics in the field of specialization of the Visiting Battelle Professor of Metallurgy.

801 G 3
Theoretical Metallurgy
W. 3 cl.
Prereq.: 800.
Continuation of 800.

802 G 3
Theoretical Metallurgy
Sp. 3 cl.
Prereq.: 801.
Continuation of 801.

820 G 3
Theory of Metal Refining
Sp. 3 cl.
Prereq.: 730.

831 G 3
Advanced Metallurgical Thermodynamics II
W. 3 cl.
Prereq.: 730.
Continuation of 730; thermodynamics of metallurgical systems. Speiser.
832  G 3
Advanced Metallurgical Thermodynamics III
A. 3 cl.
Prereq.: 730.
Continuation of 831; irreversible phenomena; metallurgical kinetics; application of rate theory to transport phenomena in metals and to metallurgical reactions. Speiser.

835†  G 3
Point Defects in Crystalline Materials
W. 3 cl.
Prereq.: 730 or permission of instructor.
A thermodynamic and electrochemical treatment of the formation, concentrations, mobilities, and interactions of atomic, ionic, and electronic point defects in materials at high temperatures. Rapp.

841  G 3
Theory and Properties of Metals
W. 3 cl.
Prereq.: 740.
Continuation of 740. Speiser.

842  G 3
Theory and Properties of Metals
A. 3 cl.
Prereq.: 841.
Continuation of 841. Speiser.

851  G 3
Advanced Physical Metallurgy III
Sp. 3 cl.
Prereq.: 745 and 750.
Classification of phase transformations, continuous and discontinuous precipitation from solid solution, eutectoidal transformations, massive and martensitic transformations, order-disorder changes. Meyrick.

852  G 3
Advanced Physical Metallurgy IV
W. 3 cl.
Prereq.: 851.
Relation of properties to microstructure. Hirth.

855  G 3
Structures of Metals and Alloys
Sp. 3 cl.
Prereq.: 480, 551, and Math. 415; or permission of instructor.
Application of X-ray diffraction and electron diffraction theory to the study of the structure of metals and alloys. Rigney.

860  G 3
Quantitative Dislocation Theory
A. 3 cl.
Prereq.: Math. 255 or permission of instructor.

861  G 3
Advanced Mechanical Metallurgy
Sp. 3 cl.
Prereq.: 560.
Detailed discussion of elasticity, plasticity, plastic deformation, dislocation theory of plastic flow, and fracture; effect of state of stress on plastic flow. Spretnak.

881  G 1
Graduate Seminar
Repeatable to a maximum of 12 cr. hrs.
Discussion of current thesis problems and outstanding current literature in metallurgical engineering; round table discussion of selected metallurgical topics.

994  G 2
Group Studies in Metallurgical Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 8 cr. hrs.
Pertinent topics to be announced.

999  G Arr.
Research in Metallurgy
Research for thesis or dissertation purposes only.

Microbiology
Office: 368 Biological Sciences Building, 484 West 17th Avenue
Professors Dugan (Chairman), Banwart, Birkeland (Emeritus), Bohl, Dodd, Ferguson, Hudson (Emeritus), MacPherson, Miller, Randles, Rheins, Rosen, Saslaw, Snell, Stahly (Emeritus), Wilson, Woolfert (Emeritus), and Yohn; Associate Professors Byers, Choperpenning, Copeland, Frey, Kolodziej, Kreier, Pfister, St. Pierre, Suie, and Wolff; Assistant Associate Professor Mollemhauer; Assistant Professors Mote and Sharp; Instructors Ackermann and Lesniowski.

For related courses see Biology.

211†  U 5
General Microbiology
A. 3 cl., 6 lab. hrs.
Prereq.: Superior performance in biol., chem., and math. in high school and permission of instructor.
A special course for first year college students; morphologic and physiologic characteristics of microorganisms. Frey, Kolodziej, and Pfister. Fee.

212†  U 5
General Microbiology
W. 3 cl., 6 lab. hrs.
Prereq.: Superior performance in biol., chem., and math. in high school and permission of instructor.
A special course for first year college students; genetics and ecology of microorganisms. Frey, Dugan, and Randles. Fee.
509 U G 5
Microbiology in Relation to Man
Su, A, W, Sp. 3 cl., 2 2-hr. labs.
Prereq.: Biol. 150 or equiv.; Biol. 101 recommended. Not open to students with credit for 600-level courses in Microbiol.
Not to be taken concur. with Microbiol. 607.
Not for students who intend to take other courses in Microbiol. Designed to give the student an understanding of microorganisms which have a bearing on the physical and economic well-being of man. Ackermann, Mote, and Randles. Fee.

592 U 2
Independent Study of Practical Microbiology
Prereq.: 4th yr. microbiol., major and permission of coordinating adviser. Students will work with course instructor, teaching assistants and associates to examine preparation and presentation of material, and gain experience working with students and faculty.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 600 AND 700
Unless otherwise indicated the prerequisites for 600 and 700-level courses are 15 hours of chemistry and 10 hours of biological sciences.

605† U G 5
Basic Microbiology for Science Teachers
Su. 3 cl., 3 2-hr. labs.
Prereq.: Biological science majors in the College of Education, or students in the Academic Year Institute, or grad. teachers of Biological Sciences. Biology and physiology of bacteria; their applications to foods, soil, fertility, sanitation, and disease; laboratory exercises include those designed for limited equipment in high schools. Fee.

607 U G 5
General Microbiology
A, W, Sp. 3 cl., 2 2-hr. lab.
Prereq.: 30 cr. hrs. in Biol., Sci. and 15 cr. hrs. in Chem. May not be taken concur. with 509.
Fundamental principles of microbiology and the characteristics of microorganisms emphasizing their morphology, classification, visualization, isolation, cultivation and maintenance, growth and death. Kolodziej and Kreier. Fee.

609 U G 5
General Microbiology
A, W. 3 cl., 2 3-hr. labs.
Prereq.: 607.
Fundamental principles of microbiology emphasizing the physiology, ecology, and genetics of microorganisms. Copeland, Dugan, and Frey. Fee.

622 U G 5
Principle of Infection and Resistance
W, Sp. 3 cl., 2 2-hr. labs.
Prereq.: 607 or equiv.
A study of host-parasite relationships, with emphasis on pathogenicity and immunity. Dodd. Fee.

Medical Microbiology
(See Med. Micro. 624 and 625.)

624 U G 5
Microbial Parasitism
A, Sp. 3 cl., 2 2-hr. labs.
Prereq.: 622.
Overview of parasitic relationships with emphasis on host response as influenced by route of contact, nature of etiologic agent(s), host species, and environmental influences. Rheins. Fee.

625† U G 5
Pathogenesis and Immunology of Infectious Diseases
A, Sp. 3 cl., 2 2-hr. labs.
Prereq.: 622.
A consideration of the microbiological and immunological aspects of representative types of infectious diseases. Fee.

627 P 6
Microbiology for Optometry Students
Sp. 3 cl., 2 2-hr. labs.
Prereq.: Enrollment in the College of Optometry. A specialized course in microbiology designed for professional students in Optometry which will deal with principles of infection, resistance, and related topics as they relate to the eye. Rheins.

632 U G 5
Cellular Aspects of the Immune Response
A, Sp. 3 cl., 2 2-hr. labs.
Prereq.: 622 or equiv.
Cellular and molecular mechanisms of the immune response; characterization of cell products elaborated subsequent to antigenic stimulation; significance of these products in immunologic disease.

634 U G 5
Water Microbiology
W. 2 cl., 2 2-hr. labs.
Prereq. or concur.: 607, and Chem. 243 or equiv.
A basic study of the relationships and influence of aquatic environments on microorganisms and the effect of microbial metabolic processes on the quality of water. Dugan.

636 U G 5
Food Microbiology
Sp. 3 cl., 3 2-hr. labs.
Prereq.: 509, 607 or equiv.
The role of microorganisms in food preservation and processing with related sanitation and public health problems. Banwart. Fee.

639* U G 4
Aquatic Microbiology
Su (2nd term). 3 all-day cl. per wk.
Prereq.: 20 cr. hrs. of biological sciences, including Microbiol. 607 or equiv., and Chem. 243 or equiv.
Given only at the Franz Theodore Stone Laboratory. The nature and activities of bacteria in the aquatic environment, with emphasis on the different physiological types found in the Lake Erie region. Randles.
640  U G 5  General Cellular Biology
A. W. 4 cl., 1 4-hr. lab.
Prereq.: 16 cr. hrs. in biology, sciences and Chem. 242 and 246 or equiv.
Not open to students with credit for Biol. 312 or 640.
Study of generalized subcellular structures and metabolism emphasizing dependence of function on structure, principles of organization and biosynthesis, and capture and utilization of energy. Byers and Sharp. Fee.

642  U G 5  Cell Differentiation
Sp. 3 cl., 1 1-hr. rec.
Prereq.: 640 or equiv. or permission of instructor.
A study of cell differentiation including cyclic and non-cyclic change in macromolecules and organelles in cell populations. Sharp.

652  P G 4  General and Pathogenic Microbiology for Dental Students
A. 3 cl., 2 1-hr. labs.
Prereq.: Dent. 2nd yr. standing.
A survey of the principles of microbiology emphasizing sterilization, infectious processes and immunology. Chorpenning and Rosen.

653  P G 3  Oral Microbiology
W. 2 cl., 1 1-hr. lab.
Prereq.: 652 or permission of instructor.
A study of the oral flora and the oral diseases having a microbial etiology. Rosen.

Soil Microbiology
(See Agron. 660.)

670  U G 5  Cytologic Preparations in Electron Microscopy
A. W. 3 cl., 2 3-hr. labs.
Prereq.: 10 cr. hrs. in biological sciences and Chem. 244 or equiv.
Basic principles of electron microscopy, preparation, examination, and interpretation of biological specimens. Pflister.

693  U G 1-5  Individual Studies in Microbiology
Prereq.: Microbiol. 4th yr. major or grad. standing and permission of instructor.
No more than 5 cr. hrs. can be counted toward an undergraduate microbiol. major.
Repeatable only by undergraduates to a maximum of 15 cr. hrs.
Outlined by instructor to meet individual student's needs.

694  U G 2-5  Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Group work on special topics in microbial or cellular biology.

710†  U G 3  History of Microbiology and Allied Fields
Sp. Lecs., confs., and library work.
Prereq.: Microbiol. advanced graduate standing and permission of instructor.
The historical development of bacteriology, immunology, and allied fields.

723  U G 5  Immunology and Immunochemistry
Su. 3 cl., 2 3-hr. labs.
Prereq.: 622 and permission of instructor.
A thorough treatment of the basic phenomena involving antigens and antibodies, their physico-chemical nature, and immunological reactions. Chorpenning. Fee.

725*  U G 5  Bacterial Pathogens
W. 3 cl., 2 2-hr. labs.
Prereq.: 624.

728†  U G 4  Pathogenic Protozoology
W. 3 cl., 1 2-hr. lab.
Prereq.: Permission of instructor.
Pathogenic protozoa of animals are considered; emphasis on host-parasite relationships, pathogenesis of diseases, structural characteristics of parasites; lab, fresh, and preserved material. Kreier.

736*  U G 5  Advanced Food Microbiology
A. 2 cl., 2 3-hr. labs.
Prereq.: 636 and permission of instructor.
Advanced studies of the microorganisms involved in the preservation and processing of food products using rapid analytical procedures. Banwart. Fee.

749  U G 5  Basic Virology
W. 3 cl., 2 3-hr. labs.
Prereq.: 609 and Biochem. or Physiol. Chem. and permission of instructor.
The basic physical, chemical, and biological properties of animal and bacterial viruses including intracellular replication and subcellular responses to virus infection. Woiff. Fee.

760  U G 5  Physiology of Bacteria
W. 3 cl., 2 3-hr. labs.
Prereq.: 609.
Nutritional requirements of bacteria, mechanisms of anaerobic dissimilation of carbon compounds, and industrial fermentation. Kolodziej and Randles. Fee.

761*  U G 5  Physiology of Bacteria
Sp. 3 cl., 2 3-hr. labs.
Prereq.: 760.
Bacterial enzymes, mechanisms and energy relationships in respiration, nitrogen metabolism, and bacterial syntheses. Kolodziej. Fee.
765† U G 5
Applied Microbiology
A. 3 cl., 2 3-hr. labs.
Prereq.: 761 and permission of instructor.
A study of the utilities: activities of microorganisms exploited to produce useful chemical reactions or commercial products. Fee.

770 U G 5
Microbial Cytology
Sp. 3 cl., 2 3-hr. labs.
Prereq.: 609 and permission of instructor.
A thorough study of morphology, fine structure and composition of microorganisms, and the relation of these to cell function. Pfister. Fee.

775 U G 4
Protozoan Growth and Reproduction
Sp. 2 1/2-hr. cl.
Prereq.: 640, Biochem. 511 or equiv., and permission of instructor.
A consideration of factors regulating the growth and multiplication of selected protozoans with emphasis on the roles of environment and genome and on molecular mechanisms. Eyers.

780 U G 5
Microbial Genetics
Sp. 3 cl., 2 3-hr. labs.
Prereq.: 609 and permission of instructor.
A thorough study of microbial genetics with emphasis on bacteria and viruses. Copeland. Fee.

781 U G 5
Special Groups of Microorganisms
Su. 3 cl., 2 3-hr. labs.
Prereq.: 609 and permission of instructor.
A study of the morphology, physiology, and ecology of “non-typical” bacteria, actinomycetes, myxobacteria, spirochaetes, flagellates, and others. Fee.

799 U G 1
Microbiology Colloquium
Repeatable to a maximum of 15 cr. hrs.

820* G 5
Advanced Virology
Sp. 2 cl., 2 3-hr. labs.
Prereq.: 749 and permission of instructor.
Laboratory study of viruses and some of the virus diseases of animals and man; methods of isolation, propagation, identification, diagnosis, and control are considered. Wolff. Fee.

822* G 3
Advanced Immunology
Sp.
Prereq.: Permission of instructor.
Advanced studies of immunological phenomena, with emphasis on the physical and chemical aspects of antigens and antibodies. Dodd.

824† G 5
Isoantigens of Man and Animals
Sp. 3 cl., 2 3-hr. labs.
Prereq.: 723 or equiv. and permission of instructor.
Advanced genetic, chemical, and immunological studies of isoantigens, including those in erythrocytes, leukocytes, platelets, body fluids, and tissue; implications in transplantation and immunological diseases. Chorpenning. Fee.

860† G 5
Advanced Topics in Bacterial Physiology
A. 3 cl., 2 3-hr. labs.
Prereq.: 760 and permission of instructor.
Laboratory study of bacterial physiology by a variety of techniques. Dugan, Fees, and Randles. Fee.

880 G 1-3
Seminar in Microbiology
Repeatable by permission of instructor only.

900 G 2
Interdepartmental Seminar in Developmental Biology
A, W, Sp. 1 2-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs. Students will present oral reports and lead discussion on research progress in specific areas of developmental biology.

905 G 1-3
Interdepartmental Seminar in Polar and Alpine Studies
Sp.
(See under Interdepartmental Seminars.)

907 G 1
Interdepartmental Seminar in Natural Resources
Repeatable to a maximum of 9 cr. hrs. with permission of the dept. of enrollment.
(See under Interdepartmental Seminars.)

908 G 1
Interdepartmental Seminar in Nutrition and Food Technology
Sp.
(See under Interdepartmental Seminars.)

904 G 2-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Group work on special topics in microbial or cellular biology.

999 G Arr.
Research in Microbiology
Research for thesis or dissertation purposes only.
Military Science

Office: 235 Military Science Building, 2121 Tuttle Park Place.
Army Reserve Officers Training Corps.
Colonel Horton and Staff.

Basic Military Science

101. U 2
American Military History
W. 1 2-hr. cl., 1 hr. leadership lab.
Prereq.: Special advance permission of Professor of Mil. Sc.
Must have previous military science credit.
The Military Heritage of America from 1607 through 1865; development through a study of the U.S. Army,
its organization, tactics, technology, battles, campaigns
and commanders; leadership laboratory.

102. U 2
American Military History
W. 1 2-hr. cl., 1 hr. leadership lab.
Prereq.: Special advance permission of Professor of Mil. Sc.
Must have previous military science credit.
Continuation of 101, from 1865 through 1953; leadership laboratory.

111. U 2
U. S. Defense Establishment and National Security
A. 2 1-hr. cl., 1 lab.
Nature of war, power, national security; proper functions of armed forces; evolution of military
professionalism; missions and organization of U. S.
Defense Establishment; collective security arrangements.

112. U 2
Development of Basic Weaponry
W. 1 2-hr. cl., 1 lab.
Prereq.: 111, or permission of Prof. of Mil. Sc.
Examination and application of fundamentals of weaponry and marksmanship, including: evolution of
the rifle; mechanics and functioning of standard military rifles and .22 calibre target rifle; weapons
safety.

113. U 2
Map Reading
Sp. 2 1-hr. cl., 1 lab.
Interpretation of topographic maps, emphasizing
terrain evaluation, including: symbology, grid and
polar coordinates, elevation and relief, scale and
distance, azimuth, intersection, resection, and aerial
photographs.

201. U 2
Map and Aerial Photograph Reading
A. 2 1-hr. cl., 1 lab.
Prereq.: Completion of 101, 102, and 103.
Application of basic principles of map reading,
emphasizing terrain evaluation, including map symbols,
military grid system, and elementary aerial photograph
reading; leadership laboratory.

202. U 2
U. S. Defense Establishment
and National Security
W. 2 1-hr. cl., 1 lab.
Prereq.: Completion of 101, 102, and 103.
The nature of war, power, national security; proper
functions of armed forces; evolution of military
professionalism; missions and organization of U. S.
Defense Establishment; collective security arrangements.

203. U 2
Introduction to Operations and Basic Tactics
Sp. 2 1-hr. cl., 1 lab.
Prereq.: Completion of 101, 102, and 103.
Mission, organization, and composition of the infantry
rifle squad; combat formations; patrolling; field
fortifications and camouflage; principles of offensive
and defensive combat; leadership laboratory.

Advanced Military Science

301. U 3
Military Leadership Case Studies
A. 2 2-hr. cl., 1 hr. leadership lab.
Prereq.: 301 through 203 or equiv.
Study of behavioral patterns and managerial methods
applied to the military environment.

302. U 3
Small Unit Tactics
Su, W. 2 2-hr. cl., 1 hr. leadership lab.
Prereq.: 203 and 301 or permission of Professor of Mil.
Sc.
Organization, mission, characteristics, and capabilities
of the infantry squad, platoon, company, and
battalion; review of rifle squad and weapons squad
tactics; study of platoon tactics, troop leading
procedures; preparation of estimates and orders;
company tactics to include attack, defense, and
retrograde operations; infantry tank-team techniques;
leadership laboratory.

303. U 3
Principles of Military Teaching
Sp. 2 2-hr. cl., 1 hr. leadership lab.
Prereq.: 302 or permission of Professor of Mil. Sc.
An introduction to the branches of the Army and study
of fundamentals of instruction in the military
educational environment.

401. U 3
Military Operations
Su, A. 2 2-hr. cl., 1 hr. leadership lab.
Prereq.: 303 or permission of Professor of Mil. Sc.
The study of Army organizations and operations to
include managerial aspects of command and staff;
emphasizes support of combat operations in various
environmental situations; guest speakers program
sponsored by National Strategy Information Center.
Subject: World Change and Military Implications;
leadership laboratory.

402. U 3
Logistics and Administration
W. 2 2-hr. cl., 1 hr. leadership lab.
Prereq.: 401 or permission of Professor of Mil. Sc.
Study of logistics to include management of combat and garrison supply, medical services, equipment maintenance, transportation and troop movement; training management to include staff scheduling principles and the design and execution of training exercises; Army administration to include military publications, standard forms, and the supervision of administrative requirements; guest speaker program sponsored by National Strategy Information Center. Subject: World Change and Military Implications; leadership laboratory.

403 U 3
Military Justice and Preparation for Service
Sp., 2 2-hr. cl., 1 hr. leadership lab.
Prereq.: 402 or permission of Professor of Mil. Sc.
Study of military justice; review of map reading; civic action; internal defense and development of Southeast Asian nations; and service orientation.

Mineralogy
Office: 291 Watts Hall, 104 West 19th Avenue

Professors Foster (Chairman), Ehlers, McConnell, McLachlan, and Wenden; Associate Professor Tettenhorst.

414 U 5
Principles of Mineralogy
W., 3 cl., 2 2-hr. lab.
Prereq.: Chem. 112 or 112, Math. 117 or 150.
Not open to students with credit for 411, 412, or 421.
An introductory course, emphasizing principles and illustrating the internal structure of solids and relationship of structure and chemical composition to properties, applications, and external features. Tettenhorst.

421 U 3
Elementary Mineralogy and Crystallography
A., W., 3 2-hr. lab.
Prereq.: Chem. 112 or 112.
Not open to students with credit for 414.
Crystal systems, symmetry, common forms and cleavage or crystals; chemical bonding and mineral structures; selected phase diagrams; light identification of about 80 common minerals using physical and chemical properties. Wenden.

422 U 3
Elementary Optical Mineralogy
W., Sp., 3 2-hr. lab.
Prereq.: 421.
Elements of optical mineralogy; mineral properties in plane and cross-polarized light; mineral identification in powders and thin-sections; X-ray diffraction in mineral identification and mineral-mixture analysis. Wenden.

605 U G 5
Thermochemical Mineralogy
A., 3 cl., hrs.
Prereq.: Chem. 533 or equiv., or permission of instructor.
Thermal properties of minerals; application of high temperature equilibrium to problems of petrology and technology, using phase diagrams. Foster.

609† U G 5
Extra-Terrestrial Mineralogy
W., 3 cl.
Prereq.: 422 or senior standing in Geol., Astron., or related fields.
Mineralogy of meteorites, tektites, and lunar samples as a basis of study of their composition, age, and origin, and those of the earth and solar system. Foster.

621 U G 5
Microscopic Mineralogy
A., W., 2 cl., 3 2-hr. lab.
Prereq.: 414 or 422, and Physics 112 or equiv.
A. open only to Geol. graduates; W. open only to Cer. E. majors.
Not open to students with credit for (625).
Theory and use of polarizing microscope; determination of optical constants and identity of minerals. Ehlers.
A. Emphasis on mineral powders.
W. Emphasis on powders and thin-sections of minerals and synthetic products.

624* U G 3
Microscopy of Opaque Minerals
Sp., 3 2-hr. lab.
Prereq.: 621 or equiv.
Application of the petrographic microscope to the study of opaque minerals and ores, their identification, textures, and paragenesis; polished section preparation, etch tests, and micro-chemical tests. Wenden.

645 U G 5
Advanced Crystallography
A., 3 cl., 2 2-hr. lab.
Prereq.: 414, 421, or equiv.
Principles of crystallography; morphology, structure and habit in crystals; twinning; two-circle goniometer measurement and drawing of crystals; crystallographic calculations; investigations with precession X-ray camera. Wenden.

646 U G 5
Advanced Mineralogy
W., 3 cl., 2 2-hr. lab.
Prereq.: 414, 421, or equiv.
Mineral stoichiometry and calculations; application of instrumental methods to mineral identification and the study of mineral suites from selected localities; physical and chemical properties, and paragenesis of minerals on crystal chemical principles. Wenden.

650 U G 5
X-Ray Powder Diffraction
W., 3 cl., 2 3-hr. lab.
Prereq.: 414 and Math. 153.
Emphasis on diffractometry; evaluation of instrumental, geometrical, and other factors affecting intensity and position of diffraction maxima; qualitative and quantitative analysis, particle-size and other applications. Tettenhorst.
654  U G 5
X-Ray Crystallography
Sp.  3 cr., 2-3 hr. lab.
Prereq.: 414, 421, or equiv.
Not open to students with credit for Chem. 654.
Principles of X-ray crystal analysis; phase identification
by powder film and diffractometer methods; X-ray
fluorescent analysis; particle size determination; unit
cell and space group by rotation and Weissenberg
methods. Wendem.

665  U G 3
Crystallochemical Mineralogy
W.  3 cr.
Prereq.: 414, 421, or permission of instructor.
Application of crystal chemical principles to study of
major structure types, to properties, stability and
occurrence of minerals, and to problems of
polymorphism, solid solution, and crystal growth.
Wendem.

706*  U G 3
Advanced Thermochemical Mineralogy
W.  3 cr.
Prereq.: 605.
Derivation and interpretation of phase diagrams of
ternary and quaternary systems of importance in
petrology and technology. Fooster.

722  U G 5
Igneous Petrology
W.  3 cr., 2-2 hr. lab.
Prereq.: 422 and Geol. 203 and permission of instructor,
or 621.
Petrography, petrogenesis, and occurrence of igneous
rocks, with special emphasis on phase equilibria;
macroscopic and microscopic examination of igneous
and petrographic suites in the laboratory. Ehlers and
Eliot.

730  U G 3
Clay Mineralogy
Sp.  3 cr., conf.
Prereq.: 650 or permission of instructor.
Relationship of structure and chemical composition of
clay minerals to properties, origin, occurrence, and
applications; evaluation of X-ray, differential thermal,
infrared, and electron microscope data. Tettenhorst.

747†  U G 3
History of Mineralogy and Crystallography
Sp.  3 cr.
Prereq.: Any 600-level course in Mineral. or Geol., or
permission of instructor.
To alternate with Mineral. 624.
Concepts in mineralogy and crystallography from
ancient times to 1952; invention and development of
instrumental tools; lives and contributions of
outstanding mineralogists and crystallographers.
Wendem.

784  U G 3-5
Group Studies in Mineralogy
Su, A, W, Sp.  6-10 hr. lab. and conf.
Prereq.: Satisfactory courses in field of problem, and
permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Special problems in petrological, thermochemical,
crystallochemical, X-ray or clay mineralogy, history
of mineralogy, or other advanced non-thesis research.

807*  G 3
Hydrothermal Mineralogy
Sp.  3 cr.
Prereq.: 722 and Chem. 531, 532, and 623; or equiv.
The effect of water under various pressure and
temperature conditions related to magmatic and
experimental conditions; mineral synthesis, stability,
and growth of single crystals in hydrothermal
environments. Ehlers.

808*  G 3
High Pressure Mineralogy
Sp.  3 cr.
Prereq.: 722 and Chem. 531, 532, and 533; or equiv.
The general approach of high pressure techniques to
synthesis and stability of inorganic mineral compounds
in both geological and experimental environments;
stability of minerals within the earth's crust and mantle
with technological applications. Ehlers.

823*  G 3
Advanced Optical Mineralogy
A.  3 cr., 2-3 hr. lab.
Prereq.: 722 or equiv.
Theory and determination of optical constants and
directional features using Universal Stage; includes
determination of optic angles, feldspar compositions,
double refraction technique, and petrographic analysis.
Ehlers.

831  G 3
Advanced Clay Mineralogy
A.  3 cr., lec., labs., and confs.
Prereq.: 730.
Advanced topics including one-dimensional structure
plots, two-dimensional diffraction effects, and relation
of structure and composition; individual problems;
evaluation of current investigations. Tettenhorst.

858  G 3
Advanced Mineral Structures
Sp.  3 cr.
Prereq.: 665 and Chem. 675.
Review of methods of crystal structure determination by
optical, physical, and X-ray methods; selected examples
from each mineral class; computations illustrated with
laboratory data. McLachlan.

875  G 3
Crystal Growth
A.  3 cr., confs.
A survey of the known methods of growing crystals
involved in growth, nucleation, and habits of growth.
McLachlan.

876  G 3
Crystal Physics
W.  3 cr.
Prereq.: Chem. 675, and Math. 571.
An introduction to the use of tensors in the description
of the gross physical properties of crystals. McLachlan.
Seminar in Mineralogy
A, W, Sp. 2-6 hr. cont.
Repeatable to a maximum of 12 cr. hrs.
Conference and reports on the developments in mineralogical research and their application to the problems of mineralogy and mineral technology.

Research in Mineralogy and Petrography
Research for thesis or dissertation purposes only.

Music
Office: 105 Hughes Hall, 1899 College Road

Professors Luce (Director), Barnes, Cady, Evans, Gerle, Haddad, Hardesty, Held, Hoppin, Kuehnefuhs, Livingston, Main, McGinnis, Phelps, Poland, Stagner (Visiting), Tetley-Kardos, and Tolbert; Associate Professors Barnes, Casey, Cooper, Hickfang, Hightshoe, Huff, McClure, Mixter, Mooney, Muschick, Ramsey, Sexton, Titus, Vedder, Whitesides, and Wilson; Assistant Professors Baker, Barber, Battenberg, Bonney, Burkart, Costanza, Culver, Droste, Fligel, Gano, Green, Kates, LeBlanc, Levey, Lowder, Maas, McDonald, Meeker, Moore, Neely, Platt, Simmons, Thompson, Whallon, Wink, and Zimmerman; Instructors Harriman, Hurn, Jones, Kiesgen, Maag, Meier, Sederis, Sentieri, Stevens, Swank, Turley, and Von Gruenigen.

Preceding the class sessions of Music 221 and Music 201, placement tests will be given to determine the ability of students in these subjects. (See School of Music for details of time and place.)

Concert Attendance
A, W, Sp. Attendance at 9 concerts or recitals.
Prereq.: Attendance at 45 concerts and recitals.

Introduction to Music
Su, A, W, Sp. 3 cr., 2 hrs. arr.
Not for credit to Mus. majors.
A musical background is not required.
A consideration of the materials of music and important styles, forms, and composers from the Baroque to the present. Gano. Fee.

Introduction to the History of Western Music I
A, W, Sp. 3 cr.
Prereq.: 141.
Not for credit to Mus. majors.
An historical survey of music from classical antiquity to about 1750. Fee.

Introduction to the History of Western Music II
Su, A, W, Sp. 3 cr.
Prereq.: 141.
Not for credit to Mus. majors.
An historical survey of music from 1750 to the present. Fee.

Symphonic Choir
A, W, Sp. 3 or more hrs. rehearsal each week.
Prereq.: Admission by audition only.
Repeatable to a maximum of 12 cr. hrs.
Symphonic Choir is a concert organization singing a variety of literature. Casey. Fee.

Women's Glee Club
A, W, Sp. 3 or more hrs. rehearsal each week.
Prereq.: Auditions are held at stated periods, and vacancies in the club are filled with the best available voices. Admission by audition and permission of director.
Repeatable to a maximum of 12 cr. hrs.
[Membership in this concert group is open to all women students in the University by audition.] Study and performance of choral literature for women's voices. Turley. Fee.

Men's Glee Club
A, W, Sp. 3 or more hrs. rehearsal each week.
Prereq.: Auditions are held at stated periods, and vacancies in the club are filled with the best available voices. Admission by audition and permission of director.
Repeatable to a maximum of 12 cr. hrs.
[Membership in this concert group is open to all men students in the University by audition.] Study and performance of choral literature for men's voices. Staiger. Fee.

University Symphony Orchestra
Su (1st term), A, W, Sp. 3 or more hrs. rehearsal each week.
Prereq.: Admission by audition and permission of director.
Repeatable to a maximum of 12 cr. hrs.
[Membership is open to all University students by audition.] The University Orchestra is an 85-piece orchestra of full instrumentation devoted to the preparation of standard and modern literature; the group gives at least three concerts each year. Gerle. Fee.
185  U 1  
Chamber Orchestra  
A, W, Sp. 3 or more hrs. rehearsal each week.  
Prereq.: Admission by audition.  
Repeatable to a maximum of 12 cr. hrs.  
A selected group giving public and broadcast performances; professional orchestral techniques are emphasized. Gerle. Fee.

186  U 1  
University Football Marching Band  
A, W. 3 or more hrs. rehearsal each week.  
Prereq.: Admission by audition and permission of director.  
Open to men students.  
Repeatable to a maximum of 6 cr. hrs.  
The University Marching Band is a selected group of brass and percussion players which performs at football games and rallies during Autumn Quarter. Droste. Fee.

187  U 1  
ROTC Band (Air-Army)  
W, Sp. 3 or more hrs. rehearsal each week.  
Prereq.: Admission by audition and permission of director.  
Open to men and women students.  
Repeatable to a maximum of 10 cr. hrs.  
Droste. Fee.

188  U 1  
The University Concert Band  
Su (1st term), A, W, Sp. 3 or more hrs. rehearsal each week.  
Prereq.: Admission by audition and permission of director.  
Repeatable to a maximum of 12 cr. hrs.  
A selected group of limited membership devoted to the preparation and performance of the best band literature; gives public concerts and performs for University functions. McGinnis. Fee.

189  U 1  
The University Buckeyes Bands  
A, W, Sp. 3 or more hrs. rehearsal each week.  
Prereq.: Admission by audition and permission of director.  
Repeatable to a maximum of 12 cr. hrs.  
Provide concert band participation for students not enrolled in the University Concert Band; perform for University functions and give public concerts. Droste, Le Blanc, and Meeker. Fee.

190  U 1  
Opera Chorus  
Su (1st term), A, W, Sp. 2 or more hrs. rehearsal each wk.  
Prereq.: Admission by audition and permission of instructor.  
Not open to juniors and seniors in opera program.  
Repeatable to a maximum of 12 cr. hrs.  
Hickfang. Fee.

191  U 1  
Chorale  
A, W, Sp. 2 or more hrs. rehearsal each week.  
Prereq.: Admission by audition and permission of instructor.  
Repeatable to a maximum of 12 cr. hrs.  
A selected group of mixed voices which performs an extensive repertoire in concerts both on and off campus. Casey. Fee.

194  U 1  
Brass Choir  
A, W, Sp. 2 or more hrs. rehearsal each week.  
Prereq.: Admission by audition and permission of instructor.  
Repeatable to a maximum of 12 cr. hrs.  
A selected group of brass and percussion students which gives public performances both on and off campus. Evans. Fee.

195  U 1  
University Percussion Ensemble  
A, W, Sp. 2 or more hrs. rehearsal each wk.  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 12 cr. hrs.  
A laboratory and performance musical ensemble whose literature consists of original and transcribed works for percussion instruments alone or with percussion as a dominant feature. Moore.

196  U 1  
Jazz Ensembles  
A, W, Sp. 2 or more hrs. rehearsal each wk.  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 12 cr. hrs.  
A selected group devoted to playing, arranging, and rehearsing contemporary jazz and stage band literature. Battenberg. Fee.

197  U 1  
Music Education Laboratory Ensemble  
A, W, Sp. 2 or more hrs. rehearsal each wk.  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 3 cr. hrs.  
Laboratory ensembles which provide performance experience on secondary instruments.

199  U 1  
Small Ensembles  
Su, A, W, Sp. 2 or more hrs. rehearsal each week.  
Prereq.: Admission by audition and permission of instructor.  
Each decimal subdivision repeatable to a maximum of 12 cr. hrs. Fee.  
199.01 Piano  
199.02 Voice  
199.03 Strings  
199.04 Woodwinds  
199.05 Brass  
199.06 Organ  
199.07 Percussion  
199.08 Harpsichord  
199.09 Harp  
199.10 Miscellaneous
200 U 1-2
Applied Music (Secondary)
Su, A, W, Sp. 1 1/2 hr. lesson, studio classes and recital attendance arr.
Prereq.: Music major or permission of the Director of the School of Music.
Repeatable to a maximum of 12 cr. hrs. for each decimal subdivision.
Fundamental applied music instruction in areas other than a student's major or principal area.

200.01 Piano

200.02 Voice

200.03 Strings
Su (1st term), A, W, Sp.

200.04 Woodwinds
Su (1st term), A, W, Sp.

200.05 Brass
Su (1st term), A, W, Sp.

200.06 Organ
Su (1st term), A, W, Sp.

200.07 Percussion

200.08 Harpsichord

200.09 Harp

201 U 1-2
Applied Music (Principal)
1 hr. lesson, studio classes and recital attendance arr.
Prereq.: Passing of placement test.
Required of students in all music curricula to a minimum of 6 qtr. hrs.
Open to other qualified students within the limits of instructional facilities by permission of Director of the School of Music.
Repeatable to a maximum of 10 cr. hrs. for each decimal subdivision.
Instruction in applied music to develop musicianship, performance, and a wide reading knowledge of music literature.

201.01 Piano
Hadad, Neely, Mooney, Tetley-Kardos, and Platt.

201.02 Voice
Muschick, Whitesides, Cooper, Meier, Hickfang, and Kiesgen.

201.03 Strings
Su (1st term), A, W, Sp.
Geller, Kates, Hardesty, McClure, and Culver.

201.04 Woodwinds
Su (1st term), A, W, Sp.

201.05 Brass
Su (1st term), A, W, Sp.
Battenberg, Burkart, Droste, Evans, Le Blanc, and Jones.

201.06 Organ
Su (1st term), A, W, Sp.
Held, Wilson, and Riggsby.

201.07 Percussion
Moore.

201.08 Harpsichord

201.09 Harp
Harriman.

212 U 2
Diction for Singers (Italian)
Su (1st term), A 3 cr.
Prereq.: Minimum of 6 cr. hrs. of applied study in voice or permission of instructor.
Fundamentals of phonetics and sound production as applied to singing in Italian.

213 U 2
Diction for Singers (German)
W 3 cr.
Prereq.: Minimum of 6 cr. hrs. of applied study in voice or permission of instructor, and 212.
Fundamentals of phonetics and sound production as applied to singing in German. Cooper.

214 U 2
Diction for Singers (French)
Sp 3 cr.
Prereq.: Minimum of 6 cr. hrs. of applied voice or permission of instructor, and 212.
Fundamentals of phonetics and sound production as applied to singing in French. Muschick.

221 U 3
Music Theory I
A, W 3 cr.
Prereq.: Passing of placement tests.
Detailed study of basic theoretical concepts, the elements of music, and musical notation, including elementary written and keyboard harmony, melody writing, analysis, and creative work.

222 U 3
Music Theory II
W, Sp 3 cr.
Prereq.: 221.
Study of the principles of diatonic harmony, non-chordal tones, and secondary dominants, including two, three, and four-part writing, analysis, keyboard harmony, and creative work.

223 U 3
Music Theory III
Su, Sp 3 cr.
Prereq.: 222.
A survey of chromatic harmony, seventh and ninth chords and modulation, with continuing emphasis on written and keyboard application, analysis, and original composition.
224 U 1
Sight Singing and Dictation I
A, W. 3 lab. hrs.
Singing and writing of major and minor scales, intervals, triads, tonal and rhythmic groups, tonal melodies, and canons.

225 U 1
Sight Singing and Dictation II
W, Sp. 3 lab. hrs.
Prereq.: 224.
Singing and writing of chromatic scales, seventh-chord outlines, tonal and rhythmic groups, more difficult tonal melodies, and two-part work.

226 U 1
Sight Singing and Dictation III
Su, Sp. 3 lab. hrs.
Prereq.: 225.
Singing and writing of synthetic scales, seventh and ninth chord outlines, tonal melodies and harmonic progressions with modulations, syncopated rhythmic figures, and two-part work.

241 U 3
Music History I
A. 3 cl., 2 lab. hrs.
Prereq.: 223.
The development of music from the earliest times through the sixteenth century. Mass.

242 U 3
Music History II
W. 3 cl., 2 lab. hrs.
Prereq.: 241.
The development of music in the 17th and 18th centuries. Mass.

243 U 3
Music History III
Sp. 3 cl., 2 lab. hrs.
Prereq.: 242.
The development of music in the 19th and 20th centuries. Mass.

244 U 3
Survey of African and African-Derived Music in the Western World
Sp. 3 cl.
Not open to students with credit for Black Studies 244. (Cross-listed in the Black Studies Division.)
An introduction to traditional African music and its role in the history and development of Afro-American music with its concomitant socio-political milieu.

261 U 1 or 2
Applied Music Methods and Materials I
261.01 Piano
A, W, Sp. 4 cl.
Lowder.
261.02 Voice
A, W, Sp. 4 cl.
Swank.

261.03 Strings
A. 4 cl.
Culver.
261.04 Woodwinds
A. 4 cl.
Von Gruenigen.
261.05 Brass
W. 4 cl.
Evans.
261.07 Percussion
W, Sp. 4 cl.
Moore.

262 U 2
Applied Music Methods and Materials II
Prereq.: 261 or equiv.
262.01 Piano
Su, A, W, Sp. 4 cl.
262.02 Voice
W, Sp. 4 cl.
262.03 Strings
W. 4 cl.
262.04 Woodwinds
Sp. 4 cl.
262.05 Brass
Sp. 4 cl.

263 U 2
Applied Music Methods and Materials III
Prereq.: 262 or equiv.
263.01 Piano
Sp. 4 cl.
263.02 Voice
Sp. 4 cl.

264 U 2
Applied Music Methods and Materials IV
Prereq.: 263 or equiv.
264.01 Piano
A. 4 cl.
264.02 Voice
A. 4 cl.

265 U 2
Music for Group Recreation
A, Sp. 3 cl.
Preparation and participation in folk singing and dancing: experience in group leadership designed for recreation and camp leaders, social workers, teachers of music, and classroom teachers. Sexton.

270 U 3
Basic Experiences in Music: Fundamentals
Su, A, W, Sp. 5 cl.
Ear-training, music reading, creative writing, voice production, and some instrumental experience as applied to the music program in the elementary school. Sexton. Fee.

271 U 2
Basic Experiences in Music: Literature and Listening
Su, A, W, Sp. 4 cl.
The elements involved in active, intelligent listening, understanding, and appreciation of representative works of music as applied to the music program in the elementary school. Sexton and Turley. Fee.

312 U 2

Opera Performance
Su (2nd term), A, W, Sp. 4 lab. hrs.
Prereq.: Junior or senior standing and permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Instruction and experience in preparation for open performance, including study of operatic literature and coaching of operatic roles. Hickfang.

370 U 3

Music for Elementary Teachers
Su, A, W, Sp. 5 cr.
Prereq.: 270, 271, and professional standing.
Music literature and teaching aids for children, including singing, rhythmic, creative, and listening experiences, and their presentation. Sexton, Bonney, Thompson, and Toibert. Fee.

401 U 1-2

Applied Music (Principal)
1 hr. lesson, studio classes and recital attendance arr.
Prereq.: 201 and permission of applied area faculty.
Open to other qualified students within the limits of instructional facilities by permission of the Director of the School of Music.
Repeatable to a maximum of 8 cr. hrs. for each decimal subdivision.
Applied music instruction required in the B.M.E. curriculum to develop musicianship, performance, and a wide reading knowledge of music literature.

401.01 Piano

401.02 Voice

401.03 Strings
Su (1st term), A, W, Sp.

401.04 Woodwinds
Su (1st term), A, W, Sp.

401.05 Brass
Su (1st term), A, W, Sp.

401.06 Organ
Su (1st term), A, W, Sp.

401.07 Percussion

401.08 Harpsichord

401.09 Harp

402 U 2 or 4

Applied Music (Major)
1 hr. lesson, studio classes and recital attendance arr.
Prereq.: 201 and permission of applied area faculty.
Repeatable to a maximum of 16 cr. hrs. for each decimal subdivision.
Instruction required in B.M. curricula in performance to develop professional qualities of musicianship, technique, and knowledge of music literature.

402.01 Piano

402.02 Voice

402.03 Strings
Su (1st term), A, W, Sp.

402.04 Woodwinds
Su (1st term), A, W, Sp.

402.05 Brass
Su (1st term), A, W, Sp.

402.06 Organ
Su (1st term), A, W, Sp.

402.07 Percussion

402.08 Harpsichord

402.09 Harp

421 U 3

Music Theory IV
A 3 cr.
Prereq.: 223.
Critical study of chromatic harmony of the 18th and 19th centuries including modulatory methods and devices; current musical practice and relationships to traditional composition.

422 U 3

Music Theory V
W. 3 cr.
Prereq.: 421.
Techniques of impressionism, and investigation of 20th century analytical methods for tonal music, and an introduction to twelve-tone compositional methods.

423 U 3

Music Theory VI
Sp. 3 cr.
Prereq.: 422.
Analytical study of recent compositional techniques and devices and investigation of serial, aleatory, and electronic practices; creative work in contemporary styles.

424 U 2

Ear-Training I
A. 4 lab. hrs.
Prereq.: 226.
Sight-singing, dictation, and keyboard harmony.

425 U 2

Ear-Training II
W. 4 lab. hrs.
Prereq.: 424.
Intermediate sight-singing, dictation, and keyboard harmony.

426 U 2

Ear-Training III
Sp. 4 lab. hrs.
Prereq.: 425.
Advanced sight-singing, dictation, and keyboard harmony.
427  U 2
Keyboard Harmony I
A.  2 cl.
Prereq.: 261.01, 262.01, and 263.01 (6 cr. hrs),
201.01 (6 cr. hrs.), or equiv.
Systematic review and utilization of basic harmonic
materials at the keyboard.

428  U 2
Keyboard Harmony II
W.  2 cl.
Prereq.: 427.
An introduction to score reading at the keyboard.

429  U 2
Keyboard Harmony III
Sp.  2 cl.
Prereq.: 428.
Score reading at the keyboard.

501  U 1-2
Applied Music (Principal)
1 1-hr. lesson, studio classes arr.
Prereq.: 401 and permission of applied area faculty.
Open to other qualified students within the limits of
instructional facilities by permission of the Director
of School of Music.
Repeatable to a maximum of 8 cr. hrs. for each
decimal subdivision.
Applied music instruction required in the B.M.E.
curriculum to develop musicianship, performance, and
a wide reading knowledge of music literature.

501.01 Piano

501.02 Voice

501.03 Strings
Su (1st term), A, W, Sp.

501.04 Woodwinds
Su (1st term), A, W, Sp.

501.05 Brass
Su (1st term), A, W, Sp.

501.06 Organ
Su (1st term), A, W, Sp.

501.07 Percussion

501.08 Harpsichord

501.09 Harp

502  U 2 or 4
Applied Music (Major)
1 1-hr. lesson, studio classes and recital attendance arr.
Prereq.: 402 and permission of applied area faculty.
Repeatable to a maximum of 16 cr. hrs. for each
decimal subdivision.
Instruction required in B.M. curricula in performance
to develop professional qualities of musicianship,
technique, and knowledge of music literature; half
recital required in junior year.

502.01 Piano

502.02 Voice

502.03 Strings
Su (1st term), A, W, Sp.

502.04 Woodwinds
Su (1st term), A, W, Sp.

502.05 Brass
Su (1st term), A, W, Sp.

502.06 Organ
Su (1st term), A, W, Sp.

502.07 Percussion

502.08 Harpsichord

502.09 Harp

521  U 3
Form and Analysis
Su.  A.  3 cl.
Prereq.: 423.
Introduction to the study of the formal structure of
music.

524  U 3
Instrumentation
W, Sp.  3 cl.
Prereq.: 423.
An elementary course in scoring for the instruments
of the orchestra and the band. McClure.

531  U 3
Counterpoint
A.  3 cl.
Prereq.: 423.
A fundamental course in counterpoint including
species counterpoint, double counterpoint, imitation,

535  U 3
Composition
W, Sp.  3 cl.
Prereq.: 423.
Creative writing in the small forms.

560  U 3
Beginning Conducting
A, W.  3 cl.
Prereq.: 421.
The basic technique of the baton; a syllabus of
selected literature and reading assignments will be
used as a basis for study. McGinnis, Casey, nardetsy,
and Barber.

570  U 3
General Music in Elementary Schools:
Basic Teaching Practices
A, W.  3 cl.
Prereq.: Enrollment in the College of Education.
Not open to students with credit for 561.
A study of the role of the music teacher in planning
musical experiences for children with emphasis on
child-development and appropriate teaching practices.
571 U 3
General Music in Elementary Schools:
Music Literature for Children
Sp. 3 cl.
Prereq.: Enrollment in the College of Education.
Not open to students with credit for 561.
Study and analysis of art, folk, ethnic, and popular
music literature suitable for children in elementary
schools.

572 U 3
General Music in Secondary Schools:
Middle and Junior High School General Music
A. 3 cl.
Prereq.: Enrollment in the College of Education.
Not open to students with credit for 562.
The role of music in adolescents' general education
and the development of competencies essential to
teaching.

573 U 3
General Music in Secondary Schools:
Organization and Teaching of High School
Music Courses
W. 3 cl.
Prereq.: Enrollment in the College of Education and
completion of University Basic Education Requirements
in the humanities and social sciences.
Not open to students with credit for 563.
Organization and teaching of courses (a) relating
music to other arts or humanities and (b) dealing with
the theory, history, or appreciation of music.

574 U 3
Choral Music in the Schools:
Basic Teaching Practices
W. 2 cl., 2 lab. hrs.
Prereq.: Enrollment in the College of Education.
Not open to students with credit for 564.
Factors relating to organizing and teaching choral
music in elementary, middle, and junior high schools.

575 U 3
Choral Music in Senior High Schools
Sp. 2 cl., 2 lab. hrs.
Prereq.: Enrollment in the College of Education.
Not open to students with credit for 564.
Rehearsal procedures, choral techniques, materials,
and literature suited to various choral organizations
of senior high schools.

576 U 3
Instrumental Music in Elementary Schools
A, Sp. 3 cl., 1 1-hr. lab.
Prereq.: Enrollment in the College of Education.
Not open to students with credit for 563.
The role of instrumental music instruction in public
education, techniques of teaching instrumental music,
study of music appropriate to musical organizations in
elementary schools.

577 U 3
Instrumental Music in Secondary Schools
A, W. 3 cl., 1 1-hr. lab.
Prereq.: Enrollment in the College of Education.
Not open to students with credit for 563.
The role of instrumental music instruction in public
education, techniques of teaching instrumental music,
study of music appropriate to musical organizations in
secondary schools.

578† U 3
The Music Education Curriculum
W, Sp. 3 cl.
Prereq.: Enrollment in the College of Education.
A study of the musical and learning processes involved
in the music education curriculum from kindergarten
through high school.

593 U G 1-5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Individual studies in specified problems in the field
of music.

594 U 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Supervised group studies of special problems.

601 U 1-2
Applied Music (Principal)
1 1-hr. lesson, studio classes arr.
Prereq.: 501 and permission of applied area faculty.
Open to other qualified students within the limits
of instructional facilities by permission of Director
of School of Music.
Repeatable to a maximum of 8 cr. hrs. for each
decimal subdivision.
E elective applied music instruction at the senior level
for students in the B.M.E. curriculum; continuation
of study of literature, technique, and musicanship.

601.01 Piano

601.02 Voice

601.03 Strings
Su (1st term), A, W, Sp.

601.04 Woodwinds
Su (1st term), A, W, Sp.

601.05 Brass
Su (1st term), A, W, Sp.

601.06 Organ
Su (1st term), A, W, Sp.

601.07 Percussion

601.08 Harpsichord

601.09 Harp
602** U 3 or 6
Applied Music (Major)
1 hr. lesson, studio classes arr.
Prereq.: 502 and permission of applied area faculty.
Repeatable to a maximum of 15 cr. hrs. for each
decimal subdivision.
Applied music instruction required in BM curricula in
performance to develop professional qualities of
musicologist; full recital required in senior year.

602.01 Piano

602.02 Voice

602.03 Strings
Su (1st term), A, W, Sp.

602.04 Woodwinds
Su (1st term), A, W, Sp.

602.05 Brass
Su (1st term), A, W, Sp.

602.06 Organ
Su (1st term), A, W, Sp.

602.07 Percussion

602.08 Harpsichord

602.09 Harp

611 U 3
Introduction to Piano Pedagogy
Sp. 3 cl.
Prereq.: 6 cr. hrs. in 501.01 or permission of instructor.
A critical analysis of various methods and principles
of piano instruction, and of literature for the beginning
and intermediate performer.

612 U G 3
Piano Pedagogy: Group Instruction
A. 3 cl.
Prereq.: 6 cr. hrs. in 501.01 or permission of instructor.
Concepts of group piano instruction, techniques for
development of keyboard musicianship, and knowledge
of appropriate literature and materials. Lowder.

613† U G 3
Piano Pedagogy: Practicum
Su, A, W, Sp. 3 cl.
Prereq.: 611 or 612 or permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
To provide supervised experience in piano instruction
and guidance in the development of sequences of
instruction and in the treatment of specific teaching
problems.

621** U G 3
Analysis: The Classic Period
Su, W. 3 cl.
Prereq.: 521 or 243.
An analytical study of representative works from
Classic literature.

622* U G 3
Analysis: The Romantic Period
Su. W. 3 cl.
Prereq.: 521 and 243.
An analytical study of representative works from
Romantic literature, Barnes and Vedder.

624** U G 3
Band Scoring
A. 3 cl.
Prereq.: 524.
Scoring for the concert band.

625* U G 3
Orchestra Scoring
A. 3 cl.
Prereq.: 524.
Scoring for the orchestra.

627 U G 3
Advanced Keyboard Harmony
Su (1st term), A. 3 cl.
Prereq.: 423.
Practice in harmonizing melodies, realizing figured
bass, improvisation, and modulation at the keyboard.

631 U G 3
Counterpoint I
Su, W. 3 cl.
Prereq.: 531.
Studies in imitation and invertible counterpoint,
applied in the writing of two-and three-part
inventions.

632 U G 3
Counterpoint II
A. 3 cl.
Prereq.: 631.
Writing of chorale preludes, trio sonata movements,
and fugal expositions.

633 U G 3
Gregorian Chant
A. 3 cl.
A study of the historical background and
characteristics of plainsong, including the technical
aspects of notation, modes, rhythm, and chironomy.
Kuehfuhs.

634 U G 3
Modal Counterpoint I
W. 3 cl.
Prereq.: 243 and 521.
Counterpoint based on the vocal polyphonic style of
the 16th century; analysis of representative works
and practice in modal writing. Kuehfuhs.

635 U G 3-5
Composition
Su, A, W, Sp. 3 cl.
Prereq.: 535.
Repeatable to a maximum of 9 cr. hrs.
Creative writing; analysis; discussion; employment of
devices used in contemporary music. Barnes, Huff, and
Levey.
640* U G 3
Music in the Middle Ages
A. 3 cl.
Prereq.: 521 or 531, and 243.
The development of western music through the 14th century.

641* U G 3
Music in the Renaissance
W. 3 cl.
Prereq.: 521 or 531, or 243.
The development of musical styles from Dufay through Palestrina and Lassus.

642* U G 3
Music in the Baroque Period
Sp. 3 cl.
Prereq.: 521 or 531, and 243.
The development of musical styles from Monteverdi through Bach.

643* U G 3
Music in the Classic Period
A. 3 cl.
Prereq.: 521 or 531, and 243.
Vocal and instrumental music of the middle and late 18th century.

644† U G 3
Music in the Romantic Period
Su, W. 3 cl.
Prereq.: 521 or 531, and 243.
The music of the Romantic period in Germany and France.

645† U G 3
Modern Music
Su, Sp. 3 cl.
Prereq.: 521 or 531, and 243.
Major trends in the development of music since 1900.

646* U G 3
The History of Music in the United States
Su. 3 cl.
Prereq.: Junior or senior standing.
A survey of music in the United States from colonial times until the present.

647 U G 3
Individual Composers: Their Lives and Works
W. 3 cl.
Prereq.: 521 or 531, and 243.
A comprehensive study of the works of an individual composer; topic varies from year to year.

648† U G 3
Chamber Music Literature
Su, A. 3 cl.
Prereq.: 521 or 531, and 243.
A survey of chamber music of the Classic and Romantic periods.

649* U G 3
Symphonic Literature
Su, W. 3 cl.
Prereq.: 521 or 531, and 243.
A survey of orchestral music from the Classic period to the present.

650* U G 3
Choral Literature
A. 3 cl.
Prereq.: 521 or 531, and 243.
A survey of choral music from the Renaissance to the present.

651† U G 3
Opera Literature
W. 3 cl.
Prereq.: 521 or 531, and 243.
A survey of the antecedents of opera and a study of representative works from each of the major periods in the history of opera.

652 U G 3
Song Literature
Sp. 3 cl.
The study of song literature including historical and philosophical backgrounds selected to meet the needs of the student, artist, or teacher; program building.

653† U G 3
Piano Literature
Su (1st term), Sp. 3 cl.
Prereq.: 521 or 531, and 243.
A study of the piano sonata and other characteristic forms from the pre-piano period to the present time. Haddad and Tetley-Kardos.

654† U G 3
Organ Literature
Sp. 3 cl.
Prereq.: 521 or 531, and 243.
A comprehensive survey from the earliest compositions to the works of present-day composers. Held.

660 U G 3
Advanced Conducting (Instrumental)
Su (1st term), Sp. 3 cl.
Prereq.: 521 and 560.
An attempt to develop the power to interpret the larger forms of instrumental literature and to read from full score. McGinnis.

661 U G 3
Advanced Conducting (Vocal)
Su (1st term), Sp. 3 cl.
Prereq.: 521 and 560.
Development of power to interpret the larger forms of choral literature and to read from full score. Casey.

670 U G 3
Medieval, Renaissance, and Baroque Musical Instruments
Sp. 3 cl.
A study of the early development of musical instruments and their uses; introduction to instrumental techniques and performance practices in these periods.
680 U G 2
Collegium Musicum
A. W. Sp. 2 hr. rehearsal, 1 cl. (alternate weeks).
Prereq.: 670.
Repeatable to a maximum of 6 cr. hrs.
Study and performance of music from the medieval, Renaissance, and baroque periods.

681 U G 3
Liturgies
W. 3 cl.
Historic liturgies of the church as a background for the work of the church musician; contemporary movements in liturgical practice. Held.

682 U G 3
Hymnology
A. 3 cl.
Prereq.: 423 or permission of instructor.
An historical survey of Christian hymnody; consideration of criteria for judging texts and tunes with regard to artistic quality and liturgical suitability. Held.

683 U G 3
Techniques and Materials for Church Choirs
Sp. 3 cl.
A study of anthem materials, chants and propers, with consideration of programming and performance. Held.

684 U 2
Field Experience in Church Music
Prereq.: 560 and 683, or concur. 683.
Repeatable to a maximum of 6 cr. hrs.
Supervised experience in the actual church situation. Held.

685 U G 1-5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Individual studies in specified problems in the field of music.

694 U G 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Supervised group studies of special problems in the field of music.

700 U G 1-2
Applied Music (Secondary)
1 hr. lesson, studio classes arr.
Prereq.: Grad. standing in music or permission of the Director of the School of Music.
Repeatable to a maximum of 12 cr. hrs. for each decimal subdivision.
Applied music study in areas other than a student's major or principal area.

700.01 Piano
700.02 Voice
700.03 Strings
Su (1st term), A, W, Sp.
700.04 Woodwinds
Su (1st term), A, W, Sp.
700.05 Brass
Su (1st term), A, W, Sp.
700.06 Organ
Su (1st term), A, W, Sp.
700.07 Percussion
700.08 Harpsichord
700.09 Harp

701 U G 1-2
Applied Music (Principal)
1 hr. lesson, studio classes arr.
Prereq.: Placement exam. or permission of applied area faculty.
Repeatable to a maximum of 12 cr. hrs. for each decimal subdivision.
Applied music study with special emphasis on literature and performance practices.

701.01 Piano
701.02 Voice
701.03 Strings
Su (1st term), A, W, Sp.
701.04 Woodwinds
Su (1st term), A, W, Sp.
701.05 Brass
Su (1st term), A, W, Sp.
701.06 Organ
Su (1st term), A, W, Sp.
701.07 Percussion
701.08 Harpsichord
701.09 Harp

711 U G 3
Theory Pedagogy
Su. 3 cl.
Prereq.: Mus. 4th yr. standing.
The teaching of music theory in colleges and secondary schools.

760 U G 3
Basic Concepts in Music Education
Su. 3 cl.
Prereq.: Ed. 586 or 587 or equiv.
The principles of music education and of the educational and cultural objectives derived from related disciplines which give direction and purpose to the music education program. Ramsey and Tolbert.
761 U G 3
Principles of Music Learning
Su, Sp. 3 cl.
Prereq.: Ed. 586 or 587 or equiv.
Analysis of the learning process in music as related to problems of music instruction to the public school. Costanza.

762† U G 3
Principles and Practices in Elementary School Music
Su (1st term). 3 cl.
Prereq.: 571 or equiv.
Analysis and appraisal of the music program in elementary schools including the relationship of music to the total school program. Tolbert.

763 U G 3
Literature of Elementary School Music
Su (1st term). 3 cl.
Prereq.: 571 or equiv.
A critical study of folk and art music of various cultures and historic periods for the general vocal and listening activities of the integrated curriculum. Tolbert.

764 U G 3
Principles and Practices in Vocal Music Education
Su (1st term). 3 cl.
Prereq.: 575 or equiv.
Analysis and appraisal of the organization, purpose, and development of the vocal music program in secondary schools.

765† U G 3
Literature for Vocal Music Education
Su (2nd term). 3 cl.
Prereq.: 575 or equiv.
A study of vocal literature of various cultures and historic periods for use with choral groups in the secondary music program.

766 U G 3
Teaching Practices in General Music
Su (2nd term). 3 cl.
Prereq.: 573 or equiv.
Study of current concepts in organizing and teaching general music in the secondary school. Ramsey.

767† U G 3
Curricular Trends in General Music
Su (2nd term). 3 cl.
Prereq.: Permission of instructor.
Analysis and development of programs in general music in which music is taught with reference to other art forms. Meeker and Tolbert.

768 U G 3
Principles and Practices in Instrumental Music Education
Su (1st term). 3 cl.
Prereq.: 577 or equiv.
Role of instrumental music in the public schools: relationship to society and the total music program, historical development, evaluation, and future trends. Meeker.

769†† U G 3
Literature for Instrumental Music Education
Su (1st term). 3 cl.
Prereq.: 577 or equiv.
Relationship of teaching materials and performance repertory to education objectives: selection of literature, interpretation, rehearsal procedures, conducting problems, attainment of musical understanding through literature. Meeker.

770 U G 3
Introduction to Research in Music Education
Su, W. 3 cl.
Prereq.: Ed. 586 or 587 or equiv.
A study of methods of research as applied to problems in school music. Costanza and Meeker.

771† U G 5
Supervision of Music Education Programs
Su. 3 cl.
Prereq.: Permission of instructor.
A study of specific problems of music supervision with special attention to music program evaluation and curriculum development. Ramsey.

786 U G 3
Introduction to Bibliographic Method
Su, A. 3 cl.
Prereq.: 521 or 531, and 243.
The collection, examination, and documentation of information about music; including general as well as music library materials. Mixter.

790 U G 1-5
Problems in Vocal Music Education
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Study of problems encountered in teaching and supervising of vocal music.

791 U G 1-5
Problems in Instrumental Music Education
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Study of problems encountered in teaching, supervising, and organization of the instrumental music program.

792 U G 1-5
Choral Problems
Su (1st term), A, W, Sp.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Study of the problems encountered in developing choruses and church choirs. Casey.
**Individual Studies**

Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Individual studies in specified problems in the field of music.

**Group Studies**

Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Supervised group studies of special problems in the field of music.

**Applied Music (Principal)**

1 hr. lesson, studio classes arr.
Prereq.: Placement exam. or permission of applied area faculty.
Open to other qualified students within the limits of instructional facilities by permission of Director of School of Music.
Repeatable to a maximum of 16 cr. hrs. for each decimal subdivision.
Advanced applied music study with emphasis on musicianship, pedagogical techniques, and literature.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Subject</th>
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<tbody>
<tr>
<td>801.01</td>
<td>Piano</td>
<td></td>
<td>Su, A, W, Sp.</td>
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<tr>
<td>801.03</td>
<td>Strings</td>
<td></td>
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<td>801.05</td>
<td>Brass</td>
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<td>801.08</td>
<td>Harpsichord</td>
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<td>A, W, Sp.</td>
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**Applied Music (Major)**

1 hr. lesson, studio classes arr.
Prereq.: Placement exam.
Repeatable to a maximum of 16 cr. hrs. for each decimal subdivision.
A specialized and intense study of literature and techniques of performance.

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<td>Strings</td>
<td></td>
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</tr>
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**811† Piano Pedagogy**
Su (1st term). 5 cr.
Prereq.: 611 or equiv., and admission to M.M. or M.A. programs in piano.
A critical analysis of various methods and principles of piano instruction, and of literature for beginning and intermediate performers.

**812† Vocal Pedagogy**
W. 5 cr.
Prereq.: Mus. grad. standing and minimum of 6 cr. hrs. of applied study in voice.
An analysis of the principles and practices current in the teaching of voice.

**813† String Instrument Pedagogy**
Su (1st term). 5 cr.
Prereq.: Mus. grad. standing and minimum of 6 cr. hrs. of applied study in string instruments.
An analysis of the principles and practices current in the teaching of strings.

**814† Woodwind Instrument Pedagogy**
Su (1st term). 5 cr.
Prereq.: Mus. grad. standing and minimum of 6 cr. hrs. of applied study in woodwind instruments.
An analysis of the principles and practices current in the teaching of woodwinds. Titus.

**815† Brass Instrument Pedagogy**
Su (1st term). 5 cr.
Prereq.: Mus. grad. standing and minimum of 6 cr. hrs. of applied study in brass instruments.
An analysis of the principles and practices current in the teaching of brass instruments. Evans.

**821 Advanced Analysis: The Classic Period**
A. 3 cr.
Prereq.: 821 or 822.
An analytical study of selected major works from the classic literature.

**822 Advanced Analysis: The Romantic Period**
W. 3 cr.
Prereq.: 2 of the following courses: 821, 622, or 821.
An analytical study of selected major works from the romantic literature. Poland.
823  G 5
Advanced Analysis: Post-Romantic to Modern Music
Sp.  3 cl.
Prereq.: 621 or 622.
Analysis of selected works reflecting the evolution from the post-romantic period to contemporary styles. Poland.

826  G 5
Development of Music Theory I
A.  3 cl.
A study of the principal treatises on music theory before 1400. Phelps.

827  G 5
Development of Music Theory II
W.  3 cl.
A study of the principal treatises on music theory from 1400 to 1700. Phelps.

828  G 5
Development of Music Theory III
Su, Sp.  3 cl.
Critical study of music and theory texts from 1700 to 1900. Phelps.

829  G 5
Contemporary Theories of Music
Sp.  3 cl.
Prereq.: Mus. grad. standing.
Fundamental concepts of theory construction and experimental verification of contemporary theories of music. Poland.

831*  G 3
Contrapuntal Techniques
Sp.  3 cl.
Prereq.: 631.
Analysis and stylistic writing of canons, invertible counterpoint, and variations.

832*  G 3
Fugue
Sp.  3 cl.
Prereq.: 632.
Detailed study of the fugue; writing of three-voice and four-voice fugues.

833  G 3
Contrapuntal Techniques
A.
Prereq.: Permission of instructor.
Contrapuntal techniques in the works of 20th-century composers.

834  G 3
Modal Counterpoint II
Sp.  3 cl.
Prereq.: 634.
Advanced counterpoint based on the vocal polyphonic style of the 16th century. Kuehretifs.

835  G 3-5
Advanced Composition
Prereq.: 2 qtr. of 635 or equiv.
Repeatable to a maximum of 15 cr. hrs.
Creative writing in the large forms at an advanced level. Barnes.

836  G 3
Musical Uses of Electronic Devices
A.  3 cl.
Prereq.: Physics 501 or equiv.
Characteristics and uses of electronic devices for compositional, analytic, and experimental purposes in music.

837  G 3
Electronic Composition
W, Sp.  3 cl.
Prereq.: 836 and 2 qtr. of 635.
Repeatable to a maximum of 6 cr. hrs.
Creative writing employing electronic sound sources.

838  G 3
Seminar in Experimental Music
A, W, Sp.  3 cl.
Prereq.: 836.
The application of electronic devices to analytical and experimental problems in music.

841*  G 5
Studies in Medieval Music
A.  3-5 cl.
Problems and research in music before 1400. Hoppin.

842*  G 5
Studies in Renaissance Music
W.  3-5 cl.
Problems and research in music between 1400 and 1600. Mixter.

843*  G 5
Studies in Baroque Music
Su, Sp.  3-5 cl.
Problems and research in music between 1690 and 1750. Livingston.

844*  G 5
Studies in Classic Music
A.  3-5 cl.
Problems and research in music of the late 18th century. Livingston.

845*  G 5
Studies in Romantic Music
Su, W.  3-5 cl.
Problems and research in music of the 19th century. Livingston.

846*  G 5
Studies in Modern Music
Su, Sp.  3-5 cl.
Problems and research in music of the 20th century. Hoppin.
847† G 5
Notation to 1300
A. 3 cl.
Prereq. or concur.: 640.
A study of neumes, the development of staff and square notation, primitive systems, rhythmic modes, Franconian notation, and the innovations of Petrus de Cruce. Mixter.

848 G 5
Notation of 14th and 15th Centuries
Su, W. 3 cl.
Prereq.: 847.
A study of Ars Nova Notation, Mannered Notation, and the transition to white notation. Hopkin.

849 G 5
Notation of the Late 15th and 16th Centuries
Sp. 3 cl.
Prereq.: 848.
The study of proportions, keyboard notations, and lute tablatures. Hopkin.

850* G 5
The History of Performance Practices
A, Sp. 3 cl.
A study of primary sources pertaining to contemporary attitudes and practices in the performance of music from the Middle Ages to the present. Livingston.

8511* G 5
Musical Sources and Historiography
Sp. 3 cl.
Prereq.: 786.
A study of music historiography, supplemented by the examination of musical documents from each of the periods of music history. Mixter.

852 G 3
The Literature of the Piano
Prereq.: Admission to the M.M. curriculum for piano major or permission of instructor.
An intensive survey of the major literature for the piano with attention to forms and performance traditions.

852.01 The Literature of the Piano I
A. 3 cl.

852.11 The Literature of the Piano II
W. 3 cl.

852.21 The Literature of the Piano III
Sp. 3 cl.

872* G 3
Administration in Music Education
Sp. 3 cl.
Prereq.: Permission of Instructor.
Seminar.

873* G 5
Seminar: Comparative Music Education
Su. 3-5 cl.
Prereq.: Permission of instructor.
An analysis and comparison of music education programs in other countries including the study of curriculum, teaching procedures, and programs of teacher preparation. Tolbert.

874 G 5
Seminar: The Development of Music Education
Sp. 3-5 cl.
Prereq.: Permission of instructor.
The development of music education from the early Greek society to the present day tracing major trends and the influence of certain persons. Cady.

875 G 5
Seminar: Psychological Factors in Music Education
A. 3-5 cl.
Prereq.: 761.
A study of the psychological factors, theory, and research in the musical development of children and adolescents with implications for school music education programs. Costanza.

876 G 5
Seminar: Evaluation and Measurement in Music Education
Sp. 3-5 cl.
Prereq.: 761 and Psych. 510.
A study of the theory, principles, and techniques of evaluation and measurement in music education. Costanza.

877 G 5
Seminar: Social Factors in Music Education
W. 3-5 cl.
Prereq.: 760.
A study of the social influences on music education and their relationship to school music programs and practices. Cady.

878* G 5
Seminar: Music Education and the Curriculum
A. 3-5 cl.
Prereq.: 875 and 877 or permission of instructor.

879 G 5
Seminar: Music in Higher Education
A. 3-5 cl.
The role of music in higher education historically and in contemporary education, including its philosophical bases, degree programs, and organization. Cady.

Medieval and Renaissance Culture
(See Medieval and Renaissance Studies 888.)

Medieval and Renaissance Literature
(See Medieval and Renaissance Studies 889.)

899 G 1-5
Interdepartmental Seminar
National Security Policy Studies

Office: 199 West 10th Avenue
Mershon Center for Education in National Security,
Richard C. Snyder (Director), Charles F. Hermann,
(associate Director).

200 U 5 National Security Policy and Policymaking
W.
Survey and policies affecting the security of the
United States and of the processes by which such
policies are formulated, executed, and appraised.

693 U G 1-5 Individual Studies in National Security Policy
Prereq: Permission of instructor.
A special national security topic is assigned to
each student for reading and a report.

702 U G 3-5 Introduction to National Security
A.: 1 cr.
Prereq: Permission of instructor.
Examination of approaches taken by various social
science disciplines to field of national security;
survey of literature in field; identification of major
problem areas.

785 U G 3-5 Research Principles and Techniques
in Leadership and Public Policy
W. 1 cr.
Prereq: Permission of instructor.
Repeatable with permission of instructor to a maximum
of 10 cr. hrs.
Examination of leadership and policy problems and the
application thereto of social science analytical
techniques and findings.

801 G 3-5 Seminar on Social Science Relationships
to Public Policy
A, W, Sp. 1 cr.
Prereq: Permission of instructor.
Repeatable with permission of instructor to a maximum
of 10 cr. hrs.
Examination of the contribution of the social and
behavioral sciences to specific public policy issues
between and within national societies.
Natural Resources

Office: School of Natural Resources, 246 Lord Hall, 224 West 17th Avenue
Professors Cowen, Gatherum, Good, Johnson, Kriebel, Larson, Pettyjohn, Schick, Schwab, Taft, and Touze; Associate Professors Bookhout, Brown, Mormon, Stockdale, Tubb, Vimmerstedt, Vogt, and Whitmore; Assistant Professors Clark, Disinger, Roth, and Thielges; Instructors Pierce and Taub.

201 U 3
Introduction to Conservation of Natural Resources
A, Sp. 3 cr., 2 1/2-day field trips.
Not open to students with credit for Conserv. 201.

202 U 3
Conservation Agencies
W. 3 cr.
Prereq.: 201 or Geog. 530.
Not open to students with credit for Conserv. 202.
History and responsibilities of governmental agencies and some private organizations for natural resources management; representatives of conservation agencies present programs and problems. Johnson.

489 U 3
Work Experience in Natural Resources
Su. A, W, Sp. 3 cr. employment; or equiv. to 10 wks. employment.
Prereq.: Permission of major adviser.
Not open to students with credit for Conserv 489.
Repeatable to a maximum of 5 cr. hrs.
The student must secure approval of adviser prior to employment, and submit a final written report by fourth week of first quarter in school following the work.

510 U G 5
Natural History of Ohio
Su, Sp. 3 cr. and arr. field trips.
Cannot be taken concur. with Bot. 410 or Zool. 220.
Geology and soils, vegetation types and regions; major wildlife; field work on ecology, observation techniques, and identification skills. Fee.

540 U G 3
Principles of Park and Recreation Management
A. 3 cr.
Prereq.: 201, or equiv. with permission of instructor.
Policies, rules and regulations, boards and commission agendas, land acquisition procedures, development, maintenance and operation of park systems, management of marinas and reservoirs. Schick.

600 U G 4
Natural Resources Problems, Programs, and Policies
W. 2 2-hr. cr.
Prereq.: 201 or Geog. 530.
Not open to students with credit for Agr. Econ. 680 or Nat. Res. 640.
Analytical study of contemporary and future problems of natural resources conservation and programs and policies related to their solution. Johnson.

601 U G 4
Interactions in Natural Resources Management
A. 2 2-hr. cr.
Prereq.: Permission of instructor.
Impact of man's activity on natural resources; interrelationships between resources and physical and social environment and prospects for effective resources management. Disinger.

610 U G 5
Interpretive Work
Su, Sp. 2 2-hr. cr. and arr. field trips.
Prereq.: Biol. 313 or equiv., Bot. 410 or Forest. 222, Geol. 102, and 5 cr. hrs. Psychol. or equiv.
Professional course for park naturalists, teachers, and outdoor education workers; history of interpretive work; philosophy and objectives; case studies of programs; interpretive techniques; and evaluation. Johnson.

611 U G 6
Field Course in Conservation and Outdoor Education
Su (1st term).
Concur.: 694.01 for 3 cr. hrs., and permission of instructor.
Study and field work in natural history, resources management, and conservation and outdoor education. Roth. Fee.

620 U G 5
Management of Fisheries
W. 5 cr.
Prereq.: Biol. 313 or equiv.
Not open to students with credit for Zool. 660.
Fisheries resource management problems and programs including biological, economic, and social factors of local, national, and international importance. Mormon.

621 U G 5
Principles of Wildlife Management
A. W. 5 cr.
Prereq.: Biol. 313 or equiv.
Introduction to the social, economic, and biological principles related to the management and utilization of wildlife resources. Good.

622 U G 15
Field Laboratory in Renewable Natural Resources Management
Sp. Full time of student arr. in the field and classroom.
Prereq.: 620 or 621, and permission of instructor.
Field experience in identifying and solving problems in the management of renewable natural resources; work in a variety of habitats using appropriate tools and techniques. Good and Mormon.

642 U G 3
Urban Parks and Recreation Management
Sp. 3 cr.
Prereq.: 540.
Organization and administration of metropolitan, county, and municipal areas; land acquisition and planning of these facilities. Schick.
643  U G 3
Outdoor Recreation by Private Enterprise
W. 3 cl.
Prereq.: 540, Econ. 201, or equiv. with permission of instructor.
Factors affecting the development of the various types of recreational facilities; case studies of several private recreation areas. Pierce and Schick.

644  U G 5
Park Design
W. 3 cl., 2 hr. lab.
Prereq.: 540.
Interrelationship of facility design and recreation land management, including various types of parks and criteria for their location and design.

683  U G 2-5
Individual Studies in Natural Resources
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.

684  U G 2-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs. for each subdivision.
Group studies on the nature and management of natural resources encompassed in one of the following areas:
684.01 Conservation and Outdoor Education
684.02 Fisheries and Wildlife
684.03 Forestry
684.04 Parks and Recreation
684.05 Resource Development
684.06 Unclassified

785  U G 4
Research Methods in Natural Resources Management
W. 2 hr. cl.
Prereq.: Math. 117, 123, or 125; an introductory course in Statistics, and permission of instructor.
Research design; experimental procedures; information-gathering tools, including reporting units for resource-related data; statistical methods; and procedures for analysis of data.

840  G 3
Policies Relating to Governmental Recreation Areas
A. 3 cl.
Prereq.: 540, and 642 or 643, or 644, or equiv. with permission of instructor.
Organizational policies and structures relating to federal, state, and local governmental agencies. Schick.

887  G 1
Interdepartmental Seminar in Natural Resources
(See under Interdepartmental Seminars.)

999  G Arr.
Research
Su, A. W. Sp.
Research for thesis or dissertation purposes only.

Naval Science

Office: 179 Physical Education Building, 337 West 17th Avenue

Captain J. M. Mason, USN, and Staff.

The sequence of courses is the same for all officer candidate students for the first two years. At the end of the second year, students may apply for the Marine Corps Option, in which case there is a variation in course presentation. All candidates are required to complete a course in American Military Affairs and a course in National Security Policy before graduation. Candidates enrolled in engineering, physics, chemistry, and mathematics, or in education with teaching majors in mathematics and physical science must complete three quarters of calculus, three quarters of physics or chemistry, and one quarter of computer science by the end of the third year in the NROTC program. Candidates enrolled in arts, humanities, business, political science, economics and education with teaching majors in areas other than physical science or mathematics, must complete three quarters of calculus or statistics, three quarters of physics or chemistry or biological science or earth science, and one quarter of computer science by the end of the third year in the NROTC program.

Candidates should consult the appropriate Naval Science Department instructor when preparing class schedules. Naval science courses are open to a limited number of civilian students with permission of the Professor of Naval Science.

Normal sequence of Naval Science courses is as follows:

First Year: All candidates—154, 152, 153.
Second Year: All candidates—261, 262, 253.
Third Year: Navy candidates—342, 343, 341.
Marine candidates—351, 352, 353.
Fourth Year: Navy candidates—475, 476, 477 unless student has not completed Naval Weapons, then 261, 262, 474.
Marine candidates—451, 452, 453.

152  U 3
Naval Administration and Introduction to Naval Ships Systems
W. 3 cl., 1 hr. lab.
Prereq.: 154.
Continuation of naval organization and management practices and a familiarization of types, structure, and purpose of ships.

153  U 3
Naval Ships Systems
Sp. 3 cl., 1 hr. lab.
Prereq.: 152.
Study of ships compartmentation, propulsion systems, auxiliary power systems, ship design, stability, and safety.
154 U 3
Survey of Naval Science
A. 2 cl., 1 2-hr. lab.
Prereq.: Enrollment in NROTC Unit or permission of professor.
An introduction to and survey of disciplines peculiar to naval science including a discussion of naval tasks and missions, regulations, customs, traditions, and organizational relationships.

261 U 3
Naval Weapons Systems I
A. 3 cl., 1 2-hr. lab.
Prereq.: 153 or permission of instructor.
Investigation of concept and technique of weapons systems, linear analysis of ballistics, and the dynamics of the basic components of weapons control systems.

262 U 3
Naval Weapons Systems II
W. 3 cl., 1 2-hr. lab.
Prereq.: 261.
Further development of the basic principles of naval weapons.

263 U 3
Principles of Naval Organization and Administration
Sp. 3 cl., 1 2-hr. lab.
Prereq.: 262.
Introduction to the structure and principles of naval organization and management.

341 U 3
Naval Operations
Sp. 3 cl., 1 2-hr. lab.
Prereq.: 343.
A study of fleet operations, including tactics, tactical communications; rules of the Nautical Road, and the principles of relative motion.

342 U 3
Naval Operations and Introduction to Navigation
A. 3 cl., 1 2-hr. lab.
Prereq.: 263.
A study of the Naval Communications system, shipboard organization and administration, and the electronic and dead reckoning methods of marine navigation.

343 U 3
Celestial Navigation
W. 3 cl., 1 2-hr. lab.
Prereq.: 342.
The determination of position by celestial methods of navigation.

351* U 3
Evolution of the Art of War, Part I
A. 3 cl., 1 2-hr. lab.
Prereq.: 253 or completion of summer camp.
A study of the evolution of weapons and tactics, illustrating the principles and variables of war used in certain battles from Alexander through the Mexican War.

352* U 3
Evolution of the Art of War, Part II
W. 3 cl., 1 2-hr. lab.
Prereq.: 351.
A continuation of the study of evolution of the art of war from the beginning of the Civil War to the end of World War II.

353* U 1
Modern Basic Military Strategy and Tactics
Sp. 1 2-hr. Sem.
Prereq.: 352.
A survey of modern strategical and tactical principles, and current military developments.

451† U 3
Amphibious Warfare, Part I
A. 3 cl., 1 2-hr. lab.
The history of amphibious warfare and its development from Gallipoli through Korea.

452† U 3
Amphibious Warfare, Part II
W. 3 cl., 1 2-hr. lab.
A study of the doctrinal techniques and present concepts of amphibious warfare, including the planning phase.

453† U 1
Leadership and the Uniform Code of Military Justice
Sp. 1 2-hr. Sem.
Survey of the UCMJ and a study of the psychology of human relationships and techniques of leadership as applied by Marines.

474 U 3
Naval Engineering
Sp. 3 1-hr. cl., 1 2-hr. lab.
Prereq.: Permission of instructor.
Not open to students with credit for 152 or 153.
Ship stability and buoyancy applications in shipboard damage control; theory of design, construction, and operation of modern naval steam engineering plants; shipboard organization and administration.

475† U 2
Seapower and Maritime Affairs I
A. 2 2-hr. Sem.
Prereq.: 343.
An analysis of seapower and maritime affairs as related to the naval forces of the United States.

476† U 2
Seapower and Maritime Affairs II
W. 2 2-hr. Sem.
Prereq.: 475.
A continuation of 475.

477† U 2
Naval Leadership
Sp. 2 2-hr. Sem.
Prereq.: 476.
A seminar study of the human relations, leadership problems, and decisions which confront the naval officer today.
Nuclear Engineering

Office: 2075 Robinson Laboratory, 206 West 18th Avenue

Professor Redmond (Chairman); Adjunct Associate Professor Epstein; Assistant Professors Carey, Krakowski, Miller, Mosher, and Nakamura; Instructor Bailey.

505 U G 3
Introduction to Nuclear Science and Engineering
Su, W, Sp. 3 cl.
Prereq.: Math. 255 and Physics 133, or permission of instructor.
Discussion of nuclear energy and nuclear radiation; sources, methods of utilization, and projections for future engineering uses.

606 U G 3
Radiological Safety
A. 2 cl., 1 2-hr. lab.
Prereq.: Permission of instructor.
General principles of radiation, radioactivity, and protection methodology with emphasis on approved operating, handling and waste disposal procedures and regulations, and biological interactions.

610 U G 3
Uses of Nuclear Radiations
A. Sp. 3 cl.
Prereq.: Physics 580.01 and Math 255, or permission of instructor.
Not open to students with credit for 710.
Industrial and research applications of radioactive isotopes; thickness and density, food irradiation, direct energy conversion, activation analysis, radioactive tracers, and topics in bioengineering.

626 U G 3
Introduction to Nuclear Power
Su, W. 3 cl.
Prereq.: Physics 580.01 and Math 255, or permission of instructor.
Nuclear power reactors; the economic and technical aspects of the nuclear power industry.

Corrosion
(See under Met. E. 635.)

660 U G 5
Introduction to Nuclear Reactor Theory
A. 5 cl.
Prereq.: Math. 255 and Physics 580.01, or permission of instructor.
Introduction to the concepts of radioactive decay, cross-sections, the multiplication constant and neutron flux and to slowing-down theory, diffusion theory, Fermi-age theory, reactor kinetics, and reactor shielding.

Materials of Nuclear Technology
(See under Met. E. 675.)

712 U G 3
Introduction to the Production, Interaction, and Detection of Nuclear Radiations
A. 3 cl.
Prereq. or concur.: Physics 580.01.
Nuclear structure, stability, reactions, and decay; interactions of electromagnetic and charged particle radiation with matter, scattering theory, and bremsstrahlung; basic processes in radiation measurements and radiation damage.

716 U G 3
Nuclear Plant Safety
Sp. 3 cl.
Prereq.: 660 and Chem. E. 778.
Modeling theory developed and applied to nuclear systems to facilitate analysis of possible nuclear accidents; nuclear incidents, accident description criteria for evaluation, nuclear plant siting and operational procedures.

720 U G 3
Reactor Dynamics and Control
Sp. 3 cl.
Prereq.: 660 and Elec. E. 520 or permission of instructor.
Not open to students with credit for 820.
Nuclear reactor and nuclear reactor system operation; control system performance requirements and control mechanisms; automatic control systems and their performance with transient and with steady state operation.

Nuclear Power Plants
(See under Mech. E. 635.)

743 U G 3
Nuclear Engineering Laboratory I
Su, A, W, Sp. 2 3-hr. lab.
Prereq.: Physics 580.01 or equiv., and Math. 255.
Experimental investigations of nuclear radiation interactions with matter; a discussion and experimental verification of radiation detection and shielding principles.

744 U G 3
Nuclear Engineering Laboratory II
Su, A, W, Sp. 2 3-hr. lab.
Prereq.: 660 and 743.
Experimental nuclear reactor analysis; understanding of the basic nuclear and reactor parameters and utilizing these fundamentals concepts in an economical engineering design.

747 U G 3
Nuclear Instrumentation
Su, A, W, Sp. 2 cl., 1 3-hr. lab.
Prereq.: 743, Elec. E. 520 or equiv., and Physics 580.05; or permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
A study of radiation detectors, measuring instruments, block diagrams and circuits; discussion of applications to nuclear research and applied measurement systems.
765  U G 3
Analysis of Neutron Chain Reactions
W.  3 cl.
Prereq.: 500 and Math. 512; Junior Physics 500.05, or permission of instructor.
The neutron distributions in infinite and finite media are analyzed with particular emphasis placed upon
asymptotic solutions, space dependent slowing down theory, multigroup slowing down theory, and transport
theory.

766  U G 4
Nuclear Reactor Analysis
Sp.  3 cl., 1-2 hr. lab.
Prereq.: 765.
Not open to students with credit for 763.
Reactor theory, probability concepts and nuclear cross sections, the multiplication constant and neutron flux,
neutron slowing down process, diffusion theory, Fermi Age Theory, homogeneous reactors, heterogeneous
reactors, and reactor kinetics.

767  U G 3
Numerical Methods in Reactor Analysis
Su.  3 cl.
Prereq.: 766, Math. 514, and Engr. Gr. 200 or equiv.
The calculations of nuclear reactor properties using matrix methods and iterative procedures; primary
emphasis on the age-diffusion theory multigroup methods.

770  U G 3
Plasmas and Controlled Fusion
W.  3 cl.
Prereq.: Physics 580.05; and Mech. E. 511, or permission of instructor.
The Thermonuclear problem; approaches to a stable and sufficiently hot plasma; nuclear reactions, plasma
kinetics, diagnostic devices, and engineering problems in research, development, and power production.

Nuclear Chemical Engineering
(See under Chem. E. 778a.)

793  U G 1-10
Individual Studies in Nuclear Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Affords the qualified student the opportunity for independent reading, study, or laboratory work in
a specialized field of interest.

794  U G 1-10
Group Studies in Nuclear Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Special group studies of a selected area of nuclear engineering not provided in other courses.

845  G 1-6
Advanced Laboratory Studies
Prereq.: 743 or 744, and permission of instructor.
Experimental treatment of advanced nuclear engineering concepts.

880  G 3
Advanced Topics
Prereq.: Permission of instructor.
Each subdivision repeatable to a maximum of 12 cr. hrs.
An advanced course of study for special topics in nuclear engineering; topics will be announced each
quarter.

880.01 Reactor Physics
880.02 Reactor Kinetics
880.03 Reactor Design
880.04 Fuel Management
880.05 Radiation Effects
880.06 Radiation Transport and Shielding
880.07 Plasma and Controlled Fusion
880.08 Nuclear Instrumentation
880.20 Special Topics

881  G 1
Nuclear Engineering Seminar
Prereq.: Grad. standing in Nuclear E. Repeatable to a maximum of 4 cr. hrs.
Current topics in nuclear engineering.

999  G Arr.
Research in Nuclear Engineering
Research for thesis or dissertation purposes only.

Nurse Anesthesiology
(School of Allied Medical Professions)

Office: 435 School of Allied Medical Professions Building, 1583 Perry Street
Instructor Lang (Division Director); Professor Hamelberg; Clinical Assistant Professor DeLeo;
Instructor Jones; Clinical Instructors Lefere and Marshall.

501  P 15
Introduction to Anesthesia
Prereq.: Graduation from an accredited school of nursing.
Not open to students with credit for 401.
Education and training of nurses in the field of anesthesia; management of technical aspects of anesthesia under physician supervision. Jones and Lang.

502  P 15
Clinical Anesthesia
Prereq.: 401 or 501.
Not open to students with credit for 402.
Advanced study of anesthetic agents, technics, pharmacology, and physiology with clinical applications. Jones and Lang.
503 P 15
Pediatric Anesthesia
Prereq.: 408 or 502.
Not open to students with credit for 403.
Advanced study of introductory and clinical anesthesia as applicable to pediatric anesthesia; training is received at the affiliated Children’s Hospital. Jones and Lang.

504 P 15
Advanced Anesthesia I
Prereq.: 403 or 503.
Not open to students with credit for 404.
Repeatable to a maximum of 45 cr. hrs.
Emphasis of study will be on more difficult anesthetic procedures and in patients with difficult disease processes. Jones and Lang.

505 P 15
Advanced Anesthesia II
Prereq.: 404 or 504.
Not open to students with credit for 405.

506 P 15
Advanced Anesthesia III
Prereq.: 405 or 505.
Not open to students with credit for 406.

Open only to students registered in the School of Nursing:

305 U 5
Introduction to Theory and Nursing Process
A. 3 cl., 2 2-hr. labs.
Prereq.: 1st yr. standing in Nursing.
Study of nature of theory; nursing process; experiences in observation, data collection in health and illness basic to nursing.

306 U 5
Introduction to Theory and Nursing Process
W. 3 cl., 2 2-hr. labs.
Prereq.: 1st yr. standing in Nursing.
Continuation of 305.

307 U 5
Introduction to Theory and Nursing Process
Sp. 3 cl., 2 2-hr. labs.
Prereq.: 1st yr. standing in Nursing.
Continuation of 305 and 306.

315 U 5
Process of Human Adaptation
A. 4 cl., 1 2-hr. lab.
Prereq.: Sophomore standing.
Study of man’s adaptive processes as they relate to the individual maturing in a family within a society. Ryan.

316 U 5
Process of Human Adaptation
W. 4 cl., 1 2-hr. lab.
Prereq.: Sophomore standing.
Continuation of 315. Ryan.

317 U 5
Process of Human Adaptation
Sp. 4 cl., 1 2-hr. lab.
Prereq.: Sophomore standing.
Continuation of 315 and 316. Ryan.

350 U 6
Problem Solving in Nursing
A, Sp. 3 cl., and average of 12 hrs. clinical study per wk.
Prereq.: 310, 311, Engl. 103, Microbiol. 509, Physiol. 311, Psychol. 100, and Soc. 101.
The process of planning, providing, and evaluating nursing care of selected patients. Daubenmire.

405 U 5
Health Directed Nursing Interactions in Health Care Systems I
A. 2 cl., 9 hr. lab.
Prereq.: 307, 317, Physiology 312, and 2nd yr. Nursing.
Study of needs and interactions with individuals in health care facilities who are experiencing alterations in normal growth, development, and performance. Kiser and Staff.
406 U 5
Health Directed Nursing Interactions in Health Care Systems II
W. 2 cl., 9 hr. lab.
Prereq.: 405 and 2nd yr. Nursing.
Study of needs and interactions with individuals in health care facilities who are experiencing alterations in normal growth, development, and performance. Kisker and Staff.

407 U 5
Health Directed Nursing Interactions in Health Care Systems III
Sp. 2 cl., 9 hrs. lab.
Prereq.: 406 and 2nd yr. Nursing.
Study of needs and interactions with individuals in health care facilities who are experiencing alterations in normal growth, development, and performance. Kisker and Staff.

410 U 8
Medical Nursing II
Su. A. 4 cl., and average of 16 hrs. clinical study per wk.
Prereq.: 310 and 311.
Nursing care of patients with long-term illness and those requiring intensive rehabilitation; emphasis on patients with problems associated with respiratory, musculoskeletal and nervous systems. Williams.

411 U 8
Surgical Nursing II
Su. A. 4 cl., and average of 16 hrs. clinical study per wk.
Prereq.: 310 and 311.
Study of the care of adult patients whose surgical intervention requires short or long term changes in living. Mourad.

420 U 8
Maternity Nursing
Su. W. 4 cl., and average of 16 hrs. clinical study.
Prereq.: 310 and 311.
Knowledge, understanding, and skill necessary in providing nursing care to the mother, infant, and family during the antepartal, intrapartal, postpartal, and newborn periods. Shaw.

421 U 8
Pediatric Nursing
Su. W. 4 cl., and average of 16 hrs. clinical conf., and field trips.
Prereq.: 310, 311, and Home Ec. 363.
Physiological and psychological changes occurring in the growing child and the impact of illness or handicap on the child, the family, and community. Brandt and Staff.

505 U 5
Nursing Transactions with Patients and Families in Crisis
A. 2 cl., 9 hrs. lab.
Prereq.: 407, Home Ec. 310, Microbiol. 509, Pharm. 470 and 3rd yr. Nursing.
Study and implementation of nursing transactions with patients experiencing acute episodical illness, psychological and physiological stress.

506 U 5
Nursing Transactions with Patients and Families in Recurring Crises
W. 2 cl., 9 hrs. lab.
Prereq.: 505.
Study and implementation of nursing transactions with patients and families experiencing long term illness with the goal of reaching the individual's maximum potential.

507 U 5
Nursing Process with Groups of Patients
Sp. 2 cl., 9 hrs. lab.
Prereq.: 506.
Study and application of methodologies of organizing and delivering health care to groups of patients in complex health care systems.

531 U 8
Community Health Nursing
Study of community health problems and the nursing care of individuals and families in homes, schools, and places of employment. Clark, Ruffing, and Steiner.

540 U 8
Nursing Study of the Psychiatric Patient
Su. A, W. Sp. 4 cl. and average of 16 hrs. clinical study per wk.
Prereq.: 410, 411, 420, and 421.
Nursing study of the psychiatric patient as an interpersonal, problem-solving process; conferences, discussions, and clinical practice.

552 U 8
The Nursing Process with Groups of Patients
Prereq.: Nurs. 4th yr. standing; concur. 553.
Not open to students with credit for 550.
Study and application of decision-making and concepts of management related to nursing process with groups of patients in the team leader/member role. Polcyn and Staff.

553 U 7
Care of the Critically Ill Patient
Prereq.: Nurs. 4th yr. standing; concur. 552.
Intensive study of the nursing care of critically ill patients with emphasis on synthesis of information to produce a plan that will have desired effects. Buckeridge and Staff.

580 U 4
History, Trends, and Issues in Nursing
Prereq.: Nurs. 3rd or 4th yr. standing.
Consideration of social, economic, and cultural forces influencing nursing and nursing education in the United States, 1870 to present with emphasis on 1930 to present; responsibilities and opportunities of the profession.
593  U  1-8
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 16 cr. hrs.
Study of selected problems in nursing.

594  U  1-8
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 16 cr. hrs.
Group study of selected problems in nursing.

685  U  G  4-7
Field Instruction in Nursing
Su, A, W, Sp.  2 cl., 4 hrs. clinical experience per cr. hr.
Prereq.: Permission of instructor.
The first qtr. of registration in this course must be for
4 cr. hrs.
Application of scientific method of study to selected
nursing and teaching problems; includes observation
and participation in clinical situations, conferences,
library study, field trips, and written reports.
685.03 Supervision and Administration. King.
685.04 Teaching. Pease.

793  U  G  1-5
Individual Studies in Nursing
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Reading, conferences, and minor investigation by an
individual student who wishes to study a particular
nursing problem intensively.

794  U  G  2-5
Group Studies in Nursing
Prereq.: 4th year Nursing or graduate student.
Repeatable to a maximum of 15 cr. hrs.
Group studies of special problems in nursing; topics
vary for quarters.

797  U  G  1-5
Interdepartmental Seminars
Repeatable by permission of School Secretary.
(See under Interdepartmental Seminars, University
Academic Policies and Course Offerings catalog.)

801  G  3-6
Concept and Theory Development
A, Sp.  3 cl.
Repeatable to a maximum of 6 cr. hrs.
Study of concept development and theories and their
usefulness for nursing as a practice discipline. King.

802  G  3
Research in Nursing
Su, A.  1-3 cl., or up to 4 hr. lab.
Prereq.: Course in basic statistical methods.
Research in nursing and its role in developing nursing;
application in nursing of various methodologies and
techniques and particular problems of design are
considered.

802.01 Non-experimental Designs
Su, A.  2 cl., 2 hr. lab.
Prereq. or concur.: Course in basic statistics
methods.
Application in nursing of non-experimental
approaches of research, pertinent data collection
techniques and tools, problems most frequently
encountered in designing and conducting
non-experimental studies.

803  G  5
Nursing of Individuals
Su, A.  5 cl.
Prereq.: Permission of instructor.
Study of the common core of knowledge in nursing
with respect to the personal systems of clients and
health care workers; application of this knowledge
through the human process.

804  G  5
Nursing of Groups
A, W.  5 cl.
Prereq.: Permission of instructor.
Study of common core of knowledge in nursing with
respect to the interpersonal systems inherent in health
care institutions; application to human process.

805  G  5
Nursing Within Communities
Sp.  5 cl.
Prereq.: Permission of instructor.
Study of the common core of knowledge in nursing
with respect to social systems as might be applied
in health care systems.

806  G  2-10
Nursing Practice Problems
Su, A, W, Sp.  2 cl., lab. arr.
Prereq.: Permission of instructor and current Ohio
license; concur. 803, 804, and 805.
Each decimal subdivision repeatable to 10 cr. hrs.
Studies of nursing care problems pertaining to a
variety of client groups; may register for more than
one section concurrently.

806.01 Family Health Care
Prereq.: Permission of instructor.
Study of the family and the role of the nurse with
healthy families.

806.02 Children
Prereq.: 806.01.
Application of theoretical, conceptual, and affective
components needed to conduct inquiry and to
practice nursing with children (newborn to six years)
and their families.

806.03 School ages and Adolescents
Prereq.: 806.01.
Application of theoretical, conceptual, and affective
components needed to conduct inquiry and to
practice nursing with children (school age and
adolescent) and their families.
806.04 Adults
Prereq.: Permission of instructor.
Study of health problems of adults.

806.05 Aged
Prereq.: Permission of instructor.
Study of health problems of the aged.

806.06 Acute Health Crises
Prereq.: Permission of instructor.
Studies of crisis and crisis intervention with respect to the health-illness continuum.

806.07 Chronic Health Problems
Prereq. or concur.: 801 and 823.
Studies of chronicity, disability, impairment, and rehabilitation in long-term problems.

806.08 Community Health Problems
Prereq. or concur.: 805.
Studies of community, community health problems, and nursing role in identifying and studying these problems.

850 G 5
Administration of Nursing Service
A, Sp. 5 cl.
Prereq.: 811, 822, or 841.
Not open to students with credit for 750.
Study of fundamentals of planning, organizing, staffing, directing, and controlling nursing service departments. King.

851 G 5
Administration of Nursing Service
Su, W. 5 cl.
Prereq.: 850.
Not open to students with credit for 751.
Continuation of 850 with exploration of major problems of nursing service administration at the supervisory level. King.

870 G 5
Curriculum Development
A, Sp. 5 cl.
Prereq.: 811, 822, or 841.
Not open to students with credit for 770.
Study of philosophy of nursing education as synthesized from theory of learning, philosophies of nursing and education, curriculum development in nursing. Pease.

871 G 4
Methods of Teaching Nursing
A, W, Sp. 4 cl.
Prereq.: 870 or permission of instructor.
Not open to students with credit for 771.
Instructional planning for courses in clinical nursing with opportunities to develop teaching-learning units and tools to assess learning outcomes. Pease.

880 G 2-5
Seminar
Repeatable to a maximum of 30 cr. hrs.
Discussion of issues, trends, and problems in nursing; topics to be announced.

994 G 2-5
Group Studies in Nursing
Prereq.: Permission of instructor.
Repeatable to a maximum of 5 cr. hrs.
Reading and group conferences for graduate students who desire to study a particular trend in nursing or nursing education.

999 G Arr.
Research in Nursing
Research for thesis purposes only.

Obstetrics and Gynecology
Office; N-435 University Hospital, 410 West 10th Avenue

Professors Copeland (Acting Chairman), Boutsalis, Holtenbeck, Holzaepfel, Melling, Teteris, and Williams; Associate Professors Ruppersberg and Stevens; Assistant Professors Anderson, Dickey, Rigby, Zartman; Instructors Essig, Villlson, and Willmer.

737 B 12
Clinical Obstetrics and Gynecology
2 months, offered July, Sept., Nov., Jan., Mar., or May.
Prereq.: Med. 3rd yr. standing.
Must repeat to 12 cr. hrs.
Normal and abnormal obstetrics and diseases of the female generative tract; management and philosophy of current therapy; supervised inpatient and outpatient experience.

740 P 6
Fetus and Newborn
1 month, offered Aug., Dec., and May.
Prereq.: Permission of instructor.
Reproduction biology and human development; the fetal-maternal axis and the product of conception; supervised clinical training and service.

745 P 6
Reproduction Endocrinology and Infertility
1 month, offered Sept. and Mar.
Prereq.: Permission of instructor.
Selective endocrinologic aspects of the specialty; correlation of biochemical, histochemical and cytologic aspects with clinical problems.

751 P 6
Obstetric and Gynecologic Specialties
1 month, offered all months.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Instruction in the newer and more advanced techniques of diagnosis and therapy which would have been neither feasible nor possible on the wards nor in the clinics.

751.01 Obstetric Specialties
751.02 Gynecologic Specialties
793 P 6, 12, 18 G 2-5
Individual Studies in Obstetrics and Gynecology
1 month, offered all months.
Prereq.: Permission of chairman.
Repeatable to a maximum of 18 cr. hrs. for professional credit.
Clinical, laboratory, conference, and library work in Obstetrics and/or Gynecology.

793.01 Obstetrics Specialties
793.02 Gynecologic Specialties

799 P 18
Residency in Obstetrics and Gynecology
12 months full time, beginning July 1.
Prereq.: Appointment as resident, University Hospitals.
Repeatable to a maximum of 360 cr. hrs.
Rotation through obstetric and gynecologic subspecialties, inpatient and outpatient services; supervisory and teaching responsibility in the patient-care team; rounds and conferences.

900 G 2-5
Obstetric and Gynecologic Pathology
Prereq.: Permission of instructor.
Repeatable to a maximum of 8 cr. hrs.
Laboratory, conference, and library work; study of current pathological specimens with emphasis upon special investigation. Molling, Hollenbeck, Holzaepfel, Williams, and Boutseis.

999 G Arr.
Research in Obstetrics and Gynecology
Research for thesis purposes only.

Occupational Therapy
(School of Allied Medical Professions)
Office: 406 School of Allied Medical Professions Building, 1583 Perry Street
Instructor Grant (Division Director); Professor Locher; Associate Professor Pennucci; Assistant Professors Adamson, Allen, Buckey, and Johnson; Clinical Assistant Professor Snyder; Instructors Hartsock, Clinical Instructors Caprio, Clingan, Czap, Daily, Davidson, Dixon, Gill, Hines, Jones, Sandman, and Shoop.

311 U 1
Occupational Therapy Orientation
Su. A. 2 cl.
Prereq.: Registration in Oc. Ther. curriculum.
Not open to students with credit for 201.
The scope of occupational therapy is presented with its relationship to broad fields of education and medicine and to other allied health professions. Adamson, Buckey, and Grant.

312 U 2
Occupational Therapy Orientation
Su. W. 1 cl, 2-hr. lab.
Prereq.: 311.
Not open to students with credit for 202.
Continuation of 311. Johnson.

313 U 2
Occupational Therapy Orientation
Su. Sp. 1 cl, 2-hr. lab.
Prereq.: 312.
Not open to students with credit for 203.
Continuation of 312. Buckey.

314 U 1
Occupational Therapy
Su, A, W, Sp. 2-hr. lab.
Not open to students with 4 cr. hrs. for 204.
Repeatable to a maximum of 4 cr. hrs.
Additional preclinical experiences. Adamson.

411 U 2
Departmental Organization
A. 2 cl.
Prereq.: Registration in Oc. Ther. curriculum.
Not open to students with credit for 301.
Occupational therapy relationships within the institution and community; a study in program planning based on treatment methods including budgets, equipment, supplies, records, and staffing implications. Adamson and Buckey.

503 U 8
Occupational Therapy
W. 5 cl, 3 2-hr. lab.
Prereq.: Psychol. 330.
Not open to students with credit for 404.
Information, discussion, and demonstration of medical problems, and use of activities, self, and groups in the total treatment program of neuropsychiatric and mentally deficient patients. Buckey and Psychiatric Staff.

504 U 5
Occupational Therapy
Sp. 2 cl, 3 2-hr. lab.
Not open to students with credit for 403.
Evaluation and treatment principles and methods through activity in cases of loss of muscle power, limited joint motion, and amputation. Grant and Staff.

595 U 1
Occupational Therapy Seminar
A. 1 cl.
Prereq.: Major standing in Oc. Ther.
Not open to students with credit for 415.
Discussion and demonstration of current methods and problems in occupational therapy. Grant.

596 U 1
Occupational Therapy Seminar
W. 1 cl.
Prereq.: 415 or 595.
Not open to students with credit for 416.
Continuation of 595. Adamson.
Ophthalmology

Office: 403 McAllen Hall, 466 W. 10th Avenue
Professors: Makley (Chairman), Blackwell, Havener, Keesler, and Perry (Emeritus); Associate Professors: Andrew, Battles, Bierdsdorf, Bredemeyer, Kapetansky, Magnuson, Moses, Quinn, and Sui; Assistant Professors: Bostwick, Bontley, Burs, Craig, Davidson, de la Motte, High, Letson, Lubow, O'dair, Olson, Sage, Simmons, Stine, and Wachtel.

625 U 5
Occupational Therapy
A. 2 cr., 3 2-hr. labs.
Prereq.: 504.
Not open to students with credit for 405 or 505.
Principles and methods of treatment in cases of lack of coordination; adaptation of equipment to meet activity needs of the individual as involved. Grant and Staff.

626 U 2
Occupational Therapy
A. 2 cr.
Prereq.: 503.
Not open to students with credit for 406 or 506.
Advanced evaluation and treatment procedures of occupational therapy in psychiatry. Locher.

627 U 8
Occupational Therapy
A. 5 cr., 3 2-hr. labs.
Prereq.: 503 and 504.
Not open to students with credit for 407 or 507.
Medical information correlated with evaluation and treatment procedures for various ages with acute and chronic medical and surgical conditions in the hospital and community setting. Johnson and Medical Staff.

630 U 6
Clinical Practice in Occupational Therapy
Prereq.: An average point-hour ratio of 2.25 in all professional courses and permission of divisional director.
Not open to students with 18 cr. hrs. for 420, 520, or 630.
Repeatable to a maximum of 18 cr. hrs.
(initial registration in this course may come in the Su, following the completion of the 6th qtr. of the professional program and may be either for one term or the qtr.
A practical experience in application of the principles and functions of occupational therapy in selected hospitals, rehabilitation centers, day care facilities, and convalescent homes. Adamson.

751 P 1
Group Studies in Ophthalmology
1 month, offered Oct. and Feb.
Prereq.: Med. 4th yr, standing.
Fundamentals of ophthalmology applicable in general practice and in other medical specialties. Makley.

793 P 6, 12, 18 G 1-5
Individual Studies in Ophthalmology
1, 2 or 3 months; offered all months.
Prereq.: Permission of chairman.
Repeatable to a maximum of 18 cr. hrs.
Research in the area of:
793.01 Ophthalmic Microbiology
793.02 Ophthalmic Immunology
793.03 Ophthalmic Pathology
793.04 Retinal Diseases

794 P 6, 12, 18
Group Studies in Ophthalmology
1 month, offered all months except July.
Prereq.: Permission of instructor.
Clinical experience in basic ophthalmology to include rotations through the outpatient service and eye ward, conferences, and rounds.

799 P 18
Residency in Ophthalmology
12 months full time, beginning July 1.
Prereq.: Appointment as resident. University Hospitals.
Repeatable to a maximum of 216 cr. hrs.
Rotation through ophthalmology clinical and outpatient services; consultative activities, supervisory and teaching responsibilities in the patient-care team; conferences and rounds.

850 G 3-5
Seminar in Ophthalmology
Prereq.: Permission of instructor.
Each student is responsible for presenting material at least twice a year; attendance at weekly Grand Round on the Ophthalmology service is included.

999 G Arr.
Research in Ophthalmology
Research for thesis purposes only.
Optometry

Office: 111 Optometry Building, 338 West 10th Avenue
Profsors McCall (Dean), Fry, and Hill; Associate Professors Bailey, and Moe; Assistant Professors Carifa, Fugate, Haines (Emeritus), V. King, Reese (Emeritus), and Zinner; Instructors Augsburger, S. Daniel, T. Daniel, Hicks, Jones, Jozwik, Lowther, Polasky, Pratte, Quelette, Reardon, Runyan, Schoessler, Schuller, and Uliack.

401 P 1
Survey of Optometry
A. 1 cl.
Prereq.: Optom. 1st yr. standing.
Development of optometry and optometric education; scope of optometric services; sources of vision information; kinds of current vision research.

411 P 3
Intermediate Geometric Optics
Sp. 3 cl.
Prereq.: Optom. 1st yr. standing and Physics 435.
Thick-lens optics; image evaluation; application to optometric systems.

431 P 5
Ophthalmic Optics I
W. 4 cl., 1 2-hr. lab.
Prereq.: Optom. 2nd yr. standing and 411.
Ophthalmic optics of single-vision and multifocal spectacle lenses; measurement and inspection of spectacle lenses; manufacturing processes.

432 P 5
Ophthalmic Optics II
Sp. 4 cl., 1 2-hr. lab.
Prereq.: 431.
Orthoptic lens design; minimizing lens aberrations; theory and practice in fitting and adjusting spectacles.

433 P 4
Ophthalmic Optics III
A. 3 cl., 1 2-hr. lab.
Prereq.: 432.
The optics of corneal and scleral contact lenses; laboratory exercises in inspecting, measuring, edging, surfacing, and modifying contact lenses.

441 P 4
Practical Optometry I
A. 3 cl., 1 3-hr. lab.
Prereq.: Optom. 2nd yr. standing, Phys. 112, and Math. 150.
Theory and techniques of keratometry, skiasometry, objective and subjective tests of refraction, accommodation, and functions of the extra-ocular muscles.

442 P 4
Practical Optometry II
W. 3 cl., 1 3-hr. lab.
Prereq.: 441.
Correlation and analysis of data: systematic determination of the etiology of anomalies and sources of visual discomfort and inefficiency; corrective procedures and prescription writing.

443 P 4
Practical Optometry III
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 442.
Ophthalmoscopy and examination of the external parts and the media of the eye; case histories; techniques of investigating special types of anomalies; corrective procedures.

641 P 5
Clinical Practice in Optometry I
Su, A, W, Sp. 2 cl., 3 3-hr. lab.
Prereq.: 443.
Clinical practice in examining eyes and carrying out corrective procedures; the conference periods are devoted to the discussion of problems encountered during the clinic periods.

642 P 5
Clinical Practice in Optometry II
Su, A, W, Sp. 2 cl., 3 3-hr. lab.
Prereq.: 641.
Continuation of 641.

643 P 5
Clinical Practice in Optometry III
Su, A, W, Sp. 2 cl., 3 3-hr. lab.
Prereq.: 642.
Continuation of 642.

651 P 4
Orthoptics
W. 3 cl., 1 2-hr. lab.
Prereq.: Optom. 3rd yr. standing and 443.
Definitions, characteristics, incidence, and phenomenology of visual problems producing loss or inefficiency of binocular vision; diagnosis, prognosis, and orthoptic treatment of such problems.

652 P 4
Aniseikonia and Low Vision
Sp. 3 cl., 1 2-hr. lab.
Prereq.: Optom. 3rd yr. standing and 443.
Etiology, clinical methods of evaluating aniseikonia and low vision; design of optical aids for such conditions; environmental aids and agencies available to the visually handicapped.

653 P 4
Contact Lenses I
W. 3 cl., 1 2-hr. lab.
Prereq.: Optom. 3rd yr. standing and 443.
The use of contact lenses; theory and methods of fitting; specification and verification; post-fitting care; contact lens solutions.

654 P 4
Contact Lenses II
Sp. 3 cl., 1 2-hr. lab.
Prereq.: Optom. 653.
Theory and clinical methods involving meridional and bifocal contact lenses; fitting astigmatic corneas and aphakic eyes; haptic and keratoconic lenses; cosmetic shells and prosthetic eyes.
Ophthalmic Pathology
A. 3 cl., 6 lab. hrs.
Prereq.: Optom. 2nd yr. standing, Path. 650.
Gross and microscopic pathology of the eye, including
diseases of the conjunctiva, orbital cavity, and pertinent
pathology of the central nervous system.

Applied Pathology of the Eye I
Sp. 3 cl., 1 2-hr. lab.
Advanced ophthalmoscopy, slit lamp microscopy,
tonometry, and other methods of detecting pathological
conditions; systematic study of ocular diseases;
artificial eyes and other prosthetic devices.

Applied Pathology of the Eye II
A. 3 cl., 1 2-hr. lab.
Prereq.: 701.
Motor disturbances of eyes, paralytic strabismus,
peripheral fixation anomalies, nystagmus, ptosis,
ptosis cutrophes, anomalous accommodative and pupillary
responses.

Applied Pathology of the Eye III
A. 3 cl., 1 2-hr. lab.
Prereq.: 702.
Visual fields; scotometry; subnormal central vision
involving pathology; telescopic lenses and aids for
subnormal vision; theory and practice in the use of
contact lenses.

Optometric Economics and Jurisprudence
W. 3 cl.
Prereq.: 643.
Historical background; legal status; practice building
techniques; office accounting and general practice
management; representative organization in optometry;
professional ethics.

Civic and National Problems in Eye Care
Sp. 3 cl.
Prereq.: 721.
Number, distribution, supply interrelationships, and
roles of the various ophthalmic groups; prevalence of
visual anomalies; governmental and public-health
aspects of vision care.

Advanced Clinical Practice in Optometry I
A, W, Sp. 2 cl., 18 hrs. lab.
Prereq.: 643.
Advanced clinical practice; the conference periods are
devoted to the discussion of problems and cases
encountered during the clinic periods.

Advanced Clinical Practice in Optometry II
A, W, Sp. 2 cl., 18 hrs. lab.
Prereq.: Optom. 4th yr. standing and 741.
Continuation of 741.

Advanced Clinical Practice in Optometry III
A, W, Sp. 2 cl., 18 hrs. lab.
Prereq.: Optom. 4th yr. standing and 742.
Continuation of 742.

Special Clinical Practice
Su, A, W, Sp. 1 cl., 2-4 3-hr. lab.
Prereq.: 443; concur. 641 and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Clinical experience in specialized phases of optometric
practice, (a) subnormal vision, (b) aniseikonia, (c) vision
in schools and industry, (d) orthoptics; and (e) contact
tapes.

Otolaryngology
Office: N-820 University Hospital, 410 West 10th Avenue

Professors Saunders (Chairman) and Birck; Associate
Professors Arthur Lim, Melnick, Miller, and Smith;
Assistant Professors Lowery, Miglets, Nib, VerMeulen,
and Wagenbrenner.

Otolaryngology-Surgical Aspects of the
Anatomy of the Head and Neck I
A. 3 cl.
Prereq.: Permission of instructor.
Not open to students with 6 cr. hrs. for 820.
Must repeat to 6 cr. hrs.
Dissection of the head and neck with lectures and
demonstrations of anatomical aspects especially
of surgical interest to the otolaryngologist. Saunders
and Birck.

Otolaryngology-Surgical Aspects of the
Anatomy of the Head and Neck II
W. 3 cl.
Prereq.: 720 and permission of instructor.
Continuation of 720. Saunders and Birck.

Seminar in Otolaryngology
Prereq.: Permission of instructor.

Otopathology
W. 2 cl.
Not open to students with 2 cr. hrs. for 850.01
Must repeat to 2 cr. hrs.
Miglets and Lim.

General Otolaryngological Pathology
Sp. 2 cl.
Not open to students with 2 cr. hrs. for 850.02
Must repeat to 2 cr. hrs.
Saunders.
750.03 Bioacoustics
Sp. 2 cl.
Not open to students with credit for 850.03.
Repeatable to a maximum of 4 cr. hrs.
Melnick.

750.04 Audiological Considerations in Otolaryngology
A. 2 cl.
Not open to students with credit for 850.04.
Repeatable to a maximum of 4 cr. hrs.
Nino.

751
Special Group Studies in Otolaryngology
1 month offered Oct. and Feb.
Prereq.: Med. 4th yr. standing.
Clinical work in basic otolaryngology as encountered in general practice and other medical specialty practice.

793
Individual Studies in Otolaryngology
1, 2, or 3 months; offered all months.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Research problems in otolaryngology involving work in animal laboratory, temporal bone laboratory, audiologic section and library; scheduled seminars and grand rounds, but no routine patient care.

794
Group Studies in Otolaryngology
1 month, offered all months except June.
Prereq.: Permission of instructor.
Clinical application of the principles of otolaryngology with patients in clinic and operating room; at least one hour daily supervised teaching by staff members; instruction by slides, films, seminars, and personal supervision. Saunders and Staff.

799
Residency in Otolaryngology
12 months full time, beginning July 1.
Prereq.: Appointment as resident, University Hospitals.
Repeatable to a maximum of 216 cr. hrs.
Rotation through clinical inpatient and outpatient services, consultative activities, supervisory and teaching responsibilities in otolaryngology, conferences and rounds.

999
Research in Otolaryngology
Research for thesis purposes only.

Pathology
Office: 4170 Medical Basic Science Building, 333 West 10th Avenue

Professors Geer (Chairman), Holaday, Koesner, Liss, Macpherson, Newton, Stevenson, and von Haam; Associate Professors Assor, Baba, Davis, Guermer, Hurd, Johansmann, Lowy, Miller, Murad, Newman, Old, Reiner, and Smetters; Assistant Professors Bishop, Cavalaris, Cooien, Clausen, Davidson, Granalis, Kirkham, Lewis, Lott, Murthy, Palileo, Samuels, Thorne, van der Hoeven, and Vaughn.

501
Medical Technology
Su. 3 cl.
Prereq.: Admission to Med. Tech. or permission of instructor.
Clinical hematology, including coagulation; urinalysis. Stevenson.

502
Medical Technology
A. 3 cl.
Prereq.: Admission to Med. Tech. or permission of instructor.
Clinical microbiology, including mycology.

503
Medical Technology
W. 3 cl.
Prereq.: Admission to Med. Tech. or permission of instructor.
Immunology; immunohematology.

504
Medical Technology
Sp. 5 cl.
Prereq.: Admission to Med. Tech. or permission of instructor.
Clinical blood and tissue chemistry; modes of investigating diseases by biochemical methods, and their interpretation. Guermer and Staff.

505
Fundamentals of Disease
A. 3 cl.
Prereq.: Admission to School of Allied Medical Professions or permission of instructor.
The nature of disease, mechanisms involved in the disease process, and use of the laboratory in defining the mechanisms of disease. Macpherson and Staff.

503
Clinical Pathology
W. 4 cl., 2 2-hr. lab. P 6
W. 4 cl. G 4
Prereq.: For professional credit, Med. 2nd yr. standing; for grad. credit, permission of instructor.
A study of the changes in the blood, urine, feces, sputum, spinal fluid, and gastric contents brought about by disease. Macpherson and Stevenson.
General Pathology

A. 5 cl., 3 2-hr. lab.
Prereq.: For professional credit, Med. 2nd yr. standing; for grad. credit, permission of instructor.
Degenerative, circulatory, inflammatory, and neoplastic lesions; reactions to injury; pathology of infectious diseases. Geer and Staff.

Special Pathology

W. 2 cl., 2 2-hr. lab.
Prereq.: 624.
The pathology of the heart and blood vessels; the respiratory tract; the bone marrow, spleen, and lymph nodes; the gastrointestinal tract; the liver, biliary tract, and pancreas. Geer and Staff.

Special Pathology

Sp. 2 cl., 2 2-hr. lab.
Prereq.: 624.
Pathology of the urinary tract; the male and female genital organs; the endocrine glands, the central nervous system; the bones, muscles, and skin. Geer and Staff.

Pathobiology

A. 3 cl.
Prereq.: Permission of instructor.
(Cross-listed in the Dept. of Vet. Path.)
Seminars on topics in comparative cellular pathology.

Pathology

A. 3 cl., 6 lab. hrs.
Prereq.: Optom. 2nd yr. standing or permission of instructor.
General pathology including the etiology of infectious disease, disturbances of nutrition, inflammation, and neoplasia, with special reference to the influence upon ophthalmic pathology; selected chapters of Special Pathology; histologic and gross demonstrations.

General Pathology

Sp. 3 cl., 2 3-hr. lab.
Prereq.: Dent. 2nd yr. standing.
General pathology, including the etiology of diseases, disturbances of nutrition, inflammation, regeneration, and tumors.

Special Lectures in Pathology

Su, A, W, Sp. 3 cl.
Prereq.: Grad. standing; Med. 3rd or 4th yr. standing.
Repeatable to a maximum of 24 cr. hrs.
Lectures in special fields of pathology; one decimal subdivision will be offered each quarter.

Blood and Bone Marrow I
Pathology of the blood and bone marrow with emphasis on the laboratory diagnosis of anemia. Stevenson.

Individual Studies in Pathology

1, 2, or 3 months; offered all months.
Prereq.: Med. Phase IV standing; or graduate standing; permission of instructor.
(When registration is for 3 professional credit hours, an additional 3 hr. professional course must be taken.)

Pathologic Anatomy
May repeat to 18 cr. hrs.
Geer and von Haam.

Principles of Clinical Cytology
May repeat to 18 cr. hrs.

Automation and Instrumentation in Clinical Chemistry
May repeat to 18 cr. hrs.
Lott.

Clinical Chemistry
May repeat to 18 cr. hrs.
Gruemer.

Neuropathology
May repeat to 18 cr. hrs.
Liss.

Immunohematology
May repeat to 18 cr. hrs.
Macpherson.

Clinical Microbiology
May repeat to 18 cr. hrs.
Macpherson.

Pediatric Pathology
May repeat to 18 cr. hrs.
Newton.

Surgical Pathology I
May repeat to 18 cr. hrs.
Holaday.
793.10 Surgical Pathology II
May repeat to 18 cr. hrs.
Holiday.

793.11 Special Topics in Pathologic Anatomy
May repeat to 18 cr. hrs.

793.12 Ultrastructure of Cells in Disease
May repeat to 18 cr. hrs.

793.13 Laboratory Medicine—the Erythrocyte
May repeat to 18 cr. hrs.
Stevenson.

793.14 Problems in Experimental Pathology
May repeat to 18 cr. hrs.
von Haam.

793.15 Problems in Pathology and Clinical Pathology
May repeat to 18 cr. hrs.

798 P 18
Internship in Pathology
12 months full time, beginning July 1.
Prereq.: Appointment as intern, University Hospital.
Repeatable to a maximum of 72 cr. hrs.
Rotation through the Divisions of Pathologic Anatomy
and Surgical Pathology; primary responsibility for
pathology service, work rounds, and staff conferences.

799 P 18
Residency in Pathology
12 months full time, beginning July 1.
Prereq.: Appointment as resident, University Hospitals.
Repeatable to a maximum of 288 cr. hrs.
Rotation through all pathology and clinical pathology
subspecialties; certain teaching responsibilities,
conferences, and seminars.

850 G 2
Seminar in Pathology and Clinical Pathology
Su, A, W, Sp. 1 2 hr. cl.
Prereq.: Grad. standing in Path.
Discussion of pertinent literature, presentation and
discussion of research work, and demonstration of
fresh specimens and slides.

999 G Arr.
Research in Pathology
Research for thesis or dissertation purposes only.

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**Pediatrics**

Offices: Children's Hospital, 561 South 17th Street
N-118 University Hospital, 410 West 10th Avenue

**Professors** Graham (Chairman), Allen, Ambuel,
Coedington, Cramblett, Hamparian, Hosier, Kontras,
Newton, Owen, Rie, Shaffer, Somerson, Sotos, and
Turner; **Associate Professors** Addanki, Cordero, Eaton,
E. Eitel, P. Eitel, Haynes, Helper, Meites, Naylor,
Paulson, Reiner, Ruppert, and Sherard; **Assistant
Professors** Arnold, Azimi, Burton, Craenen, Eberly,
Hilly, Hock, Leaverton, Pollack, Sommer, Stephenson,
Thomas, Wehe, Woo-Ming, and Young; **Instructors
Garry and Romshe.**

**715 P 6 or 12**

**Clinical Pediatrics**
2 months, offered July, Sept., Nov., Jan., Mar., or May.
Prereq.: Med. 3rd yr. standing.
Must repeat to 12 cr. hrs.
Didactic and clinical instruction in pediatrics;
presentation of health care of sick and well children.

**793 Individual Studies in Pediatrics**
1, 2, 3, or 4 months.
Prereq.: Permission of instructor.

793.01 Advanced Pediatrics P 6, 12, 18
G 1-5
1, 2, 3, or 4 months; offered all months except June.
Repeatable to a maximum of 24 cr. hrs. for
professional credit.
Graham.

793.02 Genetics P 6, 12, 18
G 1-5
1, 2, or 3 months; offered all months.
Repeatable to a maximum of 18 cr. hrs. for
professional credit.
Kontras.

793.03 Infectious Diseases P 6, 12, 18
G 1-5
1, 2, 3, or 4 months; offered all months except Jan.,
Feb., and Mar.
Repeatable to a maximum of 24 cr. hrs. for
professional credit.
Cramblett.

793.04 Pediatric Cardiology P 6, 12, 18
G 1-5
1, 2, or 3 months; offered all months except June and
Dec.
Repeatable to a maximum of 18 cr. hrs. for
professional credit.
Hosier.

793.05 Child Development P 6, 12, 18
G 1-5
2, 3, or 4 months; offered all months except June.
Prereq.: Permission of instructor.
Repeatable to a maximum of 24 cr. hrs. for
professional credit.
Students will undertake investigative study of normal
and abnormal development in children and will
conduct, under faculty supervision, a research
problem; developmental theory and techniques for
diagnosis of neuropsychological development in
infancy. Wehe.
793.06 Blood Diseases of Infants and Children
P 6  G 1-5
1 month, offered all months except June.
Newhall.

793.07 Neonatal Research
P 6, 12, 18
1, 2, 3, or 4 months; offered all months except June.
Repeatable to a maximum of 24 cr. hrs. for professional credit.
Cordero.

793.08 Adolescent Medicine
P 6, 12, 18
G 1-5
1, 2, or 3 months; offered all months.
Repeatable to a maximum of 18 cr. hrs. for professional credit.
Shaffer.

793.09 Pediatric Endocrinology
P 6, 12, 18
G 1-5
2-4 mos.; offered all months except July and August.
Repeatable to a maximum of 24 cr. hrs. for professional credit.
Sotos.

793.10 Pulmonary Diseases
P 6, 12, 18
G 1-5
1, 2 or 3 months; offered all months except June.
Repeatable to a maximum of 24 cr. hrs. for professional credit.
Young.

793.11 Handicapped Child
P 6, 12, 18
G 1-5
1, 2, or 3 mos.; offered all months except July and August.
Repeatable to a maximum of 18 cr. hrs. for professional credit.
Ambuel.

793.12 Pediatric Practice
P 6
1 month, offered all months except June.
Turner.

793.15 Newborn Care
P 6, 12, 18
1, 2, 3, or 4 months; offered all months.
Repeatable to a maximum of 24 cr. hrs.
Cordero.

793.16 Mental Retardation Training
P 6, 12, 18
G 1-5
1, 2, or 3 months; offered all months except June and August.
Prereq.: Permission of instructor.
Repeatable to a maximum of 24 cr. hrs.
Woo-Ming.

793.17 Ambulatory and Community Pediatrics
P 3-4
Offered all months.
Prereq.: Permission of instructor and registered as a student in the College of Medicine.
Repeatable to a maximum of 12 cr. hrs.
The student will study—in depth—a single problem related to the study of an individual disease, socio-economic factors, etc. Ambuel.

793.18 Pediatric Neurology
P 6-12
Offered all months except August.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Students participate in inpatient and outpatient activities—including consulting with radiology, physical medicine, electroencephalography, and child development on neurological problems. Sherard.

793.19 Adolescent Medicine—School Health
P 6
1 month; offered all months except June, July, Aug., and Dec.
Prereq.: Enrollment in the College of Medicine, and permission of instructor.
Orientation to growth and development, psychological characteristics of adolescents; supervised participation in community health programs including school health clinics. Eberly.

793.20 Adolescent Medicine—Sports Medicine
P 6
1 month; offered all months except June and July.
Prereq.: Enrollment in the College of Medicine and permission of instructor.
Introduction to adolescent psychological social and medical problems; participation in prevention, diagnosis, and treatment of sports injuries in school and university settings. Shaffer.

793.21 Adolescent Medicine—Youth and Drugs
P 6
1 month; offered all months.
Prereq.: Enrollment in the College of Medicine and permission of instructor.
Supervised student experiences with youthful drug abuse and its management in the community setting. Stephenson.

794
Group Studies in Pediatrics
1, 2, 3, or 4 months.

794.01 Advanced Pediatric Problems
P 6, 12, 18
1, 2, or 3 months; offered all months except June.
Prereq.: 715.
Repeatable to a maximum of 12 cr. hrs.
Graham.

794.02 Ambulatory Pediatrics
P 6, 12, 18
1, 2, 3, or 4 months; offered all months except June.
Prereq.: 3rd or 4th yr. standing.
Repeatable to a maximum of 24 cr. hrs.
Ambuel.

794.03 Inpatient Pediatrics
P 6, 12, 18
1, 2, 3, or 4 months; offered all months except June.
Prereq.: 3rd or 4th yr. standing.
Repeatable to a maximum of 24 cr. hrs.
Graham and Staff.

794.04 Pediatric Cardiology
P 6
1 month; offered all months except June and Dec.
Prereq.: 3rd or 4th yr. standing.
Hosier.

794.05 Pediatric Endocrinology and Metabolism
P 6, 12, 18
1, 2, 3, or 4 months; offered all months except July and Aug.
Prereq.: 3rd or 4th yr. standing.
Repeatable to a maximum of 24 cr. hrs.
Sotos.

794.06 Pediatric Hematology
P 6
1 month; offered all months except June.
Prereq.: 3rd or 4th yr. standing.
Newton.

794.07 Adolescent Medicine
P 6, 12, 18
1, 2, 3, or 4 months; offered all months.
Prereq.: 715.
Repeatable to a maximum of 24 cr. hrs.
Shaffer.
Pharmacology

Office: 5086 Medical Basic Science Building, 333 West 10th Avenue

Professors Marks (Chairman), Hollander, O’Neill, and Truitt; Associate Professors Couri, Dutta, Fischer, and Goldman; Assistant Professors Engelman and Lindauer; Instructors Knowlton and Tesi.

600 G 3
General Pharmacology
Sp. 2 cr., 1 3-hr. lab.
Prereq.: Physiol. Chem. 611, Physiol. 601, or permission of instructor.
Introduction to the general principles of pharmacology, drug classification, and the sites and mechanisms of drug action. Marks and Dutta.

601 U G 3
Laboratory Methods in Pharmacology
W. 1 cr., 2 3-hr. lab.
Prereq.: 600.
Biological, chemical, electronic, and mathemathical techniques commonly employed in a pharmacology laboratory. Truitt. Fee.

610 U G 3
Toxicology and Drug Identification
W. 1 cr., 2 3-hr. lab.
Prereq.: 600.

700 P G 4
Medical and Mammalian Pharmacology
W. 4 cr.
Prereq.: 600 or permission of instructor.
General principles of pharmacology; drugs used for diagnosis, prevention or eradication of the cause of disease, including endocrine products and chemotherapeutic agents. Marks.

701 P G 5
Medical and Mammalian Pharmacology
Sp. 4 cr., 3 lab. hrs.
Prereq.: 700.
Continuation of 700. Fee.

770 P 3
Clinical Pharmacology and Therapeutics
May.
Prereq.: Permission of instructor.
Application of clinical pharmacologic principles to the treatment of disease states. Tesi and Engelman.

783 Individual Studies in Pharmacology
1, 2, 3, months; offered all months except June.
Su, A, W, Sp. G 3-15
Prereq.: Permission of instructor.
Cardiac arrhythmias; digitalis pharmacodynamics; neuropharmacology; endocrine pharmacology; advanced cardiovascular pharmacology; autonomic pharmacology.

Petroleum Engineering

(See Chemical Engineering)

Office: 325 Chemical Engineering Building, 140 West 19th Avenue.

Associate Professor Slider.
787  U P G 1-5
Interdepartmental Seminar
(See under Interdepartmental Seminars.)
a. Neuroscience.

8201*  G 3-15
Autonomic Pharmacology
A. 2 cl., lab. arr.
Prereq.: 701 or permission of instructor.
Not open to students with credit for 720.
Comprehensive review of drugs that mimic or affect the actions of autonomic neurons with emphasis on biochemical and cellular analysis of autonomic drug action. Marks.

8211*  G 3-15
Cardiovascular Pharmacology
W. 2 cl., lab. arr.
Prereq.: 701 or permission of instructor.
Not open to students with credit for 721.
Modern concepts of the action of drugs on the heart and circulation. Dutta.

822*  G 3-15
Neuroendocrine Pharmacology
Sp. 2 cl., lab. arr.
Prereq.: 600 or 701.
Not open to students with credit for 722.
Levels of interaction of the nervous and endocrine systems. Goldman.

823  G 3-15
Pharmacology Related to Anesthesia
Su. 2 cl., lab. arr.
Prereq.: 701 or permission of instructor.
Not open to students with credit for 723.
The pharmacodynamics of anesthetic agents and of other drugs which modify the state of surgical anesthesia. Truitt and Gardier.

824*  G 3
Psychopharmacology
W. 2 cl. arr.
Prereq.: 600, 701, or permission of instructor.
Psychotropic drug-induced changes in central nervous system activity in relation to the varieties of perceptual-behavioral interpretations of that activity by self-referential systems. I.e. men. Fischer.

845  G 5-15
Bioelectric Potentials
W. 3 cl., lab. arr.
Prereq.: Physiol. 601, 602 or equiv. or permission of instructor.
Not open to students with credit for 745.
Methods of recording transmembrane potentials from cells; interpretation of cell potentials; effects of drugs on transmembrane potentials. Holland.

850  G 2
Seminar in Pharmacology
Prereq.: Permission of instructor.
Conferences on selected topics in pharmacology.

851*  G 3-15
Steroid Pharmacology
Sp. 2 cl., lab. arr.
Prereq.: 701 or permission of instructor.
Not open to students with credit for 751.
Pharmacology of steroids which affect special tissues, organs, or systems.

852*  G 3
Drug Metabolism
A. 2 cl. arr.
Prereq.: 600 or 701 or permission of instructor.
Not open to students with credit for 752.
Discussions of mechanisms of biotransformation of drugs by enzymes, pharmacologic characteristics of these systems, and techniques for the study of drug metabolism. Couri.

999  G Arr.
Research in Pharmacology
Research for thesis or dissertation purposes only.

Pharmacy
Office: 217 College of Pharmacy Building, 580 West 12th Avenue

Professors Parks (Dean), Beal, Bope, Burksman, Doskotch, LaPiridus, Malpass, Mitscher, Nelson, Willak, and Wolf; Associate Professors Husband, LaFolias, Notari, Olson, Polit, Rodowskas, Salisbury, and Sokoloski; Assistant Professors Buerki, Feller, Frank, Geraldi, Gumm, Koval, D. Miller, W. Miller, Reunin, Schwirian, Shaver, and Visconti; Instructors Bonacci, Cardinali, Huffman, Shoup, and Umstead; Clinical Instructors Anderson, Byerstrom, Schneider, and Serrin.

The areas of instruction and the courses in the College of Pharmacy comprising these areas are listed below:

PROFESSIONAL PRACTICE—475, 515, 610, 611, 615, 693, 694, 695, 710, 717.


MEDICINAL AND PHARMACEUTICAL CHEMISTRY—

PHARMACOGNOSY AND NATURAL PRODUCTS CHEMISTRY—435, 450, 451, 553, 693, 694, 754, 789, 850, 851, 852, 855, 993, 994, 999.


ADMINISTRATIVE AND SOCIAL SCIENCES IN PHARMACY—200, 400, 511, 512, 520, 523, 524, 525, 614, 625, 653, 654, 695, 820, 825, 826, 850, 993, 994, 999.
200  U 3
The Rational and Irrational Use of Drugs
A, W, Sp. 3 cl.
Not open for credit to students in the College of Pharmacy.
Survey of the fundamentals of drug action with special emphasis on drugs of abuse; discussion of medical, social, legal, and educational aspects of drug use. Nelson, Rodowskas, and Salisbury.

270  U 5
Introduction to Drug Action
W. 3 1/2 hr. cl.
Prereq.: Biol. 101 or Zool. 101.
Not open for credit to students in the College of Pharmacy or the School of Nursing.
An introduction to drug action in the treatment of disease; commonly used and abused prescription and non-prescription products will be discussed. Gerald.

400  P 3
Introduction to Pharmacy
A. 4 cl.
A survey of the profession of pharmacy dealing with pharmacy's place in the health care system, its history, educational requirements, organization, regulation, and current development.

401  P 5
Pharmaceutics I
W. 3 cl., 2 hrs. rec., 1 3-hr. lab.
Prereq.: Chem. 242 and 246 or equiv.
The application of physical chemical principles to pharmaceutics: a fundamental introduction to solid and liquid dosage forms. Matspecs, Reuning, Anderson, and Sherrin. Fee.

402  P 5
Pharmaceutics II
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 401.
The application of physical chemical principles to pharmaceutics: properties of solutions of pharmaceutical and medicinal compounds. Reuning and Sokoloski. Fee.

433  P 3
Medicinal Chemistry
Sp. 3 cl.
Prereq.: Chem. 242 or equiv.
An introduction to the chemistry of biologically active organic compounds; discussion of the synthesis, chemical properties and stereochemistry of compounds in major therapeutic classes. Lapidus, Miller, and Winitz.

434  P 5
Introductory Pharmaceutical Analysis
A. 3 cl., 2 3-hr. lab.
Prereq.: Chem. 242 and 246 or equiv.
An introduction to the quantitative chemical analysis of pharmaceuticals. Olson.

435  P 5
Bio-Pharmacy
Sp. 4 cl., 1 3-hr. lab.
Prereq.: Chem. 242 and 246 or equiv.
A study of pharmaceutical agents important in biochemical processes. Bope, Dasko, and Mitscher. Fee.

436  P 3
Advanced Pharmaceutical Analysis
W. 1 cl., 2 3-hr. lab.
Prereq.: 434 or equiv.
An introduction to selected instrumental methods of pharmaceutical analysis. Olson. Fee.

450  P 4
Pharmacognosy
W. 4 cl.
Prereq.: Chem. 242 and 246 or equiv.
A study of the history, source, identification, constituents, and medicinal preparations of some of the more important drugs of biological origin. Beal, Dasko, and Mitscher.

451  P 5
Pharmacognosy
A. 4 cl., 1 3-hr. lab.
Prereq.: Chem. 242 and 246 or equiv.
A continuation of 450. Mitscher, Dasko, and Beal. Fee.

470  P 4
Pharmacology for Nurses
A, Sp. 4 cl.
Prereq.: Chem. 102 or 122, and Physiol. 312.
Open only to students registered in School of Nursing.
A survey of the important drugs used in medicine and a consideration of their therapeutic applications. Wolf.

475  P 5
Introduction to Disease
Sp. 5 cl.
Prereq.: Anat. 200 and Physiol. 312.
A study of the nature and mechanisms of disease relative to the understanding of the action of drugs. Shaver and Visconti.

503  P 5
Pharmaceutics III
A. 3 cl., 1 3-hr. lab.
Prereq.: 402.
The application of physical chemical principles to pharmaceutics: solubility and mixed solvents, complexation, redox systems in pharmacy. Sokoloski, Frank, Reuning, Bonacci, and Sherrin. Fee.

504  P 5
Pharmaceutics IV
W. 3 cl., 1 3-hr. lab.
Prereq.: 503.
The application of physical chemical principles to pharmaceutics: heterogeneous systems, emulsions, suspensions, gels, and magmas. Frank, Sokoloski, and Reuning. Fee.
505 P 5
Pharmaceutics V
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 504.
The formulation of compounded prescriptions and other dosage forms, with emphasis on drug availability, physiological requirements, incompatibility, prediction of stability and clinical effectiveness. Notari, Frank, Reuning, Sokoloski, and Anderson. Fee.

507 P 3
Manufacturing Pharmacy
W. 1 cl., 2 3-hr. lab.
Prereq.: 402.
For regulation and mechanical fabrication of a wide variety of pharmaceutical dosage forms. Frank.

508 P 3
Manufacturing Pharmacy
W. 1 cl., 2 3-hr. lab.
Prereq.: 402.
A continuation of 507. Frank and Notari.

509 P 3
Manufacturing Pharmacy
Sp. 1 cl., 2 3-hr. lab.
Prereq.: 402.
A continuation of 507. Frank.

511 P 2
History of Pharmacy I
A. 2 cl.
Prereq.: 400.
A course designed to give the pharmacy student a deeper appreciation of the background of pharmacy and its development through the years. Buerki.

512 P 2
History of Pharmacy II
W. 2 cl.
Prereq.: 400.
A continuation of 511; emphasis on the development of the profession of pharmacy in Great Britain and the United States. Buerki.

515 P 3
Hospital Pharmacy
A, W, Sp. 1 cl., 2 3-hr. lab.
Prereq.: 402.
Repeatable to a maximum of 9 cr. hrs.
Introduction to and clinical experience in hospital pharmacy under the supervision of a registered pharmacist in University Hospital or Grant Hospital. Latiolais, Shoup, and Anderson.

520 P 4
Pharmaceutical Marketing
A. 3 75-min. cl.
Prereq.: Econ. 201.
A study of the pharmaceutical industry and the distribution of drug products and pharmaceutical services. Redowskas.

523 P 3
Pharmaceutical Record Keeping, Information Systems, and Control
A. 3 cl.
Prereq.: Econ. 201.
Deals with the professional and business records used in pharmacy practice; emphasis on the understanding of principles through case studies. Rodowskas.

524 P 4
Pharmacy Management
W. 3 cl., 1 2-hr. lab.
Prereq.: 520, and 523 or Acc. 201.
A study of fundamental problems associated with planning, organizing, and controlling a community pharmacy emphasizing case problems to illustrate the practical application of management principles. Rodowskas.

525 P 3
Pharmacy Management
Sp. 2 cl., 1 2-hr. lab.
Prereq.: 524.
A continuation of 524. Rodowskas.

553 P 3
Microscopical Pharmacognosy
W, Sp. 3 2-hr. lab.
Prereq.: 451 or equiv.
A course embodying the principles of the microscope and the application of microchemical and specialized techniques in the detection, separation, and identification of drugs. Beal. Fee.

577 P 3
Biological Products
Sp. 3 cl.
Prereq.: Microbiol. 509.
U.S.P. standards and legal requirements governing manufacture, standardization, storage and distribution of toxins, antitoxins, sera, and vaccines. Beal and Mitscher.

601 P 3
Cosmetology
Sp. 1 cl., 2 2-hr. lab.
Prereq.: Senior standing or permission of instructor.
A study of the physical, chemical and physiological aspects of materials and products comprising the area of cosmetics with particular emphasis on allergenic properties and formulation. Frank and Sokoloski.

606 P 5
Pharmaceutics VI
A. 3 cl., 1 3-hr. lab.
Prereq.: 505.
A continuation of 505 with emphasis on the physical chemical properties of drugs and dosage forms and the nature and intensity of biological action. Notari, Malipese, Sokoloski, and Anderson. Fee.

609 P 3
The Pharmacy of Metabolic Agents
Sp. 3 cl.
Prereq.: Senior standing.
A study of the pharmacy of medicinal products used in the treatment of deficiency diseases, malnutrition, and convalescence.

607 P 3  
Professional Practice I  
W. 3 2-hr. cl.  
Prereq.: 606; concur. 679.  
A clinical practice course designed to place the student in situations of the sort arising in professional community, hospital and nursing home practice. Salisbury, Anderson, Bonacci, and Bystrom.

611 P 4  
Professional Practice II  
Sp. 4 2-hr. cl. 
Prereq.: 606 and 679.  
A continuation of 610. Salisbury, Bonacci, Bystrom, and Sherrin.

613 P 3  
New and Non-Official Drugs  
Sp. 3 cl.  
Prereq.: Senior standing.  
The pharmacy of the more commonly used new and non-official medicinals. Nelson.

614 P 2  
Professional Ethics  
Sp. 1 2-hr. cl.  
Prereq.: 512 or permission of instructor.  
The conceptual basis and content of pharmaceutical ethics; significance of codified ethics, interprofessionally considered; differences of view underlying ethical issues; methods of encouraging compliance. Buerki.

615 P G 3  
Sterile Products  
W. 2 cl., 1 3-hr. lab.  
Prereq.: 504 or equiv.  
Formulation, preparation, and testing of sterile products including injections, bulk solutions, and nasal and ophthalmic preparations. Shoup and Latiolais. Fee.

625 P 3  
Pharmaceutical Jurisprudence  
Sp. 3 cl.  
A study of the laws and regulations relating to the practice of pharmacy with emphasis on cases and court decisions illustrating the pharmacist's responsibilities. Salisbury.

670 P G 6  
Chemical Pharmacology I  
W. 5 cl., 1 3-hr. lab.  
Prereq.: 433, 435, and 475.  
An interdisciplinary approach to the fundamental chemical and pharmacological principles of drugs relative to their biochemistry, absorption, metabolic fate, pharmacodynamics and therapeutic applications. Feller, Gerald, LaPidus, Miller, Witiak, and Wolf. Fee.

673 P G 6  
Chemical Pharmacology II  
Sp. 5 cl., 1 3-hr. lab.  
Prereq.: 670.  

676 P G 6  
Chemical Pharmacology III  
A. 5 cl., 1 3-hr. lab.  
Prereq.: 673.  

677 P 3  
Toxicology  
Sp. 3 cl.  
Prereq.: 676 or permission of instructor.  
Fundamentals of toxicology, including a discussion of the general classes of poisons, their physiological action, methods of treatment and detection with special emphasis on doses. Nelson.

679 P G 6  
Chemical Pharmacology IV  
W. 5 cl., 1 3-hr. lab.  
Prereq.: 676.  
A continuation of 676. Burkman, LaPidus, Miller, Mitscher, Nelson, and Witiak.

680 P 3  
Pharmacology of Newer Products  
W. 3 cl.  
Concur.: 679.  
Pharmacology of the more recent drugs and preparations and their therapeutic application. Nelson.

683 P 1-5  
Individual Studies in the Pharmaceutical Sciences  
Prereq.: Junior standing, cumulative point-hour ratio of 2.5, and permission of instructor.  
Repeatable to a maximum of 30 cr. hrs.  
Laboratory and library work designed to give the qualified student an opportunity to complete an original investigation or pursue an interest in a special problem.

694 P 1-5  
Group Studies in Pharmacy  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 30 cr. hrs.  
Group studies of selected topics in various fields of pharmacy.

695 P 2  
Seminar  
A, W, Sp. 2 cl.  
Prereq.: Senior standing or permission of instructor.  
Repeatable to a maximum of 6 cr. hrs.  
Problems arising out of professional relations of the pharmacist with the physician, medical interns, nurses, laboratory technicians, and the lay.
700 P G 5
Radioisotope Tracer Techniques and Radiopharmaceuticals
A. 3 cl., 2 3-hr. lab.
Prereq.: Permission of instructor.
A survey of the properties of radioisotopes and radiation; radioisotope tracer methods and applications to pharmaceutical sciences; the preparation, standardization, and handling of radiopharmaceuticals. Malispeis and Feller. Fee.

710 P G 3
Biopharmaceutics
W. 3 cl.
Prereq.: Senior standing or permission of instructor.
Interrelationships of absorption, distribution, metabolism, storage, and excretion of drugs with the physical-chemical and biological properties of body tissues, drugs and drug dosage forms. Reuning and Notari.

715 P G 3
Hospital Pharmacy and the Hospital Organization
A. 3 cl.
Prereq.: Senior standing, 515 or equiv., and permission of instructor.
Hospital organization and the relationship of the departmental components to the pharmacy. Latiolais and Visconti.

717 P G 5
Drug Therapy in Clinical Practice
Prereq.: 676 or permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
A clinical program involving didactic, seminar, and clinical instruction in patient drug therapy using facilities of University, Children's, Grant, and Riverside Hospitals. Visconti, Burkhman, Cardoni, Huffman, Miller, and Umstead.

737 P G 5
Advanced Pharmaceutical Analysis
Sp. 3 cl., 2 3-hr. lab.
Prereq.: 436 or permission of instructor.
The use of specialized instruments in the assay and control methods of drugs and drug preparations. Olson. Fee.

754 P G 3
Microscopical Pharmacognosy
Sp. 1 cl., 2 2-hr. lab.
Prereq.: 553 or equiv.
Pharmaceutical applications of specialized microscopic instruments. Beal.

789 P G 5
Isolation Techniques in Research
W. 3 cl., 2 3-hr. lab.
Prereq.: Chem. 242 and 246 or equiv. or permission of instructor.
A study and application of selected isolation techniques for the purification of natural products or other organic mixtures. Doskotch. Fee.

805 G 3
Technology
W. 1 cl., 2 3-hr. lab.
Prereq.: 606 or equiv.
Principles and practice in processing pharmaceutical dosage forms by the use of machines; emphasis is on fundamentals of unit processes in pharmaceutical manufacture. Fee.

806 G 2-3
Advanced Technology
Sp. 6-9 hrs. lab.
Prereq.: 606 or equiv.
Repeatable to a maximum of 9 cr. hrs.
A laboratory course designed to permit study of a variety of problems in pharmaceutical production, with the ultimate aim of pilot plant scale production. Fee.

809 G 3
Product Development
Su. 1 cl., 2 3-hr. lab.
Prereq.: 606 or equiv.
Study of problems involved in formulation of suitable dosage forms and the relationship of physical, chemical, therapeutic, and organoleptic properties of medicaments to principles of formulation. Fee.

811 G 3
Advanced Pharmacy
W. 3 cl.
Prereq.: Chem. 521 or 533, and permission of instructor.
A study of the application of physical chemical principles to the design and development of fluid pharmaceutical dosage forms. Sokoloski, Malispeis, Notari, Reuning, and Frank.

812 G 3
Advanced Pharmacy
Sp. 3 cl.
Prereq.: Chem. 521 or 533, and permission of instructor.
A study of the methods used to predict, determine, and improve the stability characteristics of medicinal agents in dosage form. Notari, Frank, Malispeis, Reuning, and Sokoloski.

816 G 3
Principles of Hospital Pharmacy
W. 3 cl.
Prereq.: 715.
Administrative and professional principles and concepts of, and trends affecting, hospital pharmacy. Latiolais, Visconti, and Shoup.

817 G 3
Principles of Hospital Pharmacy
Sp. 3 cl.
Prereq.: 816.
A continuation of 816. Latiolais, Visconti, and Shoup.
820 G 3
Social Aspects of Drug Use
W. 3 cl.
Prereq.: Permission of instructor.
A study of the social aspects of drug use with emphasis on reviewing pertinent research and developing new research approaches to existing problems. Rodowskas.

825 G 3
Advanced Pharmaceutical Marketing
W. 3 cl.
Prereq.: 520, and Bus. Admin. 650 or equiv.
Theoretical aspects of drug marketing with emphasis on policies and practices of the pharmaceutical manufacturer. Rodowskas.

826 G 3
Advanced Pharmacy Administration
Su., A. 3 cl.
Prereq.: 825 and Bus. Admin. 500 or equiv.
Repealable to a maximum of 6 cr. hrs.
Investigation and analysis of selected areas of pharmacy administration for group discussion and written report; case problems, review of current literature, and research. Rodowskas.

835 G 3
Advanced Medicinal Chemistry
W. 3 cl.
Prereq.: 679 or equiv., and Chem. 833, or permission of instructor.
Chemistry of autonomic receptor sites; recent literature references on the biological, chemical, and stereochemical requirements for adrenergic and cholinergic stimulation and blockade. Lapidus, Witlak, and Miller.

836 G 3
Advanced Medicinal Chemistry
Sp. 3 cl.
Prereq.: 679 or equiv., and Chem. 833, or permission of instructor.
Selected topics in medicinal chemistry, the subject matter being drawn from the current literature. Lapidus, Witlak, and Miller.

845 G 3
Advanced Medicinal Chemistry
W. 3 cl.
Prereq.: 679 or equiv., and Chem. 833, or permission of instructor.
Concepts of conformational analysis; recent selected literature references on the subject; the application of this science to the design and synthesis of biologically active molecules. Lapidus, Witlak, and Miller.

846 G 3
Advanced Medicinal Chemistry
A. 3 cl.
Prereq.: Chem. 833.
Repeatable to a maximum of 6 cr. hrs.
Synthesis of selected natural products; course content to change every two years; topic examples: steroids, alkaloids, heterocyclic compounds, tropolones and aromatic systems, vitamins, etc. Lapidus, Witlak, and Miller.

850 G 1
Seminar
Repeatable to a maximum of 30 cr. hrs.
Round-table discussion, oral and written reports dealing with recent advances in the pharmaceutical sciences.

851 G 3
Advanced Pharmacognosy
Sp. 3 cl.
Prereq.: Biochem. 707 or Bot. 631 or permission of instructor.
A study of research involving biosynthesis of plant constituents of pharmaceutical interest. Deskotch, Mitscher, and Beal.

852 G 3
Medicinal Plant Propagation and Cultivation
Su. 3 cl.
Prereq.: Bot. 631 or permission of instructor.
A study of the methods employed and problems involved in the propagation, cultivation, harvesting, and evaluation of medicinal plants. Beal.

Drug Metabolism
(See Pharmacol. 852.)
[Offered in cooperation with Dept. of Pharmacol.]
(Discussions of mechanisms of biotransformation of drugs by enzymes, pharmacologic characteristics of these systems, and techniques for the study of drug metabolism.)

855 G 3
Plant Drug Constituents
W. 2 cl., 1 3-hr. lab.
Prereq.: Permission of instructor.
A study of the more important classes of constituents obtained from plants, including methods of isolation, purification, and identification. Mitscher, Deskotch, and Beal.

870 G 3
Theories in Pharmacology
A. 3 cl.
Prereq.: 679 or equiv.
Orientation to graduate pharmacology; an introduction into theories of pharmacology and the research approach in pharmacology. Wolf, Burkman, Feier, Gerald, and Patil.

871 G 3
Screening Methods in Pharmacology
W. 1 cl., 2 3-hr. lab.
Prereq.: 870 or equiv., Genetics 650 or equiv., and permission of instructor.
Qualitative pharmacology covering the standard laboratory procedures and methods used in routine screening and laboratory evaluation of new drugs. Wolf. Fees.

872 G 3
Advanced Methods in Pharmacology
Sp. 1 cl., 2 3-hr. lab.
Prereq.: 871 and permission of instructor.
Theory and techniques involving spinal, tissue denervation, perfused heart, aortic strips, calculation of pA2 and pD2, receptor protection experiments; biogenic amine fluorescence microscopy, etc. Patil. Fees.
880  G  3
Biological Standardization
Su. 1 cl., 2 3-hr. lab.
Prereq.: 871 and permission of instructor.
Quantitative pharmacology covering principles of bioassay design and interpretation; laboratory consists of the performance of standard bioassays. Fee.
511 U G 5
History of Ancient and Hellenistic Philosophy
A.

512 U G 5
History of Philosophy from Bacon to Hume
W.

513 U G 5
History of Philosophy from Kant
Through the 19th Century
Sp.

520+ U G 3
American Philosophy
Sp.
Not open to students with credit for 613.
The development of American philosophy; puritanism,
deism, transcendentalism, and pragmatism.

525 U G 3
Russian Philosophy
W. 3 cl.
Prereq.: One course in the history of philos.,
permission of instructor.
Selected topics in the history of Russian philosophy:
Western influences; slavophilism and Russian religious
thought; philosophy of Dostoyevsky and Tolstoy;
Russian emigre philosophy.

H570 U G 3-5
Junior-Senior Proseminar
A, W.
Prereq.: 11 hrs. of philos., and either 3.25 or better
cumulative point-hour ratio with 3.5 or better in
philos., or permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Topics vary; emphasis on recent philosophical writing
in some specific area or on some specific problem.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600 AND 700
Not open to freshmen or sophomores. Unless
otherwise indicated the prerequisites for 600 and
700-level courses are 10 hours in philosophy.

611† U G 5
Contemporary Philosophy
W.
Examination of the doctrines of such philosophers as
Bergson, Santayana, Whitehead, Russell, and Dewey.

614† U G 5
Medieval Philosophy
Sp.
Prereq.: 10 cr. hrs. of philos. including 511, or 712 and
713.
Not open to students with credit for 714.
An examination of the main trends in the thought of
the Middle Ages, based on a study of characteristic
works of some of the most important medieval
philosophers.

615* U G 5
Pragmatism
A.
An examination of the main themes of pragmatism:
pragmatic theories of truth, reality, nature of physical
objects, knowledge of reality, and normative matters.

617 U G 5
Existentialism
Sp.
Introduction to the major doctrines of existentialism
through writings of representative existentialists, such
as Kierkegaard, Sartre, Jaspers, and Heidegger.

625 U G 3
Marxist Philosophy
Sp. 3 cl.
Prereq.: one course in the history of philos. or
permission of instructor.
Classical (traditional) Marxism; dialectical materialism
as elaborated in the USSR; recent development in
humanistic Marxism deriving from Marx's early
philosophical writings.

630 U G 5
Advanced Political and Social Philosophy
Sp.
Prereq.: 230 or permission of instructor.
An intensive examination of issues in political and
social philosophy, including democracy, civil
disobedience, anarchism, totalitarism, nature of the
state, etc.

631 U G 5
Advanced Ethical Theory
A.
Prereq.: 130.
An intensive examination of representative ethical
systems such as egoism, hedonism, intuitionism, and
utilitarianism.

641† U G 5
Advanced Aesthetic Theory
W.
Selected issues in philosophy of art, e.g., truth in art,
the function of criticism; concentrated study of
problems dealing with a particular genre.

650 U G 3
Advanced Symbolic Logic
A.
Prereq.: 260.
Advanced techniques in functional logic and proof
procedures; the axiomatization of sentential logic
and the lower functional calculus; introduction to
the higher functional calculus.

653 U G 5
Inductive Logic and Probability
A.
Prereq.: 150 or permission of instructor.
Analysis of types of empirical inference; natural law
and confirmation theory; calculus and nature of
probability; philosophic presuppositions of inductive
inference.
660 U G 5
Theory of Knowledge I
A.
Prereq.: 250 or permission of instructor.
A survey of major epistemological problems: the possibility, origin, foundation, structure, methods, limits, types, and validity of knowledge.

663 U G 5
Metaphysics I
W.
Prereq.: 250 or permission of instructor.
A survey of major metaphysical problems: categories, universals, substance and process, causality and law, space and time, metaphysical presuppositions of knowledge.

669† U G 5
Philosophy of Law
A. 3 cr.
An examination of the nature and function of law and of such problems as the relation of law to morality and the justification of punishment.

671† U G 3
Philosophy of History
Sp.
An essay of representative speculative theories of history; analysis of critical problems arising in the pursuit of historical knowledge.

672 U G 5
Philosophy in Literature
A.
Philosophical problems as reflected in classics of literature, such as the Greek dramatists, Shakespeare, Voltaire, T. S. Eliot, Proust, and Tolstoy.

673 U G 5
Philosophy of Language
Sp.
Prereq.: 150, or permission of instructor.
Semantics and language analysis; functions of language; modes of meaning, relation of linguistic structure to metaphysics.

674† U G 5
Philosophy of Mathematics
W.
Prereq.: 651.
Analysis of the concepts of mathematical truth, knowledge, and objects; special consideration of the theorems of Godel, Tarski, and Church.

675† U G 5
Philosophy of Religion
W.
A study of religious concepts and problems; the idea and nature of God, of man, their relation to the world and human destiny.

676 U G 3
Philosophy of Science
A.
A study of the nature and structure of scientific concepts, laws, and theories; appraisal of methodologies, presuppositions, and frames of reference in science.

677† U G 3
Conceptions and Methods of the Social Sciences
W.
Philosophic assumptions of social science: nature of explanation (methodological individualism, holism, functionalism); methods in natural and behavioral science; fact and value in social inquiry.

683 U G 2-10
Individual Studies in Philosophy
Prereq.: Permission of department chairman.
Students ordinarily earn from 2 to 5 cr. hrs., but Honors students may earn up to 10 cr. hrs.

684 U G 2-15
Group Studies
Prereq.: Permission of chairman.
Repeatable to a maximum of 30 cr. hrs.

712† U G 5
Philosophy of Plato
A.
Prereq.: 10 cr. hrs. of philos., including 511.

713† U G 5
Philosophy of Aristotle
W.
Prereq.: 10 cr. hrs. of philos., including 511.

715† U G 5
Selected Topics in Medieval Philosophy
Sp.
Prereq.: 10 cr. hrs. of philos., including 511.
Not open to students with credit for 714.
Repeatable to a maximum of 21 cr. hrs.

716 U G 5
Philosophy of Berkeley
W.
Prereq.: 10 cr. hrs. of philos., including 512.

717 U G 5
Philosophy of Descartes
Sp.
Prereq.: 10 cr. hrs. of philos., including 512.

718 U G 5
Philosophy of Locke
A.
Prereq.: 10 cr. hrs. of philos., including 512.

719† U G 5
Philosophy of Spinoza
W.
Prereq.: 10 cr. hrs. of philos., including 512.

720† U G 5
Philosophy of Leibniz
A.
Prereq.: 10 cr. hrs. of philos., including 512.
721 U G 5
Philosophy of Hume
W
Prereq.: 10 cr. hrs. of philos. including 512.

722* U G 5
Kant: Critique of Pure Reason
W.
Prereq.: 10 cr. hrs. of philos. including 513.

723† U G 5
Kant: Critique of Practical Reason and Critique of Judgment
Sp.
Prereq.: 722.

724* U G 5
Philosophy of Hegel
Sp.
Prereq.: 10 cr. hrs. of philos. including 513.

728† U G 5
History of Logic
Sp.
Prereq.: 651 or permission of instructor.
A history of logic from ancient Greek times to the present.

750 U G 5
Advanced Logical Theory
W. 3 cr.
Prereq.: 250 and 650.
Repeatable to a maximum of 15 cr. hrs.
Topics include Gödel's incompleteness and completeness proofs, Church's theorem, Russell's
theories of description, relations, classes arithmetic, logical truth, logical paradoxes; topics vary yearly.

761† U G 5
Theory of Knowledge II
Sp.
Prereq.: 660 or permission of instructor.
An intensive study of a systematic epistemological
treatise, such as Blanshard's Nature of Thought, Lewis' Mind and the World Order, or Lovejoy's Revolt Against
Dualism.

7641* U G 5
Metaphysics II
W.
Prereq.: 663 or permission of instructor.
An intensive study of a systematic metaphysical

767 U G 5
Philosophy of Mind
W.
Classical and contemporary approaches to the nature
of mind, mind-body, other minds, intentionality, and
other problems.

770 U G 3-5
Advanced Studies in Philosophy
Prereq.: Permission of instructor.
Repeatable to a maximum of 21 cr. hrs.

771 U G 3-5
Selected Topics in Analytic Philosophy
Prereq.: 150 and 611.
Repeatable to a maximum of 21 cr. hrs.

776 U G 5
Problems in Philosophy of Science
Sp.
Prereq.: 250 or permission of instructor.
Detailed and critical examination of significant
contributions to the traditional and contemporary
philosophical literature on the philosophy of science.

H783 U 3-5
Honors Course
Prereq.: 4th yr., standing with a grade of A in at least
half of the philos. courses taken with an average of
B in the remainder; permission of instructor under
whose supervision the work is to be completed and
the Honors Committee of the College. At least 2
quarters are required of candidates for the B.A. with
distinction in Philos. Failure to receive a grade of B
in this course is a disqualification for special honors.
Repeatable to a maximum of 15 cr. hrs.
A program of reading arranged for each student, with
individual conferences, reports and papers.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 800 AND 900
Unless otherwise indicated the prerequisites for 800 and
500-level courses are acceptable foundation courses
either in general philosophy, logic and ethics, or
history of philosophy, and in some cases in all these
subjects.

800 G 1
Current Philosophical Literature
Repeatable to a maximum of 6 cr. hrs.
Current philosophical journal articles will be read and
discussed.

811 G 5
Seminar in the History of Philosophy
A.
Repeatable to a maximum of 15 cr. hrs.

830 G 5
Seminar in Political and Social Philosophy
Sp.
Repeatable to a maximum of 15 cr. hrs.

831† G 5
Seminar in Ethics
W.
Repeatable to a maximum of 15 cr. hrs.
841† G 5
Seminar in Esthetics
Sp.
Repeatable to a maximum of 15 cr. hrs.

850 G 5
Seminar in Logic
Sp.
Repeatable to a maximum of 15 cr. hrs.

853†* G 5
Seminar in Induction and Probability Theory
Sp.
Repeatable to a maximum of 15 cr. hrs.

861†* G 5
Seminar in Theory of Knowledge
Sp.
Repeatable to a maximum of 15 cr. hrs.

864†* G 5
Seminar in Metaphysics
A.
Repeatable to a maximum of 15 cr. hrs.

870† G 5
Seminar in Philosophy of Mathematics
Sp.
Repeatable to a maximum of 15 cr. hrs.

871† G 5
Seminar in Philosophy of Logic
A.
Prereq.: 651 or permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Differing views on the nature of logical inference and logical truth.

873 G 5
Seminar in Philosophy of Language
W.
Repeatable to a maximum of 15 cr. hrs.

875† G 5
Seminar in the Philosophy of Religion
W.
Repeatable to a maximum of 15 cr. hrs.

977 G 5
Seminar in Philosophy of Science
Sp.
Repeatable to a maximum of 15 cr. hrs.

885 G 5
Seminar in Philosophical Analysis
W.
Repeatable to a maximum of 15 cr. hrs.

Medieval and Renaissance Culture
(See Medieval and Renaissance Studies 888.)

993 G 2-15
Individual Studies in Philosophy
Prereq.: An M.A. degree or at least 50 cr. hrs. of graduate study, and permission of department chairman.
Doctoral students may register for individual study in areas not normally covered by courses.

999 G Arr.
Research in Philosophy
Research for thesis or dissertation purposes only.

Photography and Cinema

Office: 204 Haskett Hall, 156 West 19th Avenue.

Professors Wagner (Chairman) and Davis (Emeritus); Associate Professors Binou, Craig, and Elsabrit; Assistant Professors Ball, Dilley, Platt, Schuth, and Vluberts; Instructors.

201 U 3
Photography
Su, A, W, Sp. 2 cr., 2 3-hr. lab.
Prereq.: 2nd year standing.
Fundamentals of photography, including cameras, emulsion characteristics, processing, filters, chemistry, and optics. Binou, Craig, Dilley, and Vluberts. Fee.

502 U G 3
The History of Photography
Su, A, Sp. 3 1-hr. cl. and lab.
Prereq.: Grad., or 4th yr. standing.
Study of the history of photography and its contribution to the arts and sciences; the critical and aesthetic considerations of the photographic image. Craig. Fee.

503 U G 3
The History of Cinema
Su, W. 2 2-hr. cl. and lab.
Prereq.: Grad., or 4th yr. standing.
History of the motion picture and critique at the contextual, artistic, technical, and information levels; evaluative study of selected films. Schults. Fee.

504 U G 3
Photography: The Early Years
W. 3 1-hr. cl.
A study of the discovery of photography and its early history, with its contribution to the arts, sciences, and society in the 19th century. Craig.
8411*  G 5
Seminar in Esthetics
Sp.
Repeatable to a maximum of 15 cr. hrs.

850  G 5
Seminar in Logic
Sp.
Repeatable to a maximum of 15 cr. hrs.

853†*  G 5
Seminar in Induction and Probability Theory
Sp.
Repeatable to a maximum of 15 cr. hrs.

8611*  G 5
Seminar in Theory of Knowledge
Sp.
Repeatable to a maximum of 15 cr. hrs.

8641*  G 5
Seminar in Metaphysics
A.
Repeatable to a maximum of 15 cr. hrs.

870†  G 5
Seminar in Philosophy of Mathematics
Sp.
Repeatable to a maximum of 15 cr. hrs.

871†  G 5
Seminar in Philosophy of Logic
A.
Prereq.: 651 or permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Differing views on the nature of logical inference and
logical truth.

873  G 5
Seminar in Philosophy of Language
W.
Repeatable to a maximum of 15 cr. hrs.

875†  G 5
Seminar in the Philosophy of Religion
W.
Repeatable to a maximum of 15 cr. hrs.

877  G 5
Seminar in Philosophy of Science
Sp.
Repeatable to a maximum of 15 cr. hrs.

885  G 5
Seminar in Philosophical Analysis
W.
Repeatable to a maximum of 15 cr. hrs.

Medieval and Renaissance Culture
(See Medieval and Renaissance Studies 888.)

993  G 2-15
Individual Studies in Philosophy
Prereq.: An M.A. degree or at least 50 cr. hrs. of
graduate study, and permission of department
Chairman.
Doctoral students may register for individual study in
areas not normally covered by courses.

999  G Arr.
Research in Philosophy
Research for thesis or dissertation purposes only.

Photography and Cinema

Office: 204 Haskett Hall, 156 West 19th Avenue.

Professors Wagner (Chairman) and Davis (Emeritus);
Associate Professors Binau, Craig, and Elsberg;
Assistant Professors Ball, Dilley, Platt, Schuth, and
Vibberts; Instructors.

201  U 3
Photography
Su, A, W, Sp.  2 cl., 2 2-hr. lab.
Prereq.: 2nd year standing.
Fundamentals of photography, including cameras,
emulsion characteristics, processing, filters, chemistry,
and optics. Binau, Craig, Dilley, and Vibberts.  Fee.
a. For students in all curricula except Journalism,
Television Communication, Art, and Graphic
Design.
b. For students in Art and Graphic Design.
c. For students in Journalism and Television
Communication.

502  U  G 3
The History of Photography
Su, A, Sp.  3 1-hr. cl. and lab.
Prereq.: Grad. or 4th yr. standing.
Study of the history of photography and its
contribution to the arts and sciences; the critical and
aesthetic considerations of the photographic image.
Craig.  Fee.

503  U  G 3
The History of Cinema
Su, W.  2 2-hr. cl. and lab.
Prereq.: Grad. or 4th yr. standing.
History of the motion picture and critique at the
contextual, artistic, technical, and information levels;
evaluative study of selected films.  Schuth.  Fee.

504  U  G 3
Photography: The Early Years
W.  3 1-hr. cl.
A study of the discovery of photography and its early
history, with its contribution to the arts, sciences, and
society in the 19th century.  Craig.
505 U G 3
Film Theory and Criticism
A, Sp. 2 hr. cl.
Prereq.: Grad. or 4th yr. standing and permission of instructor.
Study of the development of the film theory and its relation to the other arts; aesthetic of the medium and the modes of film communication as created, viewed, and analyzed. Schuth. Fee.

506 U G 3
Photographic Communications
A, W, Sp. 2 hr. cl.
Prereq.: Grad. or 4th yr. standing and permission of instructor.
Study of the photographic image in relation to communication theory; development of photographic and motion picture systems in educational and information programs. Silverman and Wagner. Fee.

521 U G 5
Advanced Photography I
Su, A, W, Sp. 2 cl., 2 2-hr. lab.
Prereq.: 201 or 594, and permission of instructor.
Not open to students with credit for 501. Advanced techniques related to specific topics with emphasis on creative photography. Binau, Craig, Dilley, and Vibberts. Fee.

522 U G 5
Advanced Photography II
Su, A, W, Sp. 2 cl., 2 2-hr. lab.
Prereq.: 501 or 521, and permission of instructor.
Continuation of 501 or 521; emphasis on photographic theory. Dilley and Vibberts. Fee.

531 U G 5
Color Photography I
A, Sp. 2 cl., 2 2-hr. lab.
Prereq.: 501 or 521, and permission of instructor.
Principles of color photography including color theory, lighting, and recent color processes. Craig and Vibberts. Fee.

532 U G 5
Color Photography II
W. 2 cl., 2 2-hr. lab.
Prereq.: 531 and permission of instructor.
Continuation of 531 with emphasis on color printing; consideration of the relationship of color theory and problems to motion pictures, television, and other creative and technical media. Craig and Vibberts. Fee.

551 U G 3
Motion Picture Production I
Su, A, W, Sp. 2 hr. cl. and lab.
Prereq.: Permission of instructor.
Not open to students with credit for 507 or 508.
Principles and procedures in motion picture production including camera, metering, laboratory, editing, and projection systems; emphasis on the silent film as a form of visual expression. Elgabr, Schuth, and Staff. Fee.

a. For students in all curricula except Journalism, Television Communication, Art, and Graphic Design.

b. For students in Art and Graphic Design.

c. For students in Journalism and Television Communication.

552 U G 5
Motion Picture Production II
A, W, Sp. 2 hr. cl. and lab.
Prereq.: 551 and permission of instructor.
Not open to students with credit for 507.
Intermediate motion picture production with emphasis on scripting, camera, and sound; examination of editorial process, relationships between film and television, and animation. Elgabr, Schuth, and Staff. Fee.

553 U G 5
Motion Picture Production III
A, Sp. 2 hr. cl. and lab.
Prereq.: 552 and permission of instructor.
Not open to students with credit for 508.
Advanced motion picture production; emphasis on production planning and management, scene directing, color, widescreen, multiple-screen, and other contemporary forms. Elgabr, Schuth, and Staff. Fee.

594 U G 5
Scientific Photography
Su, W. 3 cl., 2 2-hr. lab.
Prereq.: Science major, or 201 and 521.
For students in physical and biological science who need a knowledge of photography as an aid to their scientific work; application of photography to science. Binau and Craig.

693 U G 3-5
Individual Studies in Photography
Su, A, W, Sp. 4-8 hr. lab. hrs.
Prereq.: 9 cr. hrs. in photog. and cinema, and permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Use of departmental facilities for adding to the student's knowledge of a specially selected photographic problem pertaining to his major field.

694 U G 3-5
Group Studies in Photography and Cinema
Su, A, W, Sp. 2 hr. cl.
Prereq.: Written permission of instructor.
Repeatable to a maximum of 18 cr. hrs.

a. Script writing for film.

b. Film animation.

c. Elements of sound.

d. The editorial process.

e. Design and production of educational films.

f. Contemporary photography.

794 U G 3-5
Group Studies in Photography
Prereq.: 15 cr. hrs. in photog. and cinema.
Repeatable to a maximum of 18 cr. hrs.
Specialized problems, processes, and theories designed for students concentrating on the advanced study of photography and cinema at the M.A. and Ph.D. levels.

a. Screen Directing.

b. The Photographic Image and Society.

c. Contemporary Cinema.

d. Motion Picture Production Management.
Physical Education

Lewis A. Hess, Director of School
Office: 216 Pomerene Hall, 1760 Neil Avenue

Naomi Allenbaugh, Assistant Director of School
Office: 201 Pomerene Hall, 1760 Neil Avenue

Professors Allenbaugh, Bartels, Bennett, Hayes, Hess, Mand, Matthews, Mordy, Rupert, and Yost; Associate Professors Bailey, Erting, Fox, Harper, Hendrix, Hewlett, Karow, Kleinman, Montanaro, Morris, Nelson, Schroeder, Stevens, Sweeney, and Wheeler; Assistant Professors Beekman, Breiner, Bremmer, Coates, DeOreo, Epskamp, Fredericks, Gilliom, House, Hull, Novotny, K. O'Brien, Oyster, Sarkinen, Siessentopf, Simonian, and Taylor; Instructors Bruce, Burkholder, Burns, Campbell, Chambers, Combs, Daly, Delaplaine, Griner, Hinton, Myers, R. O'Brien, Patterson, Raysa, Ruggieri, Servedio, Steele, Wardwell, and Zubovich.

101 U 1
Physical Education (Men)
Required of all freshman men; special sections for phys. ed. majors and minors.
Instructions in the techniques of play, rules, strategies, and the social behavior involved in sports and dance activities. Fee*.

102 U 1
Physical Education (Men)
Required of all freshman men; special section for phys. ed. majors and minors.
Continuation of 101. Fee*.

103 U 1
Physical Education (Men)
Required of all freshman men; special section for phys. ed. majors and minors.
Continuation of 102. Fee*.

104 U 1
Physical Education (Women)
Required of all freshman women; special sections for phys. ed. majors and minors.
Instructions in the techniques, rules, strategy, and social behaviors of a sport or dance activity selected by the student from a wide range of offerings. Fee.

105 U 1
Physical Education (Women)
Required of all freshman women; special sections for phys. ed. majors and minors.
Continuation of 104. Fee.

106 U 1
Physical Education (Women)
Required of all freshman women; special sections for phys. ed. majors and minors.
Continuation of 105. Fee.

* Fee is charged for participation in certain skill activities.

107 U 1
Physical Education
Su, A, W, Sp. 2 lab hrs.
Not open to phys. ed. majors. Cannot be repeated for credit.
* Fee.
  a. Men.
  b. Women.

108 U 1
Physical Education
Su, A, W, Sp. 2 lab hrs.
Continuation of 107. Fee.
  a. Men.
  b. Women.

109 U 1
Physical Education
Su, A, W, Sp. 2 lab hrs.
Continuation of 108. Fee.
  a. Men.
  b. Women.

131 U 2
Physical Education Activities
W. 5 2-hr. labs.
Prereq.: Permission of chairman.
Required of phys. ed. majors.
These courses aim to develop knowledge, understandings, and skills in the basic activities appropriate to the teacher of physical education.
  a. Men.
  b. Women.

132 U 2
Physical Education Activities
Sp. 5 2-hr. labs.
Prereq.: Permission of chairman.
Required of phys. ed. majors.
Continuation of 131.
  a. Men.
  b. Women.

133 U 2
Physical Education Activities
Sp. 5 2-hr. labs.
Prereq.: Permission of chairman.
Required of phys. ed. majors.
Continuation of 132.
  a. Men.
  b. Women.

208 U 2
Orientation to Physical Education
A, Sp. 2 cl.
The scope of physical education; consideration of the areas of concentration; teaching, research, recreation, coaching, etc.; investigation of relationships to other disciplines. Wardwell and Staff.
221 U 2
Sports Officiating
2 cl., 2 lab. hrs.
Prereq.: Satisfactory evidence of playing skill in the elected athletic sport.
Repeatable to a maximum of 6 cr. hrs., subdivision not repeatable.
Study of playing rules, rule interpretation, techniques and mechanics of officiating various interscholastic and intercollegiate athletic sports.
221.01 Baseball
Sp.
221.02 Basketball
A, W.
Not open to students with credit for 222.
(Students completing the course are eligible for certification to officiate in Ohio schools.)
221.04 Football
A.
Not open to students with credit for 221.
(Students completing the course are eligible for certification to officiate in Ohio schools.)
221.05 Gymnastics
W.
221.12 Wrestling
W.
(Students completing the course are eligible for certification to officiate in Ohio schools.)

230 U 5
Nature of Human Movement
A, W, Sp. 2 2-hr. cl., 1 2-hr. lab.
The study of human movement, including its organization, significance and cultural implications. Breiner, Kleinman, and Wardwell.

231 U 1
Physical Education Activities
A, W, Sp. 3 1-hr. labs.
Required of phys. ed. majors. Cannot be repeated for credit.
These courses aim to develop knowledge, understandings, and skills in the basic activities appropriate to the teacher of physical education.
   a. Men.
   b. Women.

232 U 1
Physical Education Activities
A, W, Sp. 3 1-hr. labs.
Required of phys. ed. majors. Cannot be repeated for credit.
Continuation of 231.
   a. Men.
   b. Women.

233 U 1
Physical Education Activities
A, W, Sp. 3 1-hr. labs.
Required of phys. ed. majors. Cannot be repeated for credit.
Continuation of 232.
   a. Men.
   b. Women.

236 U 3
Sport Notation
Sp. 2 cl., 1 2-hr. lab.
Theory and techniques of Labanotation for the purpose of recording the movement in specialized sport skills.

270 U 2
Supervision of Playground
and Community Recreation Activities
Sp. 2 2-hr. labs.
Programming of recreational activities relative to community conditions; overview of activities desirable for a broad, comprehensive program.

271 U 3
Camp Counseling
A. 2 cl., 7-day Sept. workshop
Sp. 2 2-hr. cl.
Prereq.: Phys. ed. major and minor students shall have completed the Sept. workshop immediately preceding the qtr. of enrollment.
(Spring qtr. section is open to all University students.) Investigation of the responsibilities and duties of the counselor in various types of camps; practical experience in basic craft skills.

289 U 2
Directed Teaching Experience
in Physical Education
Su, A, W, Sp. 4 hr. conf.-lab.
Prereq.: Permission of departmental adviser.
Not open to students with 6 cr. hrs. for 589.
Repeatable to a maximum of 6 cr. hrs.
Opportunity is provided for assisting in the teaching of sport and dance activity classes.
   a. Men.
   b. Women.

323 U 3
Creative Physical Education
for Elementary Teachers
Su, A, W, Sp. 2 2-hr. labs.
Not open to students with credit for 541.
Theory of physical activities as a medium for creative self-expression; exploration of rhythmic, individual and group activities and their relation to development of children. Allenbaugh and Staff.

360 U 5
Kinesiology
A, W, Sp. 4 cl., 1 2-hr. lab.
Prereq.: Zoool. 231, 232.
Not open to students with credit for 660.

414 U 5
The Science of Development Through Activity
A, W, Sp. 4 cl., 1 2-hr. lab.
Prereq.: 360, and Zoool. 232.
Not open to students with credit for 214.
A systematic study of factors in human movement which affect the physiological development of the organism. Bartels.
420
The Teaching of Athletic Sports
2 cl., 2 lab. hrs.  
Prereq.: Satisfactory evidence of playing skill in the elected athletic sport.  
Repeatable to a maximum of 9 cr. hrs.; subdivision not repeatable.  
Study in the theory strategy and mechanics of coaching various interscholastic, intercollegiate athletic sports.

420.01 Baseball
a. Men. W.  
Not open to students with credit for 547.

420.02 Basketball
Not open to students with credit for 519.

420.03 Fencing
a.† Men. A.  
b.† Women. A.

420.04 Football
a. Men. W.  
Not open to students with credit for 546.

420.05 Gymnastics
a. Men. A.  

420.06 Golf
a.† Men. A.  
b.† Women. A.

420.07 Lacrosse
a. Men. A.  
b.† Women. A.

420.08 Soccer
a.† Men. Sp.  
b.† Women. Sp.

420.09 Swimming
b. Women. W.  
Not open to students with credit for 549.

420.10 Tennis
a. Men. A.  
b. Women. A.

420.11 Track and Field
a. Men. W.  
b. Women. W.  
Not open to students with credit for 544.

420.12 Wrestling
a.† Men. A.

420.13 Ice Hockey

430
Basic Movement
Sp. 1 cl., 1 2-hr. lab.  
Prereq.: 230.  
The study and practice of basic movement as a category of activity in the physical education instructional program.

441
Movement Behavior and the Perceptual-Learning Process
A, W, Sp. 3 2-hr. cl.  
Prereq.: Recommended 360, Psychol. 230, and Zoel. 232.  
Study of movement behavior and the learning of complex perceptual-motor skills, neurological and perceptual bases, learning theory, mediating variables; emphasis on application to teaching. Oyster and Siedentop.

460
Kinesiology for Dancers
Sp. 4 cl., 1 2-hr. lab.  
Prereq.: 10 cr. hrs. in biological sciences.  
Scientific study of dance movements, including analysis of joints; physiological basis of conditioning; common injuries; maturation and technical development; equilibrium; control of force and speed. Oyster.

530
The Administration of Interschool Athletics
A, Sp. 2 cl.  
An introductory course in athletic administration, including scheduling contests, records, eligibility, contest management, facilities and equipment, budgets and finance, public relations, and awards. Coates.

540
Historical Foundations of American Physical Education
A, W, So. 5 cl.  
An historical survey of the origins and development of modern physical education in America, including individual leaders and contributing factors. Bennett.

541
Physical Education for the Elementary School Child
A, Sp. 2 cl., 3 2-hr. labs.  
Prereq.: 230, and Psychol. 230.  
The study of content, program design and teaching techniques appropriate to the elementary school child. Allenbaugh, Breiner, and Hewlett.
Group Studies in Physical Education
A, W, Sp., 2 cl.
Prereq.: or concur.: Ed. 586 or Ed. 587.
Consideration of prevalent and changing concepts of physical education.

Application of Science to Physical Education
A.

Elementary School Physical Education
Sp.

Secondary School Physical Education
A, Sp.

Principles of Physical Education
Prereq.: Major or minor in phys. ed., or permission of instructor.
Origins and nature of modern physical education as developmental experience and medium of education; contributions to organic growth, personal resources, and growth in social relationships. Mand and Nelson.

Problems in Intramural Sports
Su, Sp., 2 cl.
A critical analysis of intramural sports programs; problems of policy and administration of programs on the elementary, secondary and college levels will be studied. Beekman.

Advanced Skill Techniques
Su, A, W, Sp., 4 1-hr. labs.
Prereq.: Placement examination by audition, and permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Advanced techniques of performance and a specialized and intensive study of appropriate technical literature.

History of Health Education and Physical Education
W, 3 cl.
An historical survey of physical and health education beginning with ancient Greece and with special emphasis on recent and contemporary developments in Europe and America. Bennett.

Organization and Administration of Physical Education
A, W, 5 cl.
Prereq.: 621, or equiv.
Study of policies and procedures in the organization and administration of the physical education program. Breiner.

Physical Education for Secondary School Youth
Prereq.: Satisfactory proficiency in 231-233 inclusive, or equiv.
Emphasis on the study of needs, interests, and abilities of secondary school youth, and methods and materials for the conduct of appropriate sports activities. DeCiro and Hendrix.

Men.

Women.

Physical Education for Senior High School Youth
A, Sp., 3 2-hr. cl.
Prereq.: 231-233 inclusive, or equiv.
Continuation of 647 with emphasis on the characteristics of the middle adolescent as they affect the selection and conduct of physical education activities. Hendrix and Nelson.

Evaluation in Physical Education
Su, A, W, Sp., 2 cl., 1 2-hr. lab.
A critical study of methods in evaluating biological, social, and psychological outcomes for physical education. Matthews.

First Aid and Care of Injuries
A, Sp., 3 cl., 2 2-hr. labs.
Prereq.: 360, or equiv.
Students completing this course are eligible for Red Cross standard or advanced certification in first aid.
A consideration of the methods of prevention and care of injuries, conditioning of athletes and safety provisions for the conduct of physical education.

Adapted Physical Education
Su, A, W, Sp., 3 cl., 1 4-hr. lab.
Prereq.: 360, 541, and 647.
The organization and administration of individual physical education for typical and atypical students including the culturally disadvantaged; laboratory experience in physical education for the atypical. Ersing and Wheeler.

Physical Education Workshop
Su. 3-wk. workshop.
Prereq.: Teaching experience or senior standing in Phys. Ed., and permission of instructor.
Repeatable to a maximum of 8 cr. hrs.
A team approach to activity teaching in physical education with emphasis on instruction, methods, materials, resources, evaluation, inter-relationships, and others.

Individual Studies in Physical Education
Prereq.: Grad. or senior standing, and permission of adviser.
Investigation of selected professional problems.
694  U G 1-5
Group Studies in Physical Education
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Group studies on special problems in Physical Education.

731  U G 3
Concepts of the Body in Physical Education
Su, W. 3 cr.
Study of the conceptions of the body that have influenced contemporary views of physical education and its practice. Kleinman.

751  U G 3
Physical Growth and Motor Development
Su, A. 3 cr.
Prereq.: Grad. standing, or permission of instructor.
Study of growth in phylogenetic and ontogenetic sequence; motor development; critical analysis of research in motor ability, fitness, and athletics, as related to growth and development. Mordy.

760  U G 3
Mechanical Analysis of Motor Skills
A. 3 cr.
Prereq.: 360 or equiv., and Physics 111, or permission of instructor.
The application of mechanical laws, principles, and formulae to motor skills. Simonian and Bartels.

770  U G 3
Outdoor Education and Camp Administration
Sp. 3 cr.
Prereq.: 271, or permission of instructor.
Introduction to the principles, status, and administration of outdoor education and camping. Mand.

771  U G 3
Public Recreation: Its Organization and Administration
A, W, Sp. 3 cr.
Prereq.: Soc. 465, or equiv.
Consideration of common patterns of organization of community recreation found in American cities, large and small, under municipal, school, and other auspices. Novotny.

820  G 3
Principles of Football Coaching and Management
Su. 3 cr.
Prereq.: Grad. standing, and coaching experience.
A course for advanced students of football considering the principles of various types of strategy; the designing of plays, methods of teaching and controlling players, and special problems of management. Hayes.

831  G 3
Professional Preparation of Teachers in Physical and Health Education
Su, Sp. 3 cr.
Principles underlying professional preparation of teachers in physical and health education; curriculum construction; selection of candidates; supervised teaching; staff personnel; problems pertaining to professional students. Hess.

832  G 3
Human Movement Theory in Physical Education
Sp. 3 cr.
A study of the several theoretical conceptions of human movement and their implications for physical education and dance. Kleinman.

840  G 3
Comparative Physical Education and International Sport
Sp. 3 cr.
A survey of contemporary physical education in selected countries with some attention given to international competition in sports. Bennett.

841  G 3
Physical Education in School and College
Su, A. 3 cr.
Kleinman.

842  G 3
Seminar in the Role of Sports in Society
Su, A, Sp. 3 cr.
Prereq.: Soc. 465, or equiv.
Study of the significance of sports in society; and examination of the extent to which sports contribute to human welfare. Mordy.

845  G 3
Statistics for Physical Education and Health Education
Su, A, W. 3 cr.
Prereq.: 650; Math. 116, 121, or 125; and permission of instructor.
A study of techniques for interpreting research publications in the field, and of statistical procedures useful in analyzing data. Fox and Mathews.

850  G 3
Survey of Research in Physical Education
Su, Sp. 3 cr.
Prereq.: 855, or equiv.
Mathews and Morris.

851  G 3
Motor Learning
Su, W. 2 1/2- hr. cr.
Prereq.: 441, elementary statistics, and permission of instructor.
The study of the theoretical aspects of motor-learning processes and their relationship to learning movement skills. Siedentop.
Organic Science as Applied to Physical Education and Health Education
Su, Sp.
Prereq.: 10 cr. hrs. physiol., 10 cr. hrs. chem., and 10 cr. hrs. biol., or equiv.
A systemic study of the integration of chemistry, biology, anatomy, physiology to the fields of physical education and health education.

Supervision of Physical and School Health Education
A. 3 cr.
A study of the responsibilities and functions of the supervisor in city, county, and state school systems.

Areas and Facilities in Physical Education
A. 3 cr.
Principles and techniques in determining facility needs, evaluating facilities, planning for new construction and remodeling the areas and facilities for physical education and recreation. Hess and Coates.

Methods of Research in Health Education and Physical Education
Su, W, Sp. 3 cr.
To develop some competency in professional writing and in the use of various research methods applied to health education and physical education. Fox, Mathews, and Morris.

Problems in Physical Education
Advanced problems in physical education, individual or group participation.

Recreation
A.

Adapted Physical Education
W.

Curriculum in Physical Education
Su, Sp.

Physical Education in Higher Education
A.

Physical Education in Secondary Education
Sp.

Physical Education in Elementary Education
W.

School Evaluation

Administration
Su.

Seminar in Physical Education
Su, W. 2 cr.

Seminar in Recreation
Sp. 2 cr.

Research in Physical Education
Research for thesis or dissertation purposes only.

Physical Medicine

Office: 1012 Dodd Hall, 472 West Eighth Avenue

Professor Johnson (Chairman), Nagi; Associate Professors Gilson, Guyton, Hamilton, Hartley, Melvin, Spiegel, and Stow; Assistant Professors Checkles, Earl, MacLean, Powers, and Waylonis.

Medical Rehabilitation
1 month, offered Oct. and Feb.
Prereq.: Med. 4th yr. standing.
Ambulation aids, electrodiagnosis, prosthetics, physical and occupational therapy, social service, as related to acute and chronic diseases. Johnson and Staff.

Clinical Physical Medicine and Rehabilitation
1, 2, or 3 months; offered all months.
Prereq.: Permission of instructor.

Clinical and Physiologic Bases of Physical Treatment
Sp.
Prereq.: Permission of instructor.
The indications for, and choice of, physical modalities. Stow and Johnson.

Biophysical Basis of Physical Treatment
1, 2, or 3 months; offered all months.
Prereq.: Permission of instructor.
The student will design and complete a laboratory or library research problem involving the biophysical aspects of physical diagnosis or treatment. Johnson, Stow, and Melvin.

The Natural History of Disability
A. 3 1-hr. cl.
Prereq.: Grad. or professional registration and permission of instructor.
An analysis of the nature and patterns of disability, the processes involved, and the factors influencing its course. Hamilton and Staff.
Instrumentation, Neuropsychology, Clinical Aspects of Electromyography

770 P G 3

W.
Prereq.: Resident standing and permission of dept. chairman.
In-depth study of the instrumentation and correlation of neurophysiology and clinical aspects of electromyography, including excitable membranes, biological potentials, and nerve stimulation in clinical disorders. Melvin, MacLean, and Stow.

Residency in Physical Medicine

799 P 18
Sue, W, Sp.
12 months full time, beginning July 1.
Prereq.: Appointment as resident, University Hospitals.
Repeatable to a maximum of 216 cr. hrs.
Rotation through physical medicine and rehabilitation clinical inpatient and outpatient services; consultative, supervisory, and teaching responsibilities in the patient-care team; rounds, conferences, seminars. Johnson, Guyton, Spiegel, Melvin, MacLean, Checkles, Earl, and Waylonis.

Individual Studies in Physical Medicine

933 G 3-5
Sue, A, W, Sp.
Prereq.: Permission of instructor.
Minor investigations using electrodiagnostic techniques; biophysical, physiologic, and therapeutic effects of physical agents, and other medical rehabilitation techniques. Johnson, Stow, Hartley, Melvin, and Checkles.

Research in Physical Medicine and Rehabilitation

999 G Arr.
Sue, A, W, Sp.
Research for thesis purposes only.

Physical Therapy

(School of Allied Medical Professions)
Office: 306 School of Allied Medical Professions Building, 1583 Perry Street

Associate Professor Woods (Division Director); Professor P. Johnson; Associate Professor Burnett; Assistant Professors Chase, Chidley, and Downer; Instructors Pierson and Starks; Clinical Instructors Cotzin, Holland, D. Johnson, Kisner, Smith, and Tootle.

100 U 2
Introduction to Physical Therapy
A. 2 cr.
A general orientation of physical therapy and its relation to medical services; ethics, terminology, patient management, and health care concepts.

Procedures I

480 U 3
A. W. 3 cr., 1 3-hr. lab.
Prereq.: Admission to Phys. Ther.
Not open to students with credit for 301 and 302.
Professional orientation: introduction to the hospital setting and patient care; principles and techniques of basic body mechanics; bandaging and therapeutic massage. Woods.

Procedures II

481 U 5
A. W. 4 cr., 2 2-hr. lab.
Prereq.: 480, or 301 and 302.
Not open to students with credit for 402 and 416.
Agents used in physical therapy; mechanical and physical properties; therapeutic application and physiological effects related to patients. Owen.

Procedures III

482 U 3
Sp. 1 cr., 2 2-hr. lab.
Prereq.: 481, or 402 and 416 or admission to Oc. Ther.
Not open to students with credit for 303.
Evaluation techniques and their usage in physical therapy, posture evaluation, goniometric range of motion recordings, manual muscle testing, functional tests and measurements. Downer.

Medical Kinesiology

485 U 3
W. 2 cr., 1 2-hr. lab.
Prereq.: Admission to School of Allied Medical Professions and permission of instructor.
Not open to students with credit for 303 or 304.
Biomechanics and pathomechanics in the analysis of human motion; emphasis on clinical relationships. Burnett and Kisner.

Medical Science I

521 U 2 or 3
A. 2 or 3 cr.
Prereq.: Admission to School of Allied Medical Professions.
Principles, clinical aspects, and therapeutic procedures related to selected medical specialties.

Medical Science II

522 U 2 or 3
W. 2 or 3 cr.
Prereq.: Admission to School of Allied Medical Professions.
Lectures and clinical presentations giving an orientation to signs, symptoms, and therapeutic management of patients in related medical science fields. Chidley.

Therapeutic Exercise I

541 U 4
A. 3 cr., 2 2-hr. lab.
Prereq.: Admission to Phys. Ther.
Not open to students with credit for 410.
Basic principles and techniques of therapeutic exercise related to physical and medical sciences. Kisner.
Physics

Office: 1012 Alpheus Smith Laboratory of Physics, 174 West 18th Avenue
Professors Jossem (Chairman), Arn, Bell, Brown, Dickey, Edwards, Gaines, Hausman, Heer, Jastram, Korringo, Lande (Emeritus), Mills, Nelson, C. Nielsen, H. Nielsen (Emeritus), Pool (Emeritus), Pruten, Rao, Reibel, Romanowski, Shafter, Shaw, Tanaka, Wada, Wigen, and Yaqub; Associate Professors Biatt, Donoghue, Erickson, Harris, Kim, Kurbatov (Emeritus), Mafe, Mulligan, Ploughe, Reay, Riley, Seyller, Toug, and Yang; Assistant Professors Brim (Lima), Ebner, Garland, Hopp, Palmer, Plummer (Newark) Saam, Sarwinski, Schwartz, Scott (Mansfield), Stanton, Stroub, Sung, and Torgerson.

100 - Physics & Man (5)

101

Nature of the Physical World
A, Sp. 4 cl., 1 2-hr. lab.
An elementary description of the physical world, emphasizing scientific method and contemporary viewpoints; laboratory work and demonstrations.

102

Nature of the Physical World
W. 4 cl., 1 2-hr. lab.
Prereq.: 101.
Continuation of 101.

111

General Physics: Mechanics and Heat
Su, A, W. 4 cl., 1 2-hr. lab.
Prereq.: Eligibility for Math. 150.

112

General Physics: Electricity, Magnetism, and Light
Su, A, W. 4 cl., 1 2-hr. lab.
Prereq.: 111.

113

General Physics: Modern Physics
Su, A, W. 4 cl., 1 2-hr. lab.
Prereq.: 112.

131

Introductory Physics: Particles, Motion
A, W. 5 cl., 1 2-hr. lab.
Prereq.: 1 entrance unit of physics or chem.; prereq. or concurr. Math. 151.
Not open to students with credit for 231.
A presentation of the major concepts of physics from a contemporary point of view, for students majoring in physical sciences, mathematics, or engineering.

132

Introductory Physics: Waves, Quanta
Su, A, W. 5 cl., 1 2-hr. lab.
Prereq.: 131 and Math. 151; prereq. or concurr. Math. 152.
Not open to students with credit for 232.
Continuation of 131.
133 U 5
Introductory Physics: Particle Systems, Electrodynamics
Su, A, W, Sp. 5 cl., 1 2-hr. lab.
Prereq.: 132 and Math. 152; prereq. or concur. Math. 153, or permission of instructor.
Not open to students with credit for 233.
Continuation of 132.

194 U 1-6
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Course designed to permit groups of students the opportunity to pursue special studies not otherwise offered.

241 U 3
Physical Phenomena
A, Sp. 3 cl.
Prereq.: 133 or equiv.; Math. 153; prereq. or concur. Math. 254.
Not open to students with credit for 541.
A study of gases, liquids, and solids illustrating the connection between measurements (mechanical, macroscopic) and models (statistical, microscopic) of the properties of matter in bulk.

251 U 3
The Development of Quantum Physics
Su, A, W, Sp. 3 cl.
Prereq.: 133 or equiv.; Math. 153; prereq. or concur. Math. 254.
Not open to students with credit for 551 or 560.01.
Quantum physics, introduced through a study in historical perspective, of the crucial ideas and experiments that led to the modern conception of the atom.

435 U 3
Intermediate Geometrical Optics
W. 3 cl.
For optometry students.
Ray optics of thick lenses, mirrors, prisms, and their combination; apertures and aberrations.

436 U 3
Intermediate Physical Optics
Sp. 3 cl.
For optometry students.
Wave theory of optical phenomena; applications.

437 U 2
Geometrical Optics Laboratory
W. 1 4-hr. lab.
Prereq. or concur.: 435 or 535.
For: optometry students.
Selected experiments in geometrical optics.

438 U 2
Physical Optics Laboratory
Sp. 1 4-hr. lab.
Prereq. or concur.: 436 or 536.
For: optometry students.
Selected experiments in physical optics.

501 U G 3
Descriptive Acoustics
A. 3 cl.
Prereq.: Junior standing in music, speech communication, science education.
Not open to physics majors.
Descriptive non-mathematical treatment of acoustics with applications to music and speech including sources, propagation, reception, characteristics of sound; room acoustics; hearing; apparatus.

503 U G 5
General Meteorology
Sp. 4 cl., 1 2-hr. lab.
Prereq.: Either 111, 131, or permission of instructor.
Not open to students with credit for 120.
Study of atmospheric phenomena; individual observation and prediction of weather events.

506‡ U G 5
Basic Principles and Recent Advances in Physics
Sp.
Prereq.: Academic Year Science Institute students only.
Primarily for high school physics teachers; a unified treatment of concepts and principles of classical physics together with selected topics in contemporary physics.

507‡ U G 3
Physics Seminar for In-Service Science Teachers
A. 1 3-hr. cl.
Prereq.: 15 cr. hrs. of physics and teaching experience; permission of instructor.
A course to deepen teachers’ understanding of basic physical concepts and methods of treatment of selected problems; presentation will include lectures, discussions, demonstrations, and problem solving.

508‡ U G 3
Physics Seminar for In-Service Science Teachers
W. 1 3-hr. cl.
Prereq.: 507.
Continuation of 507.

509‡ U G 3
Physics Seminar for In-Service Science Teachers
Sp. 1 3-hr. cl.
Prereq.: 508.
Continuation of 508.

516 U G 4
Intermediate Physics Laboratory
Su, A, W, Sp. 2 3-hr. labs.
Prereq.: 113 or 133 or permission of instructor.
Not open for grad. credit to students majoring in physics.
Repeatable to a maximum of 12 cr. hrs.
Selected intermediate level experiments from basic areas of physics.
525 U G 4
Dynamical Models I
Su, A, Sp. 4 cl.
Prereq.: 133 and Math, 255 or equiv.
Not open to students with credit for 521.
Dynamical models of particle motion; behavior of linear
systems; periodic and transient phenomena in
mechanical and electrical systems; central force
problems; frames of reference.

555 U G 4
Fields and Waves I
W. 4 cl.
Prereq.: 525 or equiv. prereq. or concur. Math, 551.
Not open to students with credit for 531.
Introduction to the description of fields, gravitational
and electrostatic; dielectrics; boundary-value problems;
Green's function.

580 U G 3
Topics in Physics
Su, A, W, Sp. 3 cl.
Prereq.: 525 or permission of instructor.
Introductory treatment of phenomena and elementary
theory of contemporary areas of physics.

580.01 Introduction to Modern Physics
A, Sp.
Not open to students with credit for 251, 472, 551, or
705.

580.05 Introduction to Nuclear Physics
A, Sp.
Prereq.: 580.01 or permission of instructor.
Not open to students with credit for 571.

580.06 Introduction to Solid State Physics
Sp.
Prereq.: 580.01 or permission of instructor.
Not open to students with credit for 661.

580.111 Physics of the Upper Atmosphere
A.
Prereq: 580.01 or permission of instructor.
Not open to students with credit for 651.

580.20 Special Topics
Prereq.: 580.01 or permission of instructor.
Repeatable to a maximum of 9 cr. hrs.

593 U G 2-5
Individual Studies in Physics
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Independent reading, study, or laboratory work at an
intermediate level.

594 U G 1-6
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Intermediate level group studies on special topics.

595 U 1
Seminar
Prereq.: 131, 132, 133, and Math. 254 or equiv.
Repeatable to a maximum of 6 cr. hrs.
Discussion of special topics with student participation
in the presentation of material.

616 U G 4
Advanced Physics Laboratory
Su, A, W, Sp. 2 3-hr. labs.
Prereq.: 241, 251, 525, 555, or permission of instructor.
Repeatable to a maximum of 24 cr. hrs.
Experiments selected from all areas of physics;
independent work emphasized.

617 U G 5
Electronics for Physicists
A, W, Sp. 2 cl., 2 3-hr. labs.
Prereq.: 525.
An intensive introduction to electronic circuits, devices,
and instrumentation with emphasis on laboratory
experience.

628 U G 4
Dynamical Models II
Su, W. 4 cl.
Prereq.: 525; prereq. or concur. Math, 551.
Not open to students with credit for 621.
Continuation of 525 with development of generalized
coordinate representations and equations of motion;
systems of particles; coupled systems; wave dynamics.

627 U G 4
Dynamical Models III
Sp. 4 cl.
Prereq.: 626 and Math, 551.
Continuation of 626 with emphasis on systems of
particles; kinetic models of a gas; rigid body motion;
introduction to linear transformations.

656 U G 4
Fields and Waves II
Sp. 4 cl.
Prereq.: 555 or equiv.
Continuation of 555; magnetic fields of steady currents;
induction; Maxwell's equations; plane waves; special
relativity.

657 U G 4
Fields and Waves III
A. 4 cl.
Prereq.: 656 or equiv.
Not open to students with credit for 636.
Continuation of 656; plane waves in matter, physical
optics; coherence, interference, diffraction, and
dispersion.

693 U G 1-15
Individual Studies in Physics
Prereq.: Satisfactory advanced courses in experimental
and theoretical physics and permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
A course designed to give a properly qualified student
opportunity for independent reading, study, or
laboratory work in a specialized field of interest.
694  U G 1-6
Group Studies
Prereq.: Satisfactory advanced courses in experimental and theoretical physics and permission of instructor.
Repeatable to a maximum 15 cr. hrs.
Gives groups of students an opportunity to pursue special studies not otherwise offered.

705  U G 4
Structure of Matter I
Su, A.  4 cl.
Prereq.: 251, 626, 656, or equiv. and Math. 255 and 551, or equiv.
Not open to students with credit for 727.
Quantum phenomenology; Schrödinger formulation of quantum mechanics; applications to simple systems; one-electron atoms.

706  U G 4
Structure of Matter II
W.  4 cl.
Prereq.: 705 or equiv.
Not open to students with credit for 728.
Continuation of 705; magnetic moments and spin; identical particles; many-electron atoms; molecular structure and spectra.

707  U G 4
Structure of Matter III
Sp.  4 cl.
Prereq.: 706 or equiv.
Continuation of 706; quantum statistics; band theory of solids; interaction of radiation with matter; nuclear and elementary-particle physics.

735  U G 3
Electromagnetic Theory of Light
Sp.  3 cl.
Prereq.: Permission of instructor.
Mathematical treatment of physical optics.

743  U G 4
Thermodynamics
A.  4 cl.
Prereq.: 241 and 627 or equiv.
Modern treatment of topics in physical thermodynamics including entropy, specific heats, third law, and change of phase.

780  U G 3
Topics in Contemporary Physics
Su, A, W, Sp.  3 cl.
Prereq.: 705 or permission of instructor.
Experimental and theoretical aspects of areas of current interest in physics.

780.01  Atomic Spectra and Structure
Not open to students with credit for 751.

780.02  Elementary Particles
Sp.

780.03  Low-Temperature Physics
Not open to students with credit for 744.

780.04  Molecular Spectra and Structure
W.
Not open to students with credit for 757.

780.05  Nuclear Physics
Sp.
Not open to students with credit for 711.

780.06  Solid State
A.
Not open to students with credit for 761.

780.07  Plasma Physics
A.
Not open to students with credit for 775.

780.09  X-ray Physics
Not open to students with credit for 753.

780.20  Special Topics

795  U G 1
Special Topics Seminar
A, W.
Prereq. or concur.: 705.
Repeatable to a maximum of 3 cr. hrs.
A survey of current research problems in physics.

801  G 1
Seminar in Physics
Prereq.: Acceptable specialized courses and permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Seminars will be conducted by various members of the staff on topics of current interest in their fields of specialization; students will participate in the presentation and discussion of material.

816  G 3-6
Topics in Physics
Prereq.: 616 or equiv. and permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
Laboratory and/or theoretical work on an individual basis on topics of current interest.

821  G 4
Advanced Dynamics I
A.  4 cl.
Prereq.: 626 or permission of instructor.
Generalized coordinates, Lagrange's equations, variational principles, linear transformation theory, normal coordinates, small oscillations, Hamilton's equations, and canonical transformations.

822  G 4
Advanced Dynamics II
W.  4 cl.
Prereq.: 821.
Hamilton-Jacobi theory, tensor algebra and analysis, dynamics of classical fields, elasticity, and hydrodynamics.

827  G 5
Quantum Mechanics I
A.  5 cl.
Prereq.: 706 or permission of instructor.
Systematic treatment of wave mechanics; symmetries and conservation laws, eigenvalues and eigenfunctions of linear operators, separation of variables, soluble examples, central field problem, angular momentum.
Ensembles in classical and quantum statistical mechanics; density matrix, degenerate Fermi gas; Debye theory of specific heat; black-body radiation; Bose-Einstein condensation.

848 **G 4**
**Statistical Mechanics II**
Sp. 4 cl.
Prereq.: 847.
Cluster expansions in classical and quantum mechanical real gases; phase transitions; Boltzmann equation and H theorem; transport coefficients; fluctuations and Brownian motion; Onsager relations.

**999** **G Arr.**
**Research in Physics**
Research for thesis or dissertation purposes only.

**Physiological Chemistry**

Office: 5170 Medical Basic Science Building, 333 West 16th Avenue

Professors Cornwell (Chairman), Allen, Brierley, Devor, Frajola, Krieger, Richardson, and Wikoff (Emeritus); Associate Professors Alben, Gruener, Horrocks, Merola, Newman, Nuenke, Rieske, Sprecher, and Webb; Assistant Professors Addanki, Boggs, Eyring, Kipper, Matthews, Mayer, Mekhjian, and Och.

**311** **Physiological Chemistry**
Prereq.: Chem. 102 or 122 and enrollment or intended enrollment in a program of the School of Allied Medical Professions.
Students may not receive credit for both 311.41 and 311.02.
Human biochemistry with emphasis on metabolism and applications to clinical chemistry and human nutrition; pertinent organic chemistry will be included; laboratory to illustrate general techniques with emphasis on food composition. Devor and Staff.
311.01 Lecture and Laboratory
   A. 4 cl., 1 3-hr. lab.
   U 5

311.02 Lecture
   A. 4 cl.
   U 4

312
Physiological Chemistry
Students may not receive credit for both 312.01 and 312.02.
A continuation of 311.

312.01 Lecture and Laboratory
   W. 4 cl., 1 3-hr. lab.
   U 5
   Prereq.: 311.01.

312.02 Lecture
   W. 4 cl.
   U 4
   Prereq.: 311.01 or 311.02.

540
Physiological Chemistry
   Sp. 4 cl., 2 3-hr. conf.
   U 5
   Prereq.: Dent. 1st yr. standing, Chem. 231, and 232.
   Chemistry of the carbohydrates, lipids, and proteins; biochemistry of digestion, absorption, metabolism, and excretion. Devor and Staff.

545
Physiological Chemistry (Human Nutrition)
   A. 2 cl.
   U 4
   Prereq.: 540 and Dent. 1st yr. standing.
   The elements of human nutrition with a special emphasis on the relation of diet to dentistry. Richardson.

601† P G 8
Physiological Chemistry
   A. 150 cl. and lab. hrs.
   U 5
   Prereq.: Med. 1st yr. standing or permission of instructor.
   Chemistry of carbohydrates, lipids, and proteins; biochemistry of human digestion, nutrition, metabolism and excretion; correlations between normal human metabolism and the biochemistry and genetic control of disease processes. Cornell, Nuenke, and Staff.

602† P G 3
Physiological Chemistry
   W. 2 cl. hrs. and lab.
   U 5
   Continuation of 601; experimental studies in biochemical control mechanisms in normal and pathological states including nutritional deficiencies. Cornell, Nuenke, and Staff.

603† P 1
Physiological Chemistry
   Sp. 1 cl.
   U 5
   Prereq.: Med. 1st yr. standing and 602.
   Special reading in physiological chemistry. Nuenke and Staff.

611† U G 3
Physiological Chemistry
   A. 3 cl.
   U 5
   Prereq.: Chem. 242, 244, or 253, 254 or equiv.; open to undergraduates with permission of instructor. (Course designed primarily for grad. students in medical and biological sciences.)
   Chemistry and metabolism of carbohydrates, proteins, lipids, and nucleic acids; basic principles of enzymes, control mechanisms, digestion and absorption. Cornell, Nuenke, and Staff.

612† U G 3
Physiological Chemistry
   W. 3 cl.
   U 5
   Prereq.: 611.
   Continuation of 611. Cornell, Nuenke, and Staff.

613 U G 3
Physiological Chemistry Laboratory
   W. 1 cl., 2 3-hr. lab.
   U 5
   Prereq.: One qtr. of general biochem. or physiol. chem.
   Laboratory experiments illustrating principles of biochemistry, selected for individual students according to needs and field of interest; accompanying class time emphasizes problem solving. Rieske and Staff. Fee.

636 U G 3
Quantitative Problems in Biochemistry
   Sp. 3 cl.
   U 5
   Prereq.: Elementary physical chemistry and biocemistry, or permission of instructor.
   Application of elementary physical chemical concepts to the quantitative and analysis of biochemical data.

701 P 6
A Biochemical Approach to the Study of Disease
   1 month, offered Jan. and May.
   U 6
   Prereq.: Permission of instructor.
   Subcellular organization, model systems in disease, injury and inflammation, toxic agents, deficiency states, genes, enzymes and disease, biochemical changes in growth.

705 U G 5
General Biological Chemistry
   A. 3 cl.
   U 5
   Prereq.: Chem. 242, 244 or 253, 254 or equiv.; physical chem. background of kinetics and thermodynamics, or permission of instructor.
   Not open to students with credit for Biochem. 611 or 705.
   (Cross-listed in Biochemistry and Molecular Biology as Biochem. 705).
   An intensive treatment of modern biochemistry; protein structure, enzyme catalyzed reactions, chemistry and metabolism of carbohydrates. Cornell, Serf, and Interdepartmental Staff.

707 U G 5
General Biological Chemistry
   W. 3 cl.
   U 5
   Prereq.: 705 or Biochem. 705.
   Not open to students with credit for Biochem. 707.
   (Cross-listed in Biochemistry and Molecular Biology as Biochem. 707).
   An intensive treatment of modern biochemistry; energy utilization and electron transport, photosynthesis, membranes and lipid metabolism. Cornell, Serf, and Interdepartmental Staff.
General Biological Chemistry
Sp. 3 cl.
Prereq.: 707 or Biochem. 707.
Not open to students with credit for Biochem. 709.
(Cross-listed in Biochemistry and Molecular Biology as Biochem. 709.)
An intensive treatment of modern biochemistry; intermediary metabolism of amino acids, proteins, and nucleic acids. Cornell, Seriff, and Interdepartmental Staff.

Individual Studies in Physiological Chemistry
3 or 4 months; offered all months.
Prereq.: 602, 612 or equiv. and permission of instructor.
Repeatable to a maximum of 15 cr. hrs. for grad credit; must repeat to 18 or 24 cr. hrs. for professional credit.
Qualified students may avail themselves of the facilities of the department for conducting a minor investigation under the direction of a senior staff member.

Physical Biochemistry of Proteins
A. 3 cl.
Prereq.: 709 or equiv., or permission of instructor.
Protein structure (primary, secondary, tertiary, and quaternary) in the crystal state and in solution and their relationship to function.

Bioenergetics
W. 3 cl.
Prereq.: 709 or equiv., or permission of instructor.
Flow of energy in biological systems, photosynthesis, oxidative phosphorylation, methods of studying mitochondria, chloroplasts, and other organelles.

Metabolic Control Mechanisms
A. 3 cl.
Prereq.: 709 or equiv., or permission of instructor.
Biochemistry of nucleic acids and the genetic code; protein biosynthesis and its control; control of enzymatic reactions and metabolic pathways. Alben, Bierley, Rieske, and Staff.

Enzymology
A. 3 cl.
Prereq.: 709 or equiv., or permission of instructor.
Selected topics in structure/function relationships, mechanisms of catalysis, kinetics, and metabolic inter-relations of enzyme systems.

Neurochemistry
W. 3 cl.
Prereq.: 709 or equiv., or permission of instructor.
Biochemistry and metabolism of the nervous system with discussion of synaptic transmission, memory theories, genetic defects, and associated diseases.

Membranes and Membrane Models
Sp. 3 cl.
Prereq.: 709 or equiv., or permission of instructor.
Discussion of the composition, biosynthesis, structure, function, and turnover of membranes, emphasizing the role which lipids play in maintaining membrane function.

Physical Methods in Biochemistry
W. 2 cl., 1 3-hr. lab.
Prereq.: 821, physical chemistry, or permission of instructor.
A practical and theoretical introduction to the use of the analytical ultracentrifuge, NMR, electrophoresis, spectroscopy, chromatography and radioisotopes. Alben and Rieske. Fee.

Biochemical Preparations and Techniques
A. 9 hrs. conf. and lab.
Prereq.: 821; prereq. or concur. 822.
Advanced course in biological preparations and laboratory techniques; isolation of carbohydrates, lipids, proteins, enzymes, and hormones. Fee.

Seminar
A. W, Sp. 1 cl.
Prereq. or concur.: 601, 611, or equiv.
Repeatable to a maximum of 9 cr. hrs.
Required of all grad. students majoring in physiological chem. Cornell and Staff.

Seminar in Physiological Chemistry
Repeatable to a maximum of 8 cr. hrs.
Topic to be announced.

Interdepartmental Seminar in Nutrition and Food Technology
Sp.
(See Interdepartmental Seminars, University Academic Policies and Course Offerings catalog.)

Research in Physiological Chemistry
Research for thesis or dissertation purposes only.
Physiological Optics

Office: 111 Optometry Building, 338 West 10th Avenue

Professors Hedberg (Chairman), Blackwell, Fry, and Hill; Associate Professors Bailey, J. King, Hoke, and Smith; Assistant Professors Carifa, Fugate, Haines (Emeritus), Ingling, V. King, Reese (Emeritus), and Zimmer; Instructors Augburger, T. Daniel, Jones, Lowther, Polasky, Reardon, Schoessler, and Unicke.

511 U P G 5
Introduction to Physiological Optics I
Sp. 4 cr., 1 2-hr. lab.
Not for grad. credit to students majoring in Physiol. Opt.
The eye as an optical instrument; the refracting mechanism; the mechanism of accommodation and pupillary contraction; blur of the retinal image; stray light in the eye.

512 U P G 5
Introduction to Physiological Optics II
A. 4 cr., 1 2-hr. lab.
Prereq.: 511.
Not for grad. credit to students majoring in physiol. opt.
The motility of the eye; the structure and innervation of the extraocular muscles; the center of rotation; and analysis and description of eye movements.

520 U P G 4
Measurement and Specification of Visual Stimuli
A. 3 cr., 1 2-hr. lab.
Prereq.: Optom. 2nd yr. standing and 511.
Not for grad. credit to students majoring in physiol. opt.
Light sources; diffusely transmitting and reflecting surfaces and scattering of light by a medium; principles of photometry and colorimetry as applied to visual stimuli.

531 U P G 5
Basic Human Anatomy
A. 3 cr., 2 2-hr. lab.
Prereq.: Optom. 1st yr. standing or major in physiol. opt.
Basic human developmental, neural, and gross anatomy, using models and films, supplemented with animal demonstrations.

535 U P G 5
Microscopic Anatomy
W. 3 cr., 2 2-hr. lab.
Prereq.: Optom. 1st yr. standing or major in physiol. opt.
Microscopic anatomy of cells and tissues, and special histology of the organ systems.

608 U P G 5
Anatomy of the Eye
Sp. 3 cr., 2 2-hr. lab.
Prereq.: 1st yr. Optom. or Zool. 530 and permission of instructor.
Human gross anatomy of the head and neck with special emphasis on the eye and orbit; histology and embryology of the eye and associated structures.

613 U P G 5
Intermediate Physiological Optics I
W. 4 cr., 1 2-hr. lab.
Prereq.: 512.
Monocular sensory mechanisms of vision; analysis and specification of visual stimuli; photoreception and retinocortical transmission; adaptation of photoreceptors; flicker; brightness discrimination; and color vision.

614 U P G 3
Intermediate Physiological Optics II
W. 3 cr.
Prereq.: 512.
Circulation and metabolism of the eye; intra-ocular pressure; lacrimal system; movements and functions of the eyelids.

693 U P G 1-15
Individual Studies in Physiological Optics
Prereq.: Permission of dept. chairman.
Repeatable to a maximum of 15 cr. hrs.
A properly qualified student may perform a minor investigation or add to his knowledge and technique.

715 U P G 5
Intermediate Physiological Optics III
Sp. 4 cr., 1 2-hr. lab.
Prereq.: Optom. 2nd yr. standing and 613.
Projection of visual impressions; the heteropter, retinal correspondence; binocular integration of hue and brilliancy.

716 U P G 5
Intermediate Physiological Optics IV
W. 3 cr., 1 2-hr. lab.
Prereq.: 715.
Visual perception of color, illumination figure-ground relations, size, shape, direction, distance, motion, time, and complex patterns.

730 U P G 5
Principles of Lighting
W. 4 cr., 1 2-hr. lab.
Prereq.: 716.
The effect of the distribution of light in a given environment upon efficiency, comfort, and safety; selection and arrangement of sources and light control.

731 U P G 5
Vision in Industry
Sp. 5 cr.
Prereq.: 730.
Visual testing in industry; relation of vision to performance of task; visual requirements for licenses; eye hazards and protection; compensation for loss of vision.

732 U P G 5
Vision in Schools
A. 3 cr., 6 hr. lab.
Prereq.: 730.
Visual survey methods; the prevalence of visual anomalies and eye diseases in children; basic visual skills required in school and methods for their improvement.
795  U P G 1-5
Seminar
Prereq.: Permission of instructor.
Repeatable for a maximum of 30 cr. hrs.
A series of seminars dealing with new developments in the various phases of physiological optics.

801  G 5
Advanced Physiological Optics I
A. 3 cl., 2 2-hr. lab.
Prereq.: 716.
The ocular image-forming mechanism; accommodation and pupil contraction; aberrations, stray light, entopic phenomena; shape, size, distortion; retinal illuminance and blur.

802  G 5
Advanced Physiological Optics II
W. 3 cl., 2 2-hr. lab.
Prereq.: 801.
Fixation disparity; photochemistry and electrophysiology of photoreceptors; luminosity; color-mixture; retinal-cortical transmission; simultaneous contrast; visibility; adaptation; after images.

803  G 5
Advanced Physiological Optics III
Sp. 3 cl., 2 2-hr. lab.
Prereq.: 802.
Binocular integration of hue and brilliance, fusional movements, fixation, retinal correspondence, visual perception of figure-ground relations, light, color, illumination, size, shape, direction, distance, and motion.

810  G 5
Image Evaluation
A. 5 cl.
Prereq.: 613, Physics 415, and 436.
An analysis of the causes of image impairment in the human eye and other optical systems; objective methods of assessing aberrations and blur; methods of image enhancement.

811  G 5
Mechanisms Subserving Color Vision
W. 5 cl.
Prereq.: 613.
Theoretical basis for chromatic adaptation, chromatic contrast and induction, color blindness, and other color phenomena; theory of the laws of color mixture.

812  G 5
Advanced Neurophysiology of the Visual System
A. 4 cl., 1 2-hr. lab.
Prereq.: 613, 614, 715, and 716.
The coding and transmission of visual information in the direct and accessory pathways of vertebrates and invertebrates.

813  G 5
Advanced Physiology of the Eye
A. 4 cl., 1 2-hr. lab.
Prereq.: 613 and 614.
Recent developments in the respiration, metabolism, and mechanics of ocular tissues, and the aqueous dynamics of the eye.

815  G 5
Binocular Vision and Perception
W. 3 cl., 1 2-hr. lab.
Prereq.: 803.
Visual perception: direction, space, motion; perceptual adaptation; binocular vision and fusion.

820  G 5
Specification of Visual Stimuli
Su. 3 cl., 4 hr. lab.
Prereq.: 801 or permission of instructor.
Study of visual stimuli and apparatus to control parameters such as intensity, spectral composition, retinal location, and pupil size and location; calibration and practical application.

999  G Arr.
Research in Physiological Optics
Research for thesis or dissertation purposes only.

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Phyiology
Office: 4196 Medical Basic Science Building, 333 West 10th Avenue
Professors Little (Chairman), Angerer, Bozler (Emeritus), Brownell, Grubbs, Hiatt, LeBrie, Lessler, Myers, Pieper, Smith, and Weiss; Associate Professors Berman, Gossie, Hanson, Kunz, Lippert, Lipsky, Nishikawa, and Stow; Assistant Professors Allison, Billings, Delahayes, Hendrich, Mathews, Michal, Nicoll, Noves, Paul, and Sparkman; Instructors Blair, Holt, and Yape.

For related courses see Biology.

311  U 5
Principles of Human Physiology I
A, W. 4 cl., 1 2-hr. lab.
Prereq.: 2 qtr. Chem., Anat. 200 or equiv.; or permission of instructor.
Open only to students in College of Medicine or College of Pharmacy.
Credit not given for 311 without 312.
First of a two-quarter sequence covering the following areas of physiology: neuromuscular, heart and circulation, endocrine, brain and special senses, body fluids and kidney, respiration, digestion, temperature control, and metabolism.

312  U 5
Principles of Human Physiology II
Sp, W. 4 cl., 1 2-hr. lab.
Prereq.: 311.
Continuation of 311.
600 U G 4
Human Physiology for Bio-Medical Engineers
A. 4 cl.
Prereq.: Grad standing in Bio-Medical Engineering;
Open to selected 4th yr. Engr. students by permission of instructor.
An introduction to the function of the major human organs systems and the medical aspects of engineering problems for bio-medical engineers.

601 U P G 5
Advanced Mammalian Physiology I
A. 4 cl., 1 lab.
Prereq.: Inorganic and organic chem., Physics 111, 112, 113 or equiv., and 1 yr. biological sciences, and permission of instructor for undergraduates.
Credit for 601 not given without 602; not for grad. credit to students majoring in physiol., not open to students with credit for 516 or 517.
First of a two-quarter sequence presenting the following areas of physiology: neuromuscular, heart and circulation, endocrine, brain and special senses, body fluids and kidney, respiration, digestion, temperature control, and metabolism.

602 U P G 5
Advanced Mammalian Physiology II
W. 4 cl., 1 lab.
Prereq.: 601.
Not for grad. credit to students majoring in physiol.; not open to students with credit for 517.
Continuation of 601.

604 P G 6
Advanced Physiology
A. 5 cl., 1 3-hr. lab.
Prereq.: Dent. 2nd yr. standing.
The cardiovascular system including blood, neuromuscular system, body fluids, and excretion.

605 P G 6
Advanced Physiology
W. 5 cl., 1 lab.
Prereq.: Dent. 2nd yr. standing and 604 or equiv.
The central nervous system and special senses, respiration, digestion, metabolism, the endocrines, and reproduction; continuation of 604.

723 P G 5
Cellular and Comparative Physiology
A. 4 cl., 1 lab.
Prereq.: 1 yr. each of biol., physics, and organic chem., and permission of instructor.
Not open to students with credit for 623 or 823.
Interaction between cells and their environment at the microscopic, submicroscopic, and molecular levels; regulation and control of protoplasmic functions. Lessier.

728 P G 4
Advanced Cellular and General Physiology
Sp. 4 cl. Arr.
Prereq.: Biol. 101 or equiv., Physics 112 or equiv., 2 qtrs. Chem. 232 or equiv., Chem. 531 or equiv., permission of instructor.
Not open to students with credit for 628 or 828.
Current concepts of ultrastructures and their function in various protoplasmic systems: membrane phenomena; excitatory process; energy utilization in various kinds of cells. Angerer.

729 P G 2
Advanced Cellular and General Physiology Laboratory
Sp. 2-3 hr. lab. ARR.
Prereq. or concurs.: 728.
Not open to students with credit for 628 or 828.
Techniques for the study and measurements of phenomena of cellular and general physiological interest and the application of physical and chemical principles to their interpretation. Angerer.

730 P G 5
Endocrinology
Sp. 4 cl., 1 lab.
Prereq.: 311 and 312, organic chem. and permission of instructor.
Not open to students with credit for 630 and 830.
A study of functions of the thyroid, parathyroid, pituitary, adrenal, pancreas, gonads, and other organs with possible endocrine functions. Brownell, Nishikawa, and Staff.

746* P G 5
Radiation Biophysics
A. 5 cl.
Prereq.: 1 yr. each of college biol., math., physics, and physiol. and Physiol. Chem. 601, 602 or 611, 612 or equiv., and permission of instructor.
Not open to students with credit for 646 or 846.
Stable and radioactive isotopes; biological effects of ionizing radiation. Myers.

748 U P G 4
Physical Instrumentation for Biologists
A. 1 cl., 2 3-hr. lab.
Prereq.: 1 yr. college biology and physics or permission of instructor.
Not open to students with credit for 846.
Basic concepts in semiconductor electronics; representative small signal, digital, and integrated circuits, input and output transducers, recording, storage and elementary information processing techniques are studied in the laboratory; emphasis is on representative examples rather than on a comprehensive survey of instruments. Stow.

793 U P G 2-18
Individual Studies in Physiology
Prereq.: Permission of instructor.
Reading, conferences, laboratory work by individual arrangement with qualified students who desire more intensive and specialized study than is available in other courses.

801 G 2
Topics in Physiological Research
A. 2 cl.
Prereq.: Grad 1st yr. standing in physiol. or permission of instructor.
Formal lectures and demonstrations from the graduate faculty of Physiologoy describing their areas of research interest, explaining the relationship of these areas to the subject matter of physiology and pointing out their pertinence to current frontiers in physiol.
835  G 5
Advanced Physiology of Organ Systems I
A. 4 cl., 1 lab.
Prereq.: Inorganic and organic chem., Physics 111, 112, 113 or equiv., 3 yr. of biological sciences, or permission of dept. chairman.
Not open to students with credit for 601-602, or 825-826.
First of a three-quarter sequence presenting an intensive treatment of mammalian organ systems; the cell, the membrane, neuromuscular system, central nervous system, and sense organs.

836  G 5
Advanced Physiology of Organ Systems II
W. 4 cl., 1 lab.
Prereq.: 835.
Not open to students with credit for 601-602, or 825-826.
Continuation of 835: blood, cardiovascular system, fluid compartments, kidney, and temperature regulation.

837  G 5
Advanced Physiology of Organ Systems III
Sp. 4 cl., 1 lab.
Prereq.: 836.
Not open to students with credit for 601-602, or 825-826.
Continuation of 836: respiration, acid-base balance, digestion, metabolism, endocrines, and reproduction.

840  G 3
Environmental Physiology I
A. 3 cl.
Prereq.: M.D. degree or grad. standing and 501 and 602 or equiv., and permission of instructor.
Physiology of the gaseous environment. Billings and Hiatt.

841  G 3
Environmental Physiology II
W. 3 cl.
Prereq.: M.D. degree or grad. standing and 601 and 602 or equiv., and permission of instructor.
Physiology of the electromagnetic environment. Billings and Hiatt.

842  G 3
Environmental Physiology III
Sp. 3 cl.
Prereq.: M.D. degree or grad. standing and 601 and 602 or equiv., and permission of instructor.
Physiology of the kinetic environment. Billings and Hiatt.

850  G 2
Seminar in Physiology
Repeatable.

911  G 3 or 5
Advanced Studies in Physiology
Prereq.: 602 or equiv., 826 or equiv., and 837 or equiv.
Quarter schedule of topics to be announced.
911.01 Physiology of Nerve and Muscle
DeLanayes.
911.02 Neurophysiology of Spinal Reflexes
Grosse.
911.03 Hemodynamics
Pieper.
911.04 Cardiac Dynamics
Little.
911.05 Peripheral Circulation
Paul.
911.06 Temperature Regulation
Hiatt.
911.07 Blood and Erythropoiesis
Lessler.
911.08 Comparative—Avian
Weiss.
911.09 Renal Physiology
LeBrie.
911.10 Respiration Mechanics and Gas Exchange
Lipsky.
911.11 Physiological Responses to Altered Blood Gas Concentrations
Smith.
911.12 The Adrenal Hormones
Brownell.
911.13 Endocrine Control of Metabolism
Nishikawara
911.14 Physiology of Reproduction
Hendrich.
911.15 Gastrointestinal Physiology
Hanson.
911.16 Biological Control Systems
Kunz.
911.17 Advanced Instrumentation
Stow.
911.18 Sensory Electrophysiology
Lipsky.
911.19 Limbic Systems Functioning
Michal.
911.20 General Physiology of Proteplasm
Angerer.
911.21 Thyroid Physiology
Hendrich.

999  G Arr.
Research in Physiology
Research for thesis or dissertation purposes only.
Plant Pathology

Office: 210 Botany and Zoology Building, 1735 Neil Avenue

Professors Deep (Chairman), Allison, Ellett, Janson, Leben, Partyka, Schmitthenner, Williams (Associate Chairman, Wooster), and Wilson; Associate Professors Bradfute, Garraway, Gordon, Herr, Holink, Porter, and Troxel; Assistant Professors Farley, Gingerley, Jones, Larsen, Louie, Miller, Muse, Powell, Riedel, and Weidensaul.

GENERAL PREREQUISITES FOR COURSES NUMBERED 300 AND 400

Unless otherwise indicated, the prerequisites for 300 and 400-level courses of 90 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.; or specified course(s) numbered 100-399.

401 U 5
General Plant Pathology
A. Sp. 3 cl., 2 2-hr. lab.
Prereq.: Bot. 102.
Not open to students with credit for 470.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600

Unless otherwise indicated, the prerequisites for 600-level courses are 15 cr. hrs. in the same discipline numbered 300 or higher, or 10 cr. hrs. in courses numbered 300 or higher, in the same discipline, plus 10 cr. hrs. in courses numbered 300 or higher in specified allied disciplines.

610 U G 3
Diseases of Ornamentals
W. 1 1-hr. cl., 2 2-hr. lab.
Prereq.: 401.
Not open to students with credit for 471.
A detailed study of important diseases of floral and woody ornamental plants; their cause, distribution, severity, importance, and specific control measure. Ellett.

615 U G 3
Economic Plant Pathology
A. 1 cl., 2 2-hr. lab.
Prereq.: 401 or equiv.
Not open to students with credit for 671, 672, or 675.
Principles of plant pathoogy relating to diseases of field, fruit, and vegetable crops; laboratory work with diseases of crops of interest to the student. Allison.

685 U G 2
Field Plant Pathology
Su. 1 4-hr. cl. arr.
Prereq.: 401 or 615, and permission of instructor.
Study of plant diseases in the field with emphasis on diagnosis and epidemiology; supplementary laboratory work. Ellett. Fee.

683 U G 1-5
Individual Studies
H683 (Honors) may be available to students enrolled in a college Honors Program or eligible for enrollment.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Problems may be selected in the various areas of plant pathology.

694 U G 2, 3, or 5
Group Studies
Prereq.: Senior or grad. standing.
Repeatable to a maximum of 10 cr. hrs.
Special group studies of a selected area in plant pathology not provided in other courses.

GENERAL PREREQUISITES FOR COURSES NUMBERED 800 AND 900

Unless otherwise indicated, the prerequisites for 800 and 900-level courses are 30 cr. hrs. in courses in the same discipline, or 20 cr. hrs. in the same discipline, plus 25 cr. hrs. in specified allied disciplines.

821 G 3
Principles: Bacterial, Fungal, and Nematode Diseases
A. 3 cl.
Prereq.: 401 or 615, Bot. 660, and Microbiol. 507.
Principles of plant pathology based on an understanding of pathogen structure, growth, and reproduction. Ellett.

822 G 3
Principles: Epidemiology and Control
W. 3 cl.
Prereq.: 401 or 615, Bot. 660, and Microbiol. 607.
Influence of environment on plant disease; principles of plant disease control. Larsen.

823 G 5
Principles: Virology, Physiology of Parasitism
Sp. 3 cl., 2 2-hr. lab.
Prereq.: 401 or 615, Bot. 631, and 10 cr. hrs. organic chem. or biochem.
Principles of plant virology; physiological interactions between the host plant and pathogen. Garraway.

828 G 2
Philosophy of Plant Pathology
W. 2 2-hr. cl.
Prereq.: 821, 822, and 823.
Not open to students with credit for 871.
Philosophy and principles which underlie the study of plant disease with reference to the basic factors governing initiation and development of disease and host-parasite relationships. Allison.

830 G 5
Physiology of Parasitism
W. 3 cl., 2 2-hr. lab.
Prereq.: 823, Bot. 634, and Biochem. 511 and 521.
Analysis of physiological and biochemical processes associated with penetration, development of host-parasite relations, and disease development; molecular basis for disease resistance. Garraway.
Bacterial Plant Pathogens
Sp. 2 cl., 1 2-hr. lab.
Prereq.: 401, microbiol. 607, and 25 additional cr. hrs.
biological sciences.
Not open to students with credit for 872.
Representative types of bacterial plant diseases and
factors affecting their control, severity, distribution,
and economic importance; methods used in studying
plant pathogenic bacteria. Larsen.

Plant Virology
Sp. 2 cl., 1 2-hr. lab.
Prereq.: 821 and 822.
Not open to students with credit for 873.
Biology and chemistry of plant viruses; epidemiology
and host-virus-vector interactions; methods used in
studying plant viruses. Troxel and Gordon.

Plant Nematology
A. 2 cl., 2 2-hr. lab., several field trips.
Prereq.: 821 and 822.
Not open to students with credit for 874.
Bionomics and taxonomy of nematodes which cause
plant diseases; host-parasite interactions; methods
used in studying plant parasitic nematodes. Riedel.

Physiology of Fungi
(See Botany 861.)
(Offered in cooperation with the Department of Botany)

Seminar
Prereq.: Permission of instructor.
Repeatable.

Research
Research for thesis or dissertation purposes only.

Polish

Office: 204 Dieter Cunz Hall of Languages, 1941 Millikin Road
Associate Professor Krzyzanowski; Instructor Mikulski.

Polish
A. 3 cl., 2 hr. arr.
Prereq.: Russ. 103, or 112, or permission of instructor.

Polish
W. 3 cl., 2 hr. arr.
Prereq.: 601.
Contemporary Polish Literature

Sp. 3 cl.
Prereq.: 605 or permission of instructor.
Analysis of the works of contemporary Polish writers and critical works of Polish literature.

821*  G 5
The Structure of Polish
Sp. 3 cl.
Prereq.: 605 or permission of instructor.
Analysis of the phonological and morphological systems of contemporary standard Polish.

830*  G 5
Mickiewicz and Romanticism
A. 3 cl.
Prereq.: 606 and 621, or permission of instructor.
Analysis of the major works of Polish Romantic poetry and drama; emphasis on Mickiewicz's poems, dramas, and criticism.

831*  G 5
The Age of Realism
W. 3 cl.
Prereq.: 606 and 621, or permission of instructor.
Study of the second half of the 19th century, emphasis on Sienkiewicz and Prut's intellectual and literary development.

832*  G 5
Twentieth Century Polish Writers to 1939
Sp. 3 cl.
Prereq.: 606 and 621, or permission of instructor.
Study of poetry, drama, and from the Neo-Romantic period to World War II; emphasis on Zeromski, Remont, and Wyspianski.

850†*  G 5
Seminar in Polish Literature to 1820
W. 2 cl.
Prereq.: 722 or permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

851‡*  G 5
Seminar in Polish Literature 1820-1860
A. 2 cl.
Prereq.: 722 or permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

852‡  G 5
Seminar in Polish Literature after 1860
W. 2 cl.
Prereq.: 722 or permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

993  G 2-10
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 40 cr. hrs. in any combination of decimal subdivisions.

993.01 Literature to 1820
993.02 Literature 1820-1860

Political Science

Office: 223 Derby Hall, 154 North Oval Drive

Professors Ripley (Chairman), Alger, Burgess, Carroll, Herson, Kessel, Nemzer, Rosanau, Sani, and Snyder; Associate Professors Champlin, Claussen, Hermann, Hofstetter, Liddle, Phillips, Richardson, and Stewart; Associate Professors Asher, Bedeski, Hart, Kweder, McCoy, Meckstroth, Miller, Nelson, Van Horne, and Van Meter; Adjunct Assistant Professors Andrews and Quiigley; Instructors Ban, Harrison, Kanter, Thorson, and Waldman; Lecturer Adams.

165  U 5
Fundamentals of Government
Su, A, W, Sp.  5 cl.
H165 (honors) may be available to students enrolled in a College Honors Program or by permission of dept.
Not open to students with credit for 201, 202, 203, or 265.
A study of political ideas, institutions, processes, and problems, presenting comparatively the leading types of government in the modern world.

201  U 5
The Individual in Politics
A, W, Sp.  5 cl.
Focus on concepts, such as role, attitude, and communication, used for analysis of politics at the individual or group level.

202  U 5
Political Behavior of Collectivities
A, W, Sp.  5 cl.
Focus on concepts, such as system, process, structure, and social accounting, used for the analysis of more complex entities such as a national or international system.

203  U 5
Political Analysis
A, W, Sp.  5 cl.
Introduction to problems of construction and analysis of empirical and ethical theories of politics.
300  U 5  
The American System of Government
Su, A, W, Sp.  5 cl.
Prereq.: 1 course in pol. sc.
Not open to students with credit for 100 or 200.
An intermediate study of American national government, primarily for prospective majors in the social sciences, and for pre-law students.

325  U 5  
Introduction to Comparative Politics
A, W, Sp.  5 cl.
An introduction to basic theories, approaches, and methods of analysis in comparative politics; substantive discussion of selected topics.

345  U 5  
Introduction to International Systems
Su, A, W, Sp.  5 cl.
Not open to students with credit for 545.
Political relations among states; methods and goals of diplomacy; current problems in major areas of tension; tendencies toward administrative, judicial, and legislative world organization.

365  U 5  
Introduction to Political Theory
Su.  5 cl.
Not open to students with credit for 565.
An inquiry into the major problems of political philosophy; the legitimacy of governments, forms and institutions, stability and change, freedom and control of power.

501  U G 5  
Presidential Leadership and the Presidency
Su.  5 cl.
Not open to students with credit for 601.
The roles of the president; the policies of leadership; the presidency as an institution.

504  U 5  
Black Politics
A, W, Sp.  5 cl.
Not open to students with credit for 208 or Black Studies 504.
(Cross-listed in the Black Studies Division.)
Economic, political, and social constraints on the development of black political power; the efforts made by black people in recent times to organize for effective political action.

505  U G 5  
American Municipal Government
A, W, Sp.  5 cl.
A study of municipalities in United States; their social significance, governmental structure; and experience with government by council, mayor, commission, and manager.

506  U G 3  
Government of Ohio
Sp.  3 cl.
Constitution, structure, and functions; the electoral system; finances and personnel; judiciary and law enforcement; organization and conduct of administrative programs; state relations with local governments.

541  U G 5  
Government and Politics of the New States
W.  5 cl.
A general introduction to the theoretical and substantive literature dealing with the historical development and contemporary characteristics of the new states of Asia and Africa.

560  U G 5  
Regional Patterns in International Politics
A.  5 cl.
Repeatable to a maximum of 15 cr. hrs.
Examination of ideological, institutional, and foreign political patterns in particularized regions, such as Sub-Sahara Africa, Arab Middle East, Southeast Asia.

562  U G 5  
Regional Patterns in International Politics: Latin America
Sp.  5 cl.
Basic power concepts, political institutions, and international relations of Latin America.

571  U G 5  
Democracy and Dictatorship
A.  5 cl.
A critical analysis of contemporary theories of democracy, and of the communist and fascist forms of dictatorship.

572  U G 5  
Political Theory and Political Science
Sp.  5 cl.
An examination of theoretical problems encountered in empirical political science in light of the skills and concerns of traditional political theory.

573  U G 3  
American Political Ideas
W.  3 cl.
An analysis of American ideas on law and government, authority and liberty, oligarchy and democracy, from the Puritans to the present day.

578  U G 5  
Political Decision Making
A.  3 cl., 1 lab.
Not open to students with credit for 378.
An introduction to decision-making and policy-making analysis, with emphasis on situational, individual, and organizational factors that explain decision and policy outcomes.

585  U 5  
Techniques of Political Analysis
Sp.  5 cl.
Introduction to research design, nature of data, its generation and machine analysis, variable analysis, and simple interrelational analysis, applied and developed within political science.

593  U G 1-15  
Individual Studies in Political Science
A.
Prereq.: Permission of instructor.
Students will devote their time to special projects including papers, exams, and practical political experience.
Contemporary Political Problems
A, W, Sp.  5 cl.
Repeatable to a maximum of 10 cr. hrs.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600 AND 700
Unless otherwise indicated the prerequisites for 600 and 700-level courses are two courses in political science, or a declared major in another social science, or the consent of the instructor, or the history and social science requirements of the B.A. curriculum.

American State Government and Politics
A, W, Sp.  5 cl.
Not open to students with credit for 205.
A comparative study of the American states as political systems within the American nation with attention to elections, political parties, interest groups, governmental institutions, policies, and programs.

Ethnic Politics in the American Cities
W.  5 cl.
Group conflict along ethnic lines in major American cities: factors contributing to group cohesion in politics; strategies and resources for exercising power through collective political action.

Principles of Public Administration I
Sp.  5 cl.
Basic problems of public administration: ends and means; the formulation of policy; organization and management; working methods of control; coordination and responsibility.

Principles of Public Administration II
W.  4 cl., 1 lab.
Prereq.: 3 courses in Pol. Sc.
An examination of the principles of public administration as applied to the rendering of services to the public by national, state, and local government.

Urban Politics
Sp.  5 cl.
The study of political problems facing the cities: including community power, poverty, welfare, urban renewal, urban education, law enforcement, and violence.

Administration of Justice
W.  5 cl.
A study of the nature, purposes, and limitations of law as administered through courts; the development, organization, and procedure of our judicial system; recent trends in legal thinking.

American Constitutional Law
A, W, Sp.  5 cl.
A study of leading constitutional principles in the United States as interpreted by the courts.

The National Government and the National Economy
Sp.  5 cl.
Not open to students with credit for 520.
A study of the interaction of economic and political powers illustrated in major contemporary issues of national affairs.

British Government and Politics
W.  5 cl.
An analysis of the nature of politics and the conduct of government in contemporary Britain, including the making of foreign policy.

Government of Western Europe
Su.  5 cl.
An examination of the political institutions and processes of France, West Germany, and the European integration movement.

The Soviet Union
W, Sp.  5 cl.
A general study of the Soviet Union; governmental and party institutions; ideology and methods; problems of communist dictatorship.

Survey of the Social Sciences in the USSR
W.  3 cl.
Prereq.: 4th yr. standing or grad. standing or enrollment in Certificate Program for Translators.
An introduction to bibliography and methodology of the social sciences in the USSR.

Government and Politics of Japan
W.  5 cl.
The government and politics of Japan, with special emphasis being given to the impact of cultural and social patterns on the processes of government with imported political institutions.

Southeast Asia
A.  5 cl.
Governments and politics of the Philippines, Indonesia, Indo-China, Malaya, Thailand, and Burma; contemporary problems of this region in relation to world politics.

The Government and Politics of China
A.  5 cl.
Prereq.: 222 or 525 recommended.
A study of the contemporary political process of Communist China; considerable time will be spent on an analysis of recent political change in China and the process of revolution.

Latin American Government and Politics
A.  5 cl.
Not open to students with credit for 540.
A study of political processes, institutions, and groups in Latin America, with emphasis on constitutional, geographical, social, and economic environment in which they operate.

650 U G 5
International Law
Sp. 5 cl.
A study of the principles of international law.

651 U G 5
International Organization and Administration
W. 5 cl.
An examination of the current system of international organization and its administrative aspects, with emphasis on the operations of the United Nations agencies.

655 U G 5
Soviet Foreign Policy
A. 5 cl.
Basic concepts about, and choices in, Soviet foreign policy; development and present patterns of Soviet relations with key nations; major problems in future relationships.

656 U G 5
The United States in World Affairs
A. Sp. 5 cl.
Domestic factors and agencies influencing American foreign policy; basic patterns of recent American relations, especially with the Soviet bloc, Western Europe, and the Middle East.

658 U G 5
International Relations of the Far East
Sp. 5 cl.
The Far East in contemporary world politics; factors underlying the foreign policies of the nations concerned with this region.

668 U G 5
Introduction to Jurisprudence
Sp. 5 cl.
A study of the concepts which legal systems develop and of the interests which law protects; ideas of various schools of juristic thought examined.

670 U G 5
History of Political Theory I:
The Socratic Method
A. 5 cl.
The Socratic revolution in western political philosophy. Its consequences for human thought about man, the state, law, justice, property, power, happiness.

671 U G 5
History of Political Theory II:
From Machiavelli to Hegel
W. 5 cl.
A study of representative works by major modern thinkers—including Hobbes, Montesquieu, Rousseau, Kant and Hegel—seen in historical context.

672 U G 5
History of Political Theory III:
Contemporary Political Thought
Sp. 5 cl.
An examination of the more important contemporary ideas on the nature of the state; anarchism, syndicalism, communism, fascism, socialism, and democracy.

675 U G 5
American Political Parties and Pressure Groups
A, Sp. 5 cl.
Not open to students with credit for 575.
The organization, programs, and campaign methods of political parties and pressure groups; methods of nomination, suffrage, qualifications, campaign finance, and the conduct of elections.

676 U G 5
Public Opinion and Political Behavior:
Psychological Foundations
A. Sp. 5 cl.
The formation, organization, and effects of public opinion and propaganda in the modern state; emphasis on the role of groups in political behavior.

677 U G 5
Legislation
Sp. 5 cl.
The processes of law-making in the United States, constitutions, statutes, executive ordinances, popular law-making, legislative drafting.

678 U G 5
Public Opinion and Political Behavior:
Sociological Foundations
W. 5 cl.
Prereq.: 676.
Influences of political culture, social class, primary and secondary groups, the media, minority status, and social change on public opinion are covered.

685 U G 5
Introduction to Quantitative Methods I
A. 5 cl.
An analysis of statistical applications in the literature of political science.

686 U G 5
Introduction to Quantitative Methods II
W. 5 cl.
Prereq.: 685.
Continuation of survey of statistical applications in the literature of political science.

693 U G 1-5
Individual Studies in Political Science
Prereq.: 4th yr. standing and 40 cr. hrs. in social sciences, including 15 cr. hrs. in Pol. Sc.
A special topic is assigned to each student and results are tested by papers and special examinations.
700 Basic Theories in the Study of American Government and Institutions
A, W. 2 cl.
Repeatable to a maximum of 10 cr. hrs.
Canvas of institutional literature (Congress, Courts, the Presidency); examination of theoretical approaches (interest-group theory; theories of representation, decision-making models; theories of ideology).

Introduction to National Security
(See Nat. Sec. Pol. S. 702.)

725 Basic Theories in the Study of Comparative Government
A, W, Sp. 3 cl.
Repeatable to a maximum of 15 cr. hrs.
Examination of such concepts and theories as structural-functional analysis; general systems theory; and sociocultural systems as determinants of governmental structures.

727 Problems in Western European Politics
Su, A, Sp. 1 2-hr. cl.
Prereq.: 625 or 627 or permission of instructor.
Intensive study of selected problems.

731 Problems in Soviet Politics
W. 3 cl.
Prereq.: 630 or 655.
An intensive examination of selected problems such as crises of succession, conflicts of pressure groups, Soviet policies in the United States, Sino-Soviet relations.

734 Problems in Asian Politics
A, Sp. 1 2-hr. cl.
Prereq.: 635 or permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
An advanced seminar for the purpose of structured reading of advanced scholarly materials and limited research experimentation in East and Southeast Asian topics.

740 Problems in Latin American Politics
Sp. 1 2-hr. cl.
Prereq.: 626 or 640 or permission of instructor.
An advanced seminar devoted to a structured examination of the major theories, concepts, and approaches used in the analyses of Latin American politics.

741 Political Development
A, Sp. 3 cl.
Prereq.: 541 or 636 or 640 or permission of instructor.
Theories, approaches, and methodology in the analysis of political life in the new states of Asia and Africa; discussion of selected case and cross-national studies with theoretical relevance.

745 Basic Theories in the Study of International Relations
A, W, Sp. 3 cl.
Repeatable to a maximum of 15 cr. hrs.
Examination of such basic concepts and theories as equilibrium models, balance of power, national interest, geopolitical configurations.

749 Topics in Cross-National Policy Analysis
A. 3 cl.
Prereq.: 745.
A comparative examination of substantive cross-national policy issues such as welfare, security, economic development, etc.

757* Comparative Foreign Policies
W. 5 cl.
Prereq.: 655 or 656 or permission of instructor.
Examines comparatively the sources and classes of behavior of territorial actors in the international political system.

753 Regional Integration
A. 3 cl.
Prereq.: 650 or 651 or permission of instructor.
Political trends in and consequences of regional organization.

759 International Systems
Sp. 2 2-hr. cl.
Prereq.: 745.
Examines the influence of (1) the power distribution among nations; (2) alliance configurations within the international system; and (3) events external to nations upon inter-nation behavior.

765 Analytic Political Theory
W, Sp. 3 cl.
Repeatable to a maximum of 15 cr. hrs.
Analysis of basic concepts (power, elites, political change, etc); examination of holistic political analyses (Marx, Partee, Mannheim, MacIver, etc.).

766 Selected Topics in Political Theory
A. W. 1 2-hr. cl.
Prereq.: Grad. standing or permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Intensive joint readings and discussions concentrating upon one of the major themes, problems, or movements in political theory; topic information available from instructor.

775 Basic Theories in the Study of Politics and Political Behavior
A, W, Sp. 3 cl.
Repeatable to a maximum of 10 cr. hrs.
Examination of basic concepts and theories, including political socialization, survey research, simulation and gaming, social conflict and quantitative indicators of political action.
Comparative Political Institutions
Sp. 3 cl.
Study of comparative political institutions (executives, legislatures, bureaucracies, constitutions) utilizing a broad cross-national perspective.

Comparative Political Behavior
A. 3 cl.
A cross-national examination of political behavior, including such topics as socialization, participation, voting, elite behavior, mass-elite linkages.

Comparative Political Parties and Interest Groups
W. 3 cl.
Comparative analysis of the nature and role of political parties and interest groups in contemporary societies.

The Policy Process
Sp. 3-5 cl.
Prereq.: Senior standing and 15 cr. hrs. in pol. sc. The roles of elites, ideology, organized interests, and issues in the making of government policy; case studies in the policy process.

Honors Course
Prereq.: 4th yr. standing and 40 cr. hrs. in social sciences, including 15 cr. hrs. pol. sc., with a record of A in at least half of the pol. sc. courses and an average of B in the remainder. Permission of instructor and the Honors Committee of the College. At least two qtrs. are required of candidates for the degree of Bachelor of Arts with distinction in pol. sc. Failure to receive a grade of B in this course is a disqualification for special honors. Repeatable to a maximum of 15 cr. hrs.

A special topic is assigned to each student and results are tested by the requirement of papers and special examinations.

Research Principles and Techniques in National Security
(See Nat. Sec. Pol. S. 785.)

Scope and Methods of Political Science
W, Sp. 1 2-hr. cl., 1 1-hr. cl.
Prereq.: 4th yr. standing and 15 cr. hrs. in pol. sc. The materials of political science; history of procedure in political science research; research technique; presentation of results of research.

Problems in Research Design and Execution
A, W. 4 cl. 1 1-hr. lab.
Prereq.: Grad. standing or permission of instructor. Examines the methodological problems of research designs for the acquisition and analysis of data with special attention to the methods of cross-national research.

Contemporary Political Problems
A, W, Sp. 2 3-hr. cl.
Prereq.: Senior standing and 15 cr. hrs. in pol. sc. Repeatable to a maximum of 30 cr. hrs.

GENERAL PREREQUISITES FOR COURSES NUMBERED 800 AND 900
A general foundation in undergraduate courses in history and the social sciences is assumed. Any of the 800-level courses listed may be repeated provided that no student shall earn more than 10 hours of credit in any single course.

Seminar in National Security Research
(See Nat. Sec. Pol. S. 801.)

American National Government and Institutions
A, Sp. 2 cl.
Prereq.: 700 or permission of instructor. Seminar in national political institutions, Congress, Courts, the Presidency, and federalism.

Municipal Government
A, W. 1 2-hr. cl.
Prereq.: 505, 610, 611, or equiv. Seminar in the municipal governments of the United States and Europe.

Public Administration
W. 1 2-hr. cl.
Prereq.: Any 2 of: 610, 611, 612, 520, or equiv.

Public Law
W. 1 2-hr. cl.
Prereq.: 615 and 616. Seminar in the field of public law, including special problems in the fields of constitutional law and judicial administration.

Comparative Government
A, W, Sp. 1 2-hr. cl.
Prereq.: 2 pol. sc. courses in foreign governments at 600 level or above, or equiv. Repeatable to a maximum of 15 cr. hrs. Seminar in the governments of foreign countries.

International Relations
A, W, Sp. 1 2-hr. cl.
Prereq.: 651 or 656 or 545 or equiv. Repeatable to a maximum of 15 cr. hrs. Seminar in international relations.

Political Thought
W. 1 2-hr. cl.
Prereq.: Previous coursework in political thought; permission of instructor. Seminar in the history of political ideas and in the theoretical problems of contemporary politics for advanced students in related departments.
Political Parties and Pressure Groups
Su, Sp. 1 2-hr. cl.
Prereq.: 2 courses in pol. sc. at 600 level or above, including 575.
Seminar in American political parties and pressure groups.

Policy Making
A. 1 2-hr. cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Research into the process of policy-making and the substance of public policy decisions.

Interdepartmental Seminar
(See under Interdepartmental Seminars.)

Research in Political Science
Research for thesis or dissertation purposes only.

Portuguese
Office: 248 Dieter Cunz Hall of Languages, 1841 Milikin Road
Professors Bulatkin (Chairman) and Griffin; Assistant Professor Tolman.

Elementary Portuguese
A. 5 cl.
Elements of Portuguese grammar, with oral and written exercises; attention to ear training and oral practice; and customs.

Elementary Portuguese
W. 5 cl.
Prereq.: 101.
The elements of Portuguese grammar with abundant oral and written exercises; development of conversational skill; reading, vocabulary building.

Intermediate Portuguese
Sp. 5 cl.
Prereq.: 102 or 110.
Continuation of Portuguese grammar; reading of short stories, plays, and novels; increased attention to development of oral proficiency.

Intermediate Portuguese
A. 5 cl.
Prereq.: 103 or 112.
Reading of Portuguese plays, short stories, and novels; emphasis on oral practice; non-fiction of cultural and historical significance.

Intensive Elementary Portuguese
A, W, Sp. 10 cl.
Prereq.: Permission of dept.
Not open to students with credit for 101 or 102.
Elementary Portuguese for students wishing to acquire the basic skills in one quarter; intensive drill in form, syntax, vocabulary, and idiom; equivalent to 101 and 102.

Intensive Portuguese
Su. 15 cl. Enrollment limited to 20 students.
Full time of student and full fees required.
Prereq.: Permission of chairman.
Equiv. of 101, 102, and 103. Students with credit for 101 or the equiv. may not register for more than 10 hrs.
Students with credit for 101 and 102 or the equiv. may not register for more than 5 cr. hrs. Students with credit for 103 or the equiv. may not register for credit.
Elementary and intermediate Portuguese; intensive drill in forms, syntax, vocabulary, and idiom; reading of short stories and plays in Portuguese.

Individual Studies
Prereq.: Permission of dept.
Repeatable to a maximum of 30 cr. hrs.

Group Studies
Prereq.: Permission of dept.
Repeatable to a maximum of 30 cr. hrs.

Portuguese Conversation and Composition
W. 5 cl.
Prereq.: 104 or permission of instructor.
Intensive practice in conversation and composition based on materials concerning current life in Brazil and Portugal, with thorough review of grammar.

Review Grammar and Composition
Sp. 3 cl.
Prereq.: 104.
Review of Portuguese grammar; compositions based on readings.

Portuguese Pronunciation
W. 5 cl.
Prereq.: 104.
Practice with corrective exercises to continue development of aural-oral skills.
421  U 5
Introduction to Modern Luso-Brazilian Literature
A. 5 cr.
Prereq.: 104.
Reading and discussion of important modern Portuguese and Brazilian literary works.

422  U 5
Modern Prose Fiction
W.
Prereq.: 421 or permission of instructor.
Representative readings of modern Portuguese and Brazilian novels and short stories.

423  U 5
Modern Poetry and Drama
Sp.
Prereq.: 421 or permission of instructor.
Representative readings from modern Luso-Brazilian poetry and drama; lectures, discussions, and reports.

620*  U G 5
Main Currents in the Development of Portuguese Literature
A. 5 cr.
Prereq.: 421, and 422 or 423, or permission of instructor. Portuguese literature from the Middle Ages to the present with emphasis on the evolution of major movements.

621*  U G 5
Main Currents in the Development of Brazilian Literature
A. 5 cr.
Prereq.: 421, and 422 or 423, or permission of instructor. Brazilian literature, including the Portuguese colonial literature, from the 16th century to the present.

622*  U G 5
Luis de Camoes
W. 5 cr.
Prereq.: 421, or 422 and 423, or permission of instructor. An intensive study of Os Lusíadas.

623*  U G 5
The Modern Brazilian Novel
W. 5 cr.
Prereq.: 421, and 422 or 423, or permission of instructor. The Brazilian novel from the 1930’s to the 1960’s.

693  U G 1-15
Individual Studies
Prereq.: Permission of instructor. Repeatable to a maximum of 30 cr. hrs.

694  U G 1-15
Group Studies in Portuguese
Prereq.: Permission of instructor. Repeatable to a maximum of 30 cr. hrs.

993  G 1-5
Individual Studies in Portuguese
Prereq.: Permission of instructor. Repeatable to a maximum of 15 cr. hrs.

994  G 1-15
Group Studies in Portuguese
Prereq.: Permission of instructor. Repeatable to a maximum of 30 cr. hrs.
Investigation of minor problems in the various fields of Portuguese literature and language.

Poultry Science
Office: 108 Poultry Administration Building, 674 West Lane Avenue.

Professors Naber (Chairman), Baker, Bohl, Brown, Clayton, Harvey, Jaap, Marsh, and Touchburn (Associate Chairman, Wooster); Associate Professors Alfred, Mallowsky, Nestor, and Stephens; Assistant Professors Bacon, Chamberlin, Chipley, Lashaw, and Saif.

Domestic Animals in the Service of Man
(See Animal Sc. 100)
(Of offered in cooperation with the Depts. of Dairy Sc. and Poul. Sc.)

GENERAL PREREQUISITES FOR COURSES
NUMBERED 200.
Unless otherwise indicated, the prerequisites for 200-level courses are 45 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.; or specified courses numbered 100-199.

200  U 5
Fundamentals of Poultry Science
A, Sp. 4 cr., 1 2-hr. lab.
Prereq.: Biol. 100 or Animal Sc. 100.
Application of science and technology in the poultry and related industries. Marsh.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 300 AND 400
Unless otherwise indicated, the prerequisites for 300 and 400-level courses are 90 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.; or specified courses numbered 350-399.

420  U 5
Principles of Animal Improvement
A, W, Sp. 5 cr.
Prereq.: Animal Science 100, Math. 150 or equiv., and Genetics 140 or 314.
Not open to students with credit for Animal Sc. 420 or Dairy Sc. 420.
(Cross-listed in the Depts. of Animal Sc. and Dairy Sc.)
An introduction to the methods available for bringing about genetic change in farm animals. Fechheimer, Jaap, and Swiger.
430 U 5
Principles of Animal Nutrition
Su (1st term). A, W, Sp. 4 cr., 1 2-hr. lab.
Prereq.: Chem. 102 or 122, and Math. 150 or equiv.
Not open to students with credit for Animal Sc. 430 or Dairy Sc. 430.
(Cross-listed in the Deps. of Animal Sc. and Dairy Sc.)
A study of the fundamental principles of nutrition in mammals and birds. Cline, Latshaw, Mahan, and Tynick. Fee.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 500
Unless otherwise indicated, the prerequisites for 500-level courses are 15 cr. hrs. in courses in the same discipline numbered 200 or higher, or 10 cr. hrs. in courses numbered 200 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 200 or higher in specified allied disciplines; or baccalaureate degree.

Poultry Marketing
(See Agr. Ec. 521.)
(Offered in cooperation with the Dept. of Poul. Sc.)

589 U 5
Poultry Science Experience
Prereq.: Junior standing or higher and permission of instructor.
Practical experience, including completion of outlined program and written report, in an approved poultry establishment.

593 U 2, 3 or 5
Individual Studies
H593 (Honors) may be available to students enrolled in a college Honors Program or eligible for enrollment.
Prereq.: 15 cr. hrs. 200-level courses or higher in Poul. Sc., Animal Sc., or Dairy Sc. and permission of instructor.

594 U G 2, 3, or 5
Group Studies
Su, A, W, Sp. 2 2-hr. cl.
Repeatable to a maximum of 10 cr. hrs.
Intensive study of selected areas of poultry science appropriate to the group and not provided in other courses.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 600
Unless otherwise indicated, the prerequisites for 600-level courses are 15 cr. hrs. in courses in the same discipline numbered 300 or higher, or 10 cr. hrs. in courses numbered 300 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 300 or higher in specified allied disciplines.

611 U G 5
Avian Reproduction and Egg Production
Sp. 5 cr.
Prereq.: 200 and 430 or Zool. 220.
Not open to students with credit for 311.
Physiology of avian reproduction and egg production as affected by circadian rhythms, social stress, neuroendocrine mechanisms, ambient environment and immunological competence. Jaap.

Physiology of Reproduction and Growth
(See Dairy Sc. 612.)
(Offered in cooperation with the Deps. of Animal Sc. and Poul. Sc.)

Laboratory in Reproductive Physiology and Artificial Insemination
(See Dairy Sc. 613.)
(Offered in cooperation with the Deps. of Animal Sc. and Poul. Sc.)

630 U G 5
Nutrition and Feeding of Monogastric Animals
A, W, Sp. 4 cr., 1 2-hr. lab.
Prereq.: 430 or equiv.
Not open to students with credit for Animal Sc. 630.
(Cross-listed in the Dept. of Animal Sc.)
The nutrition of swine, poultry, and laboratory animals; principles and practice. Cline, Latshaw, Mahan, and Naber. Fee.

640 U G 5
Prevention and Control of Avian Diseases
W. 3 cr., 2 2-hr. lab.
Prereq.: Chem. 102 or 122 and Microbiol. 509 or 607.
The etiology, recognition, prevention, and control of the important diseases of poultry and related birds. Marsh.

650 U G 5
Egg and Poultry Products Technology
A, Sp. 4 lec., 1 2-hr. lab.
Prereq.: Chem. 102 or 122 and Microbiol. 509 or 607.
Quality identification and maintenance; processing; physical, chemical, microbiological and nutrient properties; preservation and utilization of egg and poultry products. Chipley.

595 U G 1-2
Seminar
Naber.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 700
Unless otherwise indicated, the prerequisites for 700-level courses are 15 cr. hrs. in courses in the same discipline numbered 600 or higher, plus additional specified courses numbered 600 or higher.

Advanced Reproductive Physiology
(See Dairy Sc. 710.)
(Offered in cooperation with the Deps. of Animal Sc. and Poul. Sc.)
UG 5
Genetics of Animal Populations
W. 5 cl.
Prereq.: 420 or Genetics 630, and 10 cr. hrs. in math.
Not open to students with credit for Animal Sc. 720 or Dairy Sc. 720.
(Cross-listed in the Depts. of Animal Sc. and Dairy Sc.)
Theory and practice of analyzing and altering the genetic composition of animal populations. Swiger.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 800 AND 900
Unless otherwise indicated, the prerequisites for 800 and 900-level courses are 30 cr. hrs. in courses in the same discipline, or 20 cr. hrs. in the same discipline, plus 25 cr. hrs. in specified allied disciplines.

G 3
Advances in Physiology of Domestic Animals
A, W, Sp. 4 hr. cl.
Prereq.: Acceptable courses in physiol., anat., biochem., and permission of instructor.
Not open to students with credit for Animal Sc. 810 or Dairy Sc. 810.
(Cross-listed in the Depts. of Animal Sc. and Dairy Sc.)
810.01* Adrenal Function
A.
Brown and Gomes.
810.02* Endocrinology of Reproduction
W.
Gomes.
810.03* Immunology and Immunogenetics
Sp.
Hines.
810.04* Thyroid and Parathyroid Function
A.
Hibbs.
810.05* Mammalian Germ Cells
W.
VanDemark.
810.06* Biomoterology and Animal Performance
Sp.
Ludwick.

G 3
Current Topics in Animal Genetics
3 cl.
Prereq.: Acceptable courses in animal genetics, mathematics, and statistics.
Repeatable to a maximum of 12 cr. hrs.
Not open to students with credit for Animal Sc. 620 or Dairy Sc. 620.
(Cross-listed in the Depts. of Animal Sc. and Dairy Sc.)
820.01* Selection Index Theory
Sp.
Allaire and Harvey.
820.02* Nonadditive Genetic Variance
W.
Harvey and Swiger.
820.03* Polymorphic Systems
W.
Fechheimer.
820.04* Simulation of Genetic Systems
W.
Harvey.
820.05* Cytogenetics of Animal Populations
W.
Fechheimer.
820.06* Physiological Indices in Animal Breeding
A.
Jaap.

G 3
Advanced Studies in Nutrition
Su, A, W, Sp. 3 or 4 cl.
Prereq.: Permission of instructor.
Not open to students with credit for Animal Sc. 830 or Dairy Sc. 830.
(Cross-listed in the Depts. of Animal Sc. and Dairy Sc.)
830.01* Energy
A.
Conrad.
830.02* Minerals
W.
Cline.
830.03* Proteins and Amino Acids
Sp.
Mahan, Naber, and Vivian.
830.04* Vitamins
A.
Naber and Tyznik.
830.05* Lipids
W.
Palmquist.
830.06* Laboratory Methods in Nutrition
Sp.
Allred, Mahan, and Vivian.

G 1
Interdepartmental Seminar in Nutrition and Food Technology
Sp.
(See under Interdepartmental Seminars.)

G 2, 3, or 5
Individual Studies
Prereq.: 12 cr. hrs. of 300-level courses or higher in poul. sc., animal sc., or dairy sc. and permission of instructor.

G Arr.
Research
Research for thesis or dissertation purposes only.
Preventive Medicine

Office: B-107 Starling-Loving Hall, 320 West 11th Avenue

Professors Ellingson (Chairman), Ambuel, Billings, Fancher (Emeritus), Keller, Lewis (Emeritus), Pelchanis (Emeritus), Peterson, Rustagi, Schulte, Shaffer, Shillito (Emeritus), and Tomashick; Associate Professors Anderson, Bashe, Berry, von Gierke, Webb, and Wick; Assistant Professors Ackerman, Anthony, Banks, Briggs, Chirikos, Davis, Ertel, Garner, Gullet, Hegen, Lanzan, Lenz, Masters, McCamore, Milliken, Morley, Nick, Grubel, Sharp, Stinson, Taylor, Thomas, Turner, Wesham, Weir, and Westra; Instructors Benson, Brown, Burnier, Campbell, Chase, Coulter, Ervin, Fletcher, Gahman, Giraldo, Good, Graves, Greenlee, Hambrick, Hamdi, Helffinger, Haliman, Herwig, Holbrook, Hoyt, Hughes, Lowary, McCally, Mezger, Rudy, Samlowski, Sandman, Silovski, Smith, Jr., Wain, Weitner, Williams, Wynn, Yantes, and Young.

485 U 5
Medical Factors in the Work Environment
W. 5-1 hr. cl.
Study of human responses and adaptation to work under different environmental stresses in the industrial setting. Benson.

585 U 3
Epidemiology
A. 2 cl.
Prereq.: Microbiol. 210 or 509.

623 U P 2
Critical Reading of Scientific Literature
Sp. 1-2 hr. cl.
Prereq.: Permission of instructor.
Description of the basic principles of experimental design and statistics necessary for critical reading of the scientific literature which is used as illustrative material. Billings.

624 P 2
Quantitative Methods in Medicine
Sp. 2 cl.
Prereq.: Permission of instructor.
Principles of medical statistics and laboratory exercises in analysis of papers in the medical literature, with reference to experimental design and numerical reasoning. Keller and Staff.

685 P 6, 12, 18 G 6-12
Field Experience in Comprehensive Health Planning
Su, A, W, Sp. Field time assigned for medical students 1, 2, or 3 months and grad. students ½ or entire Summer Quarter. Prereq.: Med. 3rd yr. standing, grad. standing in Prev. Med., or permission of instructor.
Full time assignment to a state or local health planning agency, to work on a specific project in community health under the guidance of a selected faculty adviser. Banks.

730 P G 3
Principles of Environmental Health I
A. 2 2-hr. cl.
Prereq.: Permission of instructor.
Basic aspects of man as a consumer of environmental resources and producer of pollutants; man's responses to stresses in his physical environment; his ranges of tolerance for environmental extremes. Billings.

731 P G 3
Principles of Environmental Health II
W. 2 2-hr. cl.
Prereq.: 730 or permission of instructor.
Man's responses to environmental contaminants in air, water and food; his tolerance limits for toxic substances and pollutants. Billings.

732 P G 3
Principles of Environmental Health III
Sp. 2 2-hr. cl.
Prereq.: 730 and 731, or permission of instructor.
Man's responses to his biological environment; his tolerance limits for microbiological stress; modes of adaptation and mal-adaptation; alteration of man's ecosystem; the consequences of such alterations. Billings.

735 P 2
Advanced Preventive Medicine
1 month, offered Oct. and Feb.
Prereq.: Permission of instructor.
Ecology of health and disease in the modern community; environmental health; public health methods; medical nutrition; and biometric application. Keller and Staff.

740 P G 3
Population and Health I
A. 2 cl. and 1 conf.
Prereq.: Permission of instructor.
Introduces students in preventive medicine to the concepts, data, and analytical tools of demography as they relate to health problems and planning. Petersen.

741 P G 3
Population and Health II
W. 2 cl. and 1 conf.
Prereq.: 740 and permission of instructor.
Continuation of 740; applications of demography to health-care programs. Petersen.

753 P 6
Principles of Public Health Administration
1 month, offered all months except Jun.
Prereq.: Permission of instructor.
Administration, organization, and function of public health agencies; principles of sanitation, food inspection, immunization, and school health. Keller and Staff.

763 P G 1
Medicolegal Problems in Industry
A. 1 1-hr. cl.
Prereq.: Grad. standing in Prev. Med., or permission of instructor.
Legal relationships among employers, physicians, and employees; liability in case of injury; evaluation of disability; workmen's compensation; medical malpractice. Nick.
Design of Biomedical Investigations
A. 2 2-hr. cl.
Prereq.: Permission of instructor.
Design of studies in biomedical area; formulation of hypotheses; sampling; planning observations and measurements; selection of statistical techniques; testing of hypotheses. Heggen.

Health Survey Methods
W. 1 2-hr. cl. and 1 1-hr. conf.
Prereq.: Grad. or professional standing and permission of instructor.
An introduction to health survey methods; lectures, readings, classroom and community exercises; consideration of health planning and epidemiological applications. Lane, Keller, and Petersen.

Health Data: Sources and Uses
Sp. 3 1-hr. cl.
Prereq.: 770, or permission of instructor.
Examination of past and current health data accumulations, discussion of their uses and shortcomings, and experience in the acquisition and analysis of health-related information. Keller, Lane, and Petersen.

Current Health Problems: Maternal and Child Health
W. 1 2-hr. cl.
Prereq.: Grad. or professional standing and permission of instructor.
The epidemiology of major causes of death and disability among mothers and children; community programs for prevention, detection, and treatment; current status of control. Keller.

Current Health Problems: Adult Health
Sp. 1 2-hr. cl.
Prereq.: Grad. or professional standing and permission of instructor.
The epidemiology of major causes of death and disability among adults; community programs for prevention, detection, and treatment; current status of control on local, state, national, and international levels. Keller.

Biostatistics and Computers in Medical Research
W. 1 2-hr. cl. and 1 6-hr. lab.
Prereq.: Permission of instructor.
Review of the fundamental concepts of biostatistics, including more complex analysis of variance designs, integrated with application of the electronic computer. Heggen, Keller, and Chase.

Biometrics Laboratory
A, W, Sp. 2 1-hr. lab. and 2 1-hr. conf.
Prereq.: 764 or 765.
Repeatable to a maximum of 6 cr. hrs.
Participation in consultations offered to biomedical researchers, combined with individualized faculty guidance. Keller, Lane, Heggen, and Chase.

Health Data Processing
Sp. 2 1½-hr. cl.
Prereq.: 764 or equiv., and permission of instructor.
Forms design and techniques for the acquisition and manipulation of biomedical data sets, including some fundamentals of electronic data processing. Heggen and Chase.

Individual Studies in Preventive Medicine
1, 2, 3, or 4 months; offered all months except June.
Prereq.: Permission of instructor and Medical School standing or grad standing in Prev. Med.
Repeatable to a maximum of 24 cr. hrs. for professional credit and 15 cr. hrs. for grad. credit.

Aerospace Medicine
Wick.

Biometrics
Lane.

Clinical Environmental Medicine
Billing.

Environmental Health
Wick.

Epidemiology
Keller.

Nutrition
Anderson.

Occupational Medicine
Hamdi.

Community Health
Keller.

Comprehensive Health Planning
Chirikos.

Health Agency Administration
Banks.

Behavioral Science Studies in Health
Lane.

Group Studies in Preventive Medicine
1, 2, 3, or 4 months; offered all months except June.
Prereq.: Permission of instructor and Medical School standing or grad. standing in Prev. Med. or related field.
Repeatable to a maximum of 24 cr. hrs. for professional credit and 15 cr. hrs. for grad. credit.

Biometrics
Lane and Keller.

Environmental Health
Ellington.

Epidemiology
Keller, Lane, and Banks.

Community Health
Banks, Chirikos, and Campbell.
Residency in Preventive Medicine
Su. A, W, 3u.
12 months full time, beginning July 1.
Prereq.: Appointment as resident, University Hospitals.
Repeatable to a maximum of 72 cr. hrs.
Assignment to accredited area for training in aerospace
and occupational medicine.

Principles of Aerospace Medicine
A. 1 2-hr. cl.
Prereq.: Permission of instructor.
History and background of aerospace medicine;
government regulatory agencies (FAA and CAB);
civilian and military aerospace medical administration,
research and practices; field trips to aerospace
facilities. Wick.

Principles of Occupational Medicine
W. 1 2-hr. cl., field trips arr.
Prereq.: Permission of instructor.
Intramural and extramural relationships of the
physician in industry; physical facilities, personnel,
and equipment of industrial medical departments;
departmental budgeting; employee examinations;
health maintenance programs; safety programs.
Billing.

Public Health Organization
Sp. 1 2-hr. cl. and 1 1-hr. cont.
Prereq.: Permission of instructor.
History and development of public health agencies;
legal bases of public health law; administrative
structure of official and voluntary agencies and their
relationships to the complex of health and medical
services in the community. Keller and Campbell.

Environmental Toxicology I
A. 3 1-hr. cl.
Prereq.: Permission of instructor.
Effect of the environmental toxins upon the organism;
evaluation of testing methods, study of intermediary
metabolism and detoxification; and introduction to
chemically induced teratology and carcinogenesis.
Weir.

Environmental Toxicology II
W. 3 1-hr. cl.
Prereq.: 820 or equiv., or permission of instructor.
Evaluation of the effects of environmental pollution
on the organism; including noxious gases, vapors,
and particulates. Weir.

Environmental Toxicology III
Sp. 3 1-hr. cl.
Prereq.: 821 or equiv., or permission of instructor.
Continuation of 821 covering the effects of metals and
their compounds, pesticides, plastics, and plasticizers,
and the problem involved with cosmetics, food
additives, and residues. Weir.

Principles of Hyperbaric Medicine
Sp. 1 3-hr. cl.
Prereq.: Permission of instructor.
Basic considerations of the etiology, diagnosis,
provention, and treatment of hyperbaric illnesses
including caisson disease, air embolism, nitrogen
narcosis, and oxygen poisoning. Schulte.

Clinical Aerospace and Occupational Medicine I
Su. 2 1 1/2-hr. cl.
Prereq.: Permission of instructor.
Medical qualification for employment or for flying, from
viewpoints of major clinical specialties; general
aerospace and industrial medical problems; aerospace
and ground safety programs. Wick and Staff.

Clinical Aerospace and Occupational Medicine II
Su. 2 1 1/4-hr. cl.
Prereq.: 840 or permission of instructor.
Continuation of 840. Wick and Staff.

Medical Aspects of Human Engineering
A. 2 1 1/4-hr. cl.
Prereq.: 820, Physiol. 840, or permission of instructor.
Consideration of interfaces between medicine,
physiology, psychology, and engineering in the design
of complex systems operated by man; organization and
administration of human factors groups. Wick and
Staff.

Pro-Seminar in Community Health Development
A, W, Sp. 1 2-hr. session per wk., and additional
conferences.
Prereq.: Grad. standing in Prev. Med. or permission of
Instructor.
Repeatable to a maximum of 12 cr. hrs.
Each week a basic area of community health
development is presented by a specialist; the students
prepare by reading assigned literature in this area,
respond to questions raised during each session, and
prepare reviews of the key issues. Staff.

Seminar in Preventive Medicine
Prereq.: Permission of instructor.
Repeatable to a maximum of 8 cr. hrs.

Selected Topics in Occupational or
Aerospace Medicine G 1-3
Ellingson.

Selected Topics in Community Health G 2-3
Keller and Staff.

Epidemiologic Methods
A. 3 1-hr. cl.
Prereq.: Permission of instructor.
Principles of epidemiology with special emphasis on
methods employed in current epidemiologic studies of
chronic diseases. Keller and Staff.
Comprehensive Health Planning
W. 1 1/2 hr. session plus 1 1/2 hr. conference per wk. Prereq.: Grad. standing in Prev. Med. or permission of instructor. Study of comprehensive health planning concepts and techniques; with emphasis on topics relating to the design of health plans in contemporary communities. Chirikos.

Behavioral Research in Selected Health Areas
A. 1 2-hr. cl. Prereq.: Permission of instructor. A survey of behavioral research in selected health areas; special emphasis on coronary heart disease, cigarette smoking, and health and illness behavior. Lanese and Banks.

Economics of Community Health
A. 1 2-hr. cl. and 1 1-hr. cl. Prereq.: Econ. 402 or permission of instructor. Survey of the application of economic analysis to community health problems; emphasis on topics relating to the allocation of health resources and health manpower. Chirikos.

Community Health Development
A. 2 1/2-hr. conf. Prereq.: Permission of instructor. A study of the nature of community development, its operational principles, and successful techniques, as they may be applied to the health field. Keller and Campbell.

Health Planning Laboratory
Sp. 2 1/2-hr. conf. Prereq.: 852 or permission of instructor. Repeatable to a maximum of 10 cr. hrs. Practicum in the application of planning techniques to current health problems and policy issues. Chirikos and Staff.

Epidemiology and Public Health
W. 2 2-hr. conf. Prereq.: 851 or equiv., or permission of instructor. Principles of public health, vital statistics, epidemiology, environmental sanitation, and communicable disease control on local, national, and global bases. Keller and Staff.

Industrial Hygiene
Su. 2 1/2-hr. conf. Prereq.: Permission of instructor. Engineering appraisal of environmental health hazards, sampling techniques, instrumentation, and analytical methods; the industrial hygiene survey. Weir and Staff.

Environmental Control
Su. Conf. and field exercises. Prereq.: Permission of instructor.

Principles of substitution, enclosure, isolation of hazardous operations; local exhaust ventilations; general ventilation-air conditioning; noise control; radiant energy; ionizing radiation; personal protective equipment; medical supervision of persons exposed to conditions of special hazards. Weir and Staff.

Analysis of Health Care Organizations
W. 2 1/2-hr. cl. Prereq.: Permission of instructor. Acquaint student with concepts and techniques of analysis of the structures and actions of health organizations. Keller and Campbell.

Behavioral Responses in Disease Prevention
Sp. 1 2-hr. cl. and 1 1-hr. conf. Prereq.: Permission of instructor. A survey of behavioral science literature concerning health behavior, illness behavior, and sick-ole and their impact upon programs for prevention, early detection, and amelioration of disease. Banks.

Interdepartmental Seminar in Industrial Engineering
W. Prereq.: Permission of instructor. The Departments of Industrial Engineering and Preventive Medicine conduct a seminar annually with industrial psychologists in an area of common interest; topic to be announced.

Research in Preventive Medicine

Psychiatry
Office: 071 Upham Hall, 473 West 12th Avenue
Professors Gregory (Chairman), Coddington, Corson, Fischer, Green, G. Harding, Sr. (Emeritus), Kaelbling, W. Knopp, Liss, Marks, Michael, Palmer, Patterson (Emeritus), Pine, and Siegel; Associate Professors Axline, Brandes, Corlis, Fox, Gardner, Goldman, Gwynne, Haas, G. Harding, Jr., Kangas, Learmonth, Leaverton, Lohman, McGough, Missildine, Monroe, Morganstern, Pariser, Parker, Kristine (Emeritus), Stevenson, Todd, Veczollos, Weaver, and Wheldon; Assistant Professors Arnold, Baumgartner, Borelli, Burk, Burns, Carton, Cates, Coer, Gooi, Gove, Hall, C. Harding, H. Harding, Hundzialek, Johnston, King, E. Knopp, Koch, Leuchter, Lindner, Litvak, Martin, Rowe, Schmidt, Sikking, Smith, Smith-e-icas, Sraayer, Stroo, Welty, and Worst; Instructor Smeltzer.

Psychopathology I
A. 1 cl. Prereq.: Permission of chairman. A sequence course in Autumn, Winter, and Spring Quarters reviewing the clinical, etiological, and psychodynamic aspects of the common psychiatric disorders.
Psychopathology II
W. 1 cl.
Prereq.: 708.
Continuation of 708.

Psychopathology III
Sp. 1 cl.
Prereq.: 708 and 709.
Continuation of 709.

Introduction to Group Psychotherapy
Sp. 1 cl.
Prereq.: Permission of instructor.
Rationale for the use of group psychotherapy and fundamental techniques needed in starting and conducting a psychotherapeutic group.

Advanced Psychotherapy and Family Therapy I
A. 1 2-hr. cl.
Prereq.: 712 or 741 or equiv.
Family therapy, communication systems, family rules and structure; analysis of therapist-patient relationships.

Advanced Psychotherapy and Family Therapy II
W. 1 2-hr. cl.
Prereq.: 712 or equiv.
Continuation of 712.

Behavioral Science I
Sp. 1 cl.
Prereq.: Permission of chairman.
Intensive coverage of scientific research procedures in the behavioral sciences, including the nature of the hypothesis, experimental designs, techniques of controls, and some basic parametric and nonparametric statistics.

Behavioral Science II
Prereq.: 714.
Continuation of 714.

Behavioral Science III
Prereq.: 715.
Problems and methods of personality measurement with emphasis on objective approaches to personality assessment.

Neuropathological Basis of Mental Disorders
Sp. 2 cl.
Prereq.: Permission of chairman.
Emphasis on new trends in neuropathology as illustrated by results of recent research; considered as a reevaluation of established and hypothetical etiological mechanism of diseases affecting the nervous system.

Psychiatric Theory I
A. 1 cl.
Prereq.: Permission of chairman.
Psychiatric theories of personality, nature and etiology of psychopathology and psychotherapy, plus relevant historical material; emphasizes Freudian psychoanalytic theory and its precursors.

Psychiatric Theory II
W. 1 cl.
Prereq.: 718 and permission of chairman.
Continuation of 718.

Psychiatric Theory III
Sp. 1 cl.
Prereq.: 719 and permission of chairman.
Psychiatric theories of personality, nature and etiology of psychopathology and psychotherapy, plus relevant historical material; emphasizes other major theorists neither classical, psychoanalytic, nor Neo-Freudian.

Neuroendocrine Bases of Behavior
A. 1 cl.
Prereq.: Permission of chairman.
Normal and pathologic operation of selected biologic control systems examined in terms of cybernetics, relating anatomy, physiology, and pharmacology to overt behavior.

Forensic Psychiatry
Sp. 1 cl.
Prereq.: M.D. degree and permission of chairman.
Psychiatric testimony in criminal and civil legal procedures; determination of competency and indications for involuntary commitment; legal responsibilities of the psychiatrist.

Community Psychiatry
Su. 2 cl.
Prereq.: Permission of chairman.
A review of the recent growth, development, and expanding programs in the field of community psychiatry.

Psychiatric Applications of Psychological Tests
Su. 1 cl.; or Su (2nd term). 2 cl., 2 lab. hrs. optional.
Prereq.: Permission of instructor.
Psychological testing procedures and their use in clinical psychiatry (intelligence testing, personality evaluation, and neuropsychological assessment).
Clinical Psychiatry
Prereq.: Med. 3rd or 4th yr. standing.
Must repeat to 12 cr. hrs.
Psychopathology and dynamics of psychiatric syndromes; diagnosis, treatment, and interview techniques in ward work, case studies, conferences, and seminars; correlations of medical, psychological, and social factors.

Basic Psychotherapy I
A. 1 cr.
Prereq.: Permission of chairman.
Basic concepts of psychotherapy, theory, and technique, with review of the development and structure of the personality.

Basic Psychotherapy II
W. 1 cr.
Prereq.: 740.
Continuation of 740; a study of basic concepts of psychotherapy, theory, and technique, with review of the development and structure of the personality.

Child Psychiatry
Su. 1 2-hr. cl.
Prereq.: Permission of instructor.
Diagnosis and therapy in child psychiatry; etiologic forces that contribute to the development of mental illness in children and their families.

History of Psychiatry I
A. 1 cr.
Prereq.: Permission of chairman.
The development of psychiatric concepts and practices through the ages; study of biographical sources and significant writings.

History of Psychiatry II
W. 1 cr.
Prereq.: 745 and permission of chairman.
Continuation of 745.

Psychiatric Aspects of Mental Retardation
Su. 1 cl. (2 lab. hrs. optional).
Prereq.: Permission of chairman.
Theoretical and clinical aspects of mental retardation as related to psychiatry.

Anatomical Substrates of Behavior
A. 1 cr.
Prereq.: Anat. 643 and 683 or equiv.
A review of topography and discussions of the nervous system as a substrate of higher nervous functions and seat of mental disturbances.

Clinical Hypnosis and Hypnotherapy
Sp. 1 cr. 4-hr. lab. optional.
Prereq.: 710 or equiv. and permission of instructor.
Theoretical and clinical aspects of hypnosis, with experience in techniques and applications in hypnotherapy. Gwynne.

Individual Studies in Biological Psychiatry
1, 2, or 3 months; offered all months.
G 1-6
Prereq.: Permission of chairman.
Repeatable to a maximum of 12 cr. hrs. for grad. credit and to a maximum of 18 cr. hrs. for professional credit.
a. Biological Psychiatry
b. Experimental Psychology
c. Learning and Motivation
d. Neuroendocrine and Other Correlates of Conditioned Reflexes and Hypnosis.
e. Neurochemistry and Neuropharmacology
f. Neuroendocrinology
g. Neuropathology
h. Neurophysiology

Group Studies in Clinical Psychiatry
1, 2, or 3 months; offered all months.
G 1-6
Prereq.: Permission of chairman.
Repeatable to a maximum of 12 cr. hrs. for grad. credit and to a maximum of 18 cr. hrs. for professional credit.
a. Advanced Psychotherapy
b. Experimental Psychopathology
c. Mental Health Administration
d. Psychiatric Test Procedures
e. Psychosomatic Medicine
f. Social Psychiatry
g. Social Psychology
h. Clinical Psychiatry
i. Child Psychiatry

Residency in Psychiatry
12 months full time, beginning July 1.
Prereq.: Appointment as resident, University Hospitals.
Repeatable to a maximum of 210 cr. hrs.
Rotation through inpatient and outpatient services in the diagnosis and treatment of psychiatric disorders of adults and children; rounds, conferences, and individual supervision.

Scientific Basis of Clinical Psychiatry
Su (2nd term). 6 cr. (4 lab. hrs. optional).
Prereq.: M.D. and permission of instructor.
Principles of case study, interviewing, history-taking, and diagnosis; rationale, indications, contra-indications, and precautions for physiological and psychological treatment. G. Harding, Jr.
Psychiatry Research
Prereq.: M.D. and residency in Psychiatry.
Research for thesis purposes only.

Psychology

Office: 321 Arps Hall, 1945 North High Street

Professors Wallace (Chairman), Angellino, Briggs, Brock, Clark, Cook, Erickson, Fletcher, Greenwald, Horrocks, Huesman, Johnson, Kaswan, Kilpatrick, Latane, MacMinn, Marks, D. Meyer, Osipow, Pepinsky, Rie, Schmidt, Siegel, Stewart, Stogdill, Thompson, Wener, Wherry, and Wickens; Adjunct Professor P. Meyer; Associate Professors Britt, Campbell, Dearnin, Ernst, Fox, A. Gross (Visiting), Hakei, Helper, Hothersall, Jones, Kangas, Leland, Mires, Monroe, Nolan, Ostrom, Owen, and Walsh; Adjunct Associate Professors Davis, Edmonson, Engin, Gardner, Assistant Professors Dell, Gilson, Gloss, Goldrich, S. Gross (Visiting), Isaac, Jackson, Kaul, Kilmoski, Kriger, Sandman, Schweibel, Shulman, Spitzner, Staats, Wise, and Wood; Adjunct Assistant Professors Archibald, Corlis, Watson, and Weaver; Instructors Compton, Gray, Greth, Moyer, Scott, and Tincher.

100 U 5 General Psychology
Su, A, W, Sp. 5 cl.
Introductory psychology, a prerequisite to advanced courses; the application of the scientific method to behavior; topics include learning, motivation, perception, personality, physiological basis of behavior.

101 U 5 General Psychology
Su, A, W, Sp. 5 cl.
Prereq.: 100.
Continuation of 100 with further emphasis on the development of a scientific attitude toward personal psychological problems in the fields of learning, thinking, intelligence, and personality.
230 U 5
Introduction to Educational Psychology
Su, A, W, Sp.  5 cl.
Prereq.: 100.
Not open to freshmen or to students with credit for 210.
Facts and principles of human development and
learning are applied to the problems of education;
scientific evidence in the solution of educational
problems is stressed. Angelino and Staff.

300 U 5
Introductory Psychology
A, W.  5 cl.
Prereq.: 10 cr. hrs. of science.
Not open to students with credit for 100.
An introduction to psychology for students with
science background; topics covered similar to 100.

310 U 3
Basic Psychology: Perception
Su, A, Sp.  3 cl.
Prereq. or concur.: 220.
Theory, methods, and physiological correlates of
sensory and perceptual processes; emphasis on the
relation of behavior to stimulus variation. Isaac and
Owen.

311 U 3
General Psychology: Motivation and Action
A, W.  3 cl.
Prereq. or concur.: 220.
A behavioristic presentation of experimental work on
learning and motivation. Goldrich and Spitznig.

312 U 3
General Psychology: Learning and Thinking
W, Sp.  3 cl.
Prereq.: 311.
The principles developed in 311 are extended to
complex human behavior, especially verbal. Johnson
and Shulman.

320 U 3
Social Psychology
Su, A, W, Sp.  3 cl.
Prereq.: 10 cr. hrs. in psych.
The influence of group processes, organizational
variables, and culture upon the social modification of
basic drives, attitudes, and language. Brock, Greenwald,
Latane, and Ostrom.

330 U 3
Psychology of Abnormal Behavior
Su.  3 cl.
Prereq.: 10 cr. hrs. in psych.
A consideration of the symptomologies, etiologies and
therapies of the major neuroses and psychoses with
special emphasis on psychoanalytic theories and
methods.

331 U 3
Psychopathology and Psychotherapy I
A, Sp.
Prereq.: 10 cr. hrs. in psych.
Examination and comparisons of current theories of
the nature of psychological disturbances and their
management; emphasis on recent conceptualizations and
treatment approaches. Weaver.

332 U 3
Psychopathology and Psychotherapy II
W.
Prereq.: 10 cr. hrs. in psych.
Continuation of 331.

333 U 3
Human Behavior Problems
A.
Prereq.: 10 cr. hrs. in psych.
Analyses of behavior patterns which are often
considered undesirable or otherwise problematic;
emphasizes on behavioral definitions and analyses of
problems, and on behavioral interventions. Nolan.

340 U 3
Genetic Psychology
Su, W.  3 cl.
Prereq.: 9 cr. hrs. in psych.
The facts of human development with some
phylogenetic perspective; topics cover physical and
mental development, innate tendencies, mental states,
and personality development. Clark.

500 U G 3
Experimental Psychology
A, W, Sp.  2 cl., 2 lab. hrs. arr.
Prereq.: 310 and 312 or permission of instructor.
The experiments are selected both for general and
cultural values and for preparation for technical
research in experimental psychology. Spitznig.

501 U G 3
Physiological Psychology
W.  3 cl.
Prereq.: 101 or 300.
Some physiological correlates of psychological
phenomena; the properties of integrated organ
systems, with emphasis upon the characteristics of
their elements; consideration of psychosomatic
abnormalities. Goldrich.

502 U G 3
Advanced Physiological Psychology
Sp.  3 cl.
Prereq.: 501.
Further physiological correlates of psychological
phenomena; sensory and motor processes will be
special topics. Goldrich.

504 U G 3
Psychology of Music
W.  3 cl.
Prereq.: Permission of instructor.
Psychological factors in musical learning,
memorization, rhythm, harmony, form, tone color,
interpretation, dictation, and music talent. Poland.
Contemporary Viewpoints in Psychology
W. 3 cr.
Prereq.: 16 cr. hrs. in psych.
A consideration of the development of modern scientific psychology from its roots in the school of the 19th century to its contemporary status. Hothersall.

Advanced Experimental Psychology
Sp. 2 cr., 2 lab. hrs.
Prereq.: 500.
A continuation of 500 in which the student conducts additional experiments including an experiment of his own design.

Elementary Statistical Methods
Su, A, W, Sp. 2 cr., 4 lab. hrs.
Prereq.: Math. 117 or permission of instructor.
Introduction to statistics and application to psychological and educational research; rationale, computation, and interpretation. Fotheringham, Isaac, Jones, and Wherry.

Psychological Testing
A, Sp. 2 cr., 1 lab. hr.
Prereq.: 10 cr. hrs. in psych.
An overview of theoretical and practical aspects of the assessment and prediction of human behavior; topics include achievement, intelligence, personality, attitudes, interests, and interpersonal relations. Damarin.

Experimental Social Psychology
W. 2 cr., 4 lab. hrs.
Prereq.: 320, 510, and permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Typical experiments in such social psychological areas as attitude change, group processes, and group influences upon the individual. Ostrom.

Personnel and Organizational Psychology
Su, A, Sp. 3 cr.
Prereq.: 220 or permission of instructor.
Influence of individual and organizational factors on performance of complex tasks; effects of task involvement on the individual; relationships between organizations and their clients. Kilmoski.

Psychology of Personality
Su, W, Sp. 3 cr.
Prereq.: 10 cr. hrs. in Psych.
Comparative analysis of major theoretical models of personality in terms of logical and empirical criteria. Mires.

Clinical Psychology
A, W, Sp. 3 cr., 2 optional lab.
Prereq.: 15 cr. hrs. in psych.
Introduction to clinical psychology through lectures, small group discussions, tapes, and films; emphasis on research and professional problems and methods which deal with these problems. Schwebel.

Mental Hygiene for Professional Workers
Su, A, W, Sp. 3 cr.
Prereq.: 10 cr. hrs. in psych.
Not open to students with credit for 640.
The determinants of maladjustment and principles used in the prevention of maladjustment for teachers, personnel workers, social workers, psychologists, occupational therapists, and other professional groups. Fletcher and Kaul.

Counseling Psychology: An Introduction
Su, A, W, Sp. 3 cr.
Prereq.: 10 cr. hrs. in psych.
For students interested in counseling and personnel work; discussion of counseling psychology, counseling, and testing. Walsh, Kaul, and Robinson.

Educational and Vocational Appraisal
Su, W. 3 cr.
Prereq.: 10 cr. hrs. in psych.
Theory and techniques of appraisal of individual characteristics as related to the formulation of future educational and vocational plans. Walsh.

Vocational Psychology
Su, Sp. 3 cr.
Prereq.: 10 cr. hrs. in psych.
Survey of the psychological aspects of work and their implication for vocational development; the use of labor force and occupational information in vocational choice. Campbell.

Psychology of Childhood
Su, A, W, Sp. 3 cr.
Prereq.: 10 cr. hrs. in psych.
Psychological development from birth to age 12; influence of school, family, and other out-of-school activities; provision for the child's psychological needs. Angelino, Damarin, Edmonson, and Wenar.

Adolescence
Su, A, W, Sp. 3 cr.
Prereq.: 10 cr. hrs. in psych.
A study of the outstanding characteristics of the adolescent, the educational and social problems arising at this period, and means for dealing with the problem. Angelino, Horrocks, and Jackson.

Studying the Individual Child
A, W. 3 cr., lab. hrs.
Prereq.: A course in developmental psych. and permission of instructor.
Repeatable in the foll. qtr. to a maximum of 5 cr. hrs.
The student is assigned a normal child for individual study: observation of the child’s behavior at home, at school, in varied social situations (using tests where appropriate); coordination of information obtained from records and interviews and a weekly report. Werne.

560 U G 3
Educational Psychology
Su. 3 cl.
Prereq.: 10 cr. hrs. in psych.
Critical appraisal of the implications for education of modern psychological findings in advanced educational psychology.

571 U 3
Psychology of Developmental Disability
A, W. 3 cl.
Prereq.: 10 cr. hrs. in psych. or permission of instructor.
The psychological problems of exceptional children including learning disorders, sensory defects, physically handicapped, emotionally disturbed, and other developmental disabilities. Edmonson.

589 U G 3
Honors Course
A, W, Sp. 3 cl.
Prereq.: Permission of departmental Undergraduate Program Committee.
Repeatable to a maximum of 9 cr. hrs.
A program of readings, conferences, and reports selected to provide maximum individual development and preparation for graduate study in the field. Owen, Erickson, and Shulman.

600 U G 4
Psychology of Learning
Su. A. 4 cl.
Prereq.: 101 or equiv.
The principles that underlie the discovery, fixation, and retention of new modes of human behavior; emphasis on theoretical formulation of the necessary conditions of learning and forgetting. Johnson and Wickers.

601 U G 3
Comparative Psychology
A. 2 cl., 1 2-hr. lab.
Prereq.: 20 cr. hrs. in psych. or permission of instructor.
Principles of animal behavior, with emphasis upon the contributions of zoology and B. F. Skinner. Hothersall.

603 U G 3
Visual Perception
W. 3 cl.
Prereq.: 310 or permission of instructor.
Not open to students with credit for 503.
Phenomena, theory, and methods in the study of vision and visual perception as a model for sensory and perceptual processes. Owen.

609 U G 3
Introduction to Markov Learning Models
A. 2 1½-hr. cl.
Prereq.: 220 and 221.

An introductory review of model building in psychology with special emphasis on Markovian mathematical techniques; detailed examination of two or three Markovian learning models. Erickson.

610 U G 3
Introduction to Quantitative Learning Models
W. 3 cl.
Prereq.: 609.
A continuation of 609; emphasis on non-Markovian models.

611 U G 3
Educational Testing
Su. 3 cl.
Prereq.: 15 cr. hrs. in psych.
A service course for those majoring in elementary and secondary education, guidance, school psychology, and school administration; stress on use of measurements in school.

612* U G 3
Laboratory and Psychological and Educational Measurement
A. 1 cl., 4 lab. hrs.
Prereq.: 511 or 611 or equiv.
Repeatable to a maximum of 6 cr. hrs.

612.01* Administration and Scoring Procedure for Group Tests
612.02* Construction of Achievement Tests
612.03* Construction of Aptitude and Ability Tests
612.04* Construction of Personality Tests

615 U G 3
Introduction to Mathematical Psychology
W. 3 cl.
Prereq.: 510 or equiv.
Survey of current topics in mathematical psychology; topics include measurement and scaling, decision theory, signal detection theory, information theory, and mathematical learning theory.

620 U G 3
Human Performance
A, Sp. 3 cl.
Prereq.: 310 and 312 or permission of instructor.
Traces the flow of information through the human performer; topics include attention, memory, decision making, and feedback. Shulman.

621 U G 5
Psychology of Individual Effectiveness
W. 5 cl.
Prereq.: 521 or grad. standing.
Measurement of individual and organizational attributes; models for predicting effectiveness; perception, learning, information processing, decision-making as processes determining effectiveness. Hakel.

622 U G 3
Psychology of Organizational Effectiveness
Sp. 3 cl.
Prereq.: 621.
Central concepts of organization, and analysis of underlying behavioral assumptions; social processes as constraints on organizations; measurement of organizational outcomes; theory of organizational processes. Wood.
623 U G 3
Human Motivation
A. 3 cl.
Prereq.: 220 or permission of instructor.
Overview of theory and research in the explanation of the direction and level of human behavior in real life settings. Wood.

630 U G 3
Psychology of Public Attitudes
W. 3 cl.
Prereq.: 320 and 220 or equiv.
Attitude organization and change; study of the determinants of attitude. Ostrom.

631 U G 3
Differential Psychology
W. 3 cl.
Prereq.: 220 or 510.
Critical consideration of the traits wherein individuals and groups differ; factual data as to differences between men and women, races and ethnic groups, social classes, etc.

632† U G 3
Prejudice and Personality
A. 3 cl.
Prereq.: 220.
Social psychological theories of group conflict; personality dynamics in prejudice; approaches to the reduction of intergroup hostility.

635† U G 3
Psychology in Eastern Europe
W. 1 3-hr. cl.
Prereq.: 10 cr. hrs. in psych. or grad. standing or permission of instructor.
A survey of the approaches and bibliography of the psychology of human behavior with emphasis on the USSR. Brock.

651 U G 3
Psychology of Reading
Su, Sp. 3 cl.
Prereq.: 10 cr. hrs. in psych.
Psychological analysis of the reading process; the relationship of this to teaching and remedial methods; discussion of remedial reading techniques. Huelisman.

661 U G 3
Psychology of Aging
W. 2 cl.
Prereq.: 10 cr. hrs. in psych.
A survey of research and theory related to psychological changes through adulthood and old age. Jackson.

662 U G 3
Psychology of Creativity
A. 3 cl.
Prereq.: 15 cr. hrs. in psych. or permission of instructor.
A critical examination of conceptual, theoretical, and methodological problems related to the systematic study of creativity; special attention to background factors related to creative behavior. Clark.

663† U G 3
Hereditary Components of Human Behavior
Sp. 3 cl.
Prereq.: 15 cr. hrs. in psych. and 5 cr. hrs in hist. or permission of instructor.
Introduction to the hereditary aspects of human behavior including a survey of methodologies employed; presentation of major research findings for normal variations and clinical abnormalities.

671 U G 3
Principles and Economy of Learning
Su, Sp. 3 cl.
Prereq.: Grad. standing or 10 cr. hrs. psych.
The psychological principles involved in the practical control of learning activities, especially the more complex forms as seen in school and in industrial training. Engin.

680† U G 3
The Intellectual Deviate
Su, Sp. 3 cl.
Prereq.: Permission of instructor.
Theory and concepts of mental retardation, slow learner, intellectually gifted, causation, diagnosis, and treatment of social, personal, and educational problems of children so labeled.

682 U G 3
Principles of Treating the Problem Child
Sp. 3 cl.
Prereq.: 15 cr. hrs. in psych.
Methods used in dealing with behavior and personality problems of children.

684 U G 3
Delinquent Children
A. 3 cl.
Prereq.: 15 cr. hrs. in psych.
The meaning and significance of delinquency in a cultural context; its psychological basis from a theoretical and empirical framework; present modes of detection and treatment. Angelina.

693 U G 1-15
Individual Studies
Prereq.: 15 cr. hrs. in psych. and permission of instructor.
Repeatable to a maximum of 30 cr. hrs. for undergraduates and to a maximum of 45 cr. hrs. for graduates.
Individual reading or research projects by special agreement between instructor and student.

Introduction to National Security
(See Nat. Sec. Pol. S. 702.)

Research Principles and Techniques in National Security
(See Nat. Sec. Pol. S. 785.)
Laboratory in Industrial Psychology
1 cl., 4 lab. hrs.
Prereq.: 510 or equiv. and permission of instructor.
Repeatable in different sections to a maximum of 12 cr. hrs.

Attitude and Morale Scales
W.
Wood.

Measurement of Individual Effectiveness
Sp.
Hake.

Measurement of Organizational Effectiveness
A.
Wood.

Merit Rating
Su.
Wherry.

Group Studies
Su, A, W, Sp. 3 cl.
Prereq.: 15 cr. hrs. in psych. at 500 level or above and permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
The topics vary from quarter to quarter and will be announced at least one month in advance.

Advanced Experimental Laboratory
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Advanced training in the experimental and quantitative methods in the several areas of general experimental psychology and comparative psychology. Exper.

Seminar in National Security Research
(See Nat. Sec. Pol. Sci. 801.)

Advanced Theoretical Psychology
Sp. 4 cl.
A description and evaluation of the major advanced psychological behavior theories. Wickens.

Advanced Psychology of Motivation
Sp. 3 cl.
Prereq.: 20 cr. hrs. in psych. including 311 or 600 or permission of instructor.
An evaluation of the experimental and theoretical material on: physiological drives; development and maintenance of secondary motives; perception and motivation, conflict. Spitzner.

Theories of Perception
Sp. 3 cl.
Prereq.: 310 and 501 or permission of instructor.
Theoretical interpretations of the phenomena, problems, and experimental data of perception, including influences of development and learning. Owen.

Advanced Comparative Psychology
Sp. 3 cl.
Prereq.: 601.
Contemporary literature in comparative psychology. Hothsall.

Psychophysiology of the Special Senses
Su. 3 cl.
Prereq.: 502 or 503 or permission of instructor.
A survey of the basic physiology of the senses and the peripheral nervous system; emphasis on receptor mechanisms and neural coding processes.

Neuropsychology I
A. 3 cl.
An introduction to the principles governing neural integrative mechanisms; morphology of nervous systems of the vertebrates; transmission in individual neurons; properties of junctions in integrative networks; elementary laws or reflex action. Meyer.

Neuropsychology II
W. 3 cl.
Prereq.: 806.
Functional differentiation of the nervous systems of vertebrates; properties of principle division of the brain; organizations of the forebrain; mechanisms of sleep and waking rhythm; mechanisms of perception. Meyer.

Neuropsychology III
Sp. 3 cl.
Prereq.: 807.
Neural mechanisms of motivation and behavioral plasticity; control of major cyclical phenomena, including hunger, thirst, and reproduction; reactions to aperiodic and continued stresses; mechanisms of the learning process. Meyer.

History and Systems of Psychology
A. 3 cl.
Prereq.: 16 cr. hrs. in psych.
Development of psychology from the philosophcal antecedents to its present status as a science and a profession; assignments in original sources as far as possible. Hothsall.

Methodological Foundations of Experimental Psychology
W. 5 cl.
Problems of definition of psychological concepts, formulation and testing of hypotheses, theory, construction, and formulation of empirical generalization with reference to design of psychological experiments. Johnson.

Seminar in Experimental Psychology
Su, A, W. 2 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
812+  G 1
Contemporary Psychological Literature
Sp.  1 cr.
Briggs.

813  G 3
Psychology as Science and Profession
A.  3 cr.
Open only to graduate students in Psych.
Orientation for incoming graduate students, including
the roles and responsibilities of psychologists, a
departmental history, and a sampling of current
substantive interests and research methodologies.

814  G 3
Psychophysiology of Behavior Disorders
W, Sp.  3 cr.
Prereq.: 502 or 806 or permission of instructor.
An examination of current experimental research on
the neuro-electrical, neuro-chemical, CNS structural
correlates of behavior disorders.

815  G 3
Decision Processes
A.  3 cr.
Prereq.: Grad. standing in Psych., undergrad.
Introductory statistics strongly recommended.
Introductory course in the application of statistical
decision theory as a normative model and analytic
technique in the experimental study of cognitive
processes.

816  G 3
Human Performance Theory
W.  3 cr.
Prereq.: 620 or permission of instructor.
Research and theory on the discrete and on the con-
tinuous cases of human information processing; topics
include input processes, central processing functions,
and output processes. Briggs.

817  G 3
Seminar in Human Performance
A, W, Sp.  3 cr.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Briggs, Shulman, and Wise.

819  G 2
Seminars in Industrial Psychology
2 cr.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
  a. Psychology of Individual Effectiveness.
  b. Psychology of Organizational Effectiveness.
     W. Klimentoski.
  c. Human Motivation.
     W. Wood.
  d. Theoretical Developments and Issues.
     A. Klimentoski.
     Su, Sp.
     Hakel.

821  G 2
Research Seminar in Industrial Psychology
A, W, Sp.  2 cr.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Advanced training in the psychology of individual and
organizational effectiveness, emphasizing quantitative
and experimental methods. Hakel, Klimentoski, and Wood.

822  G 3
Psychological Assessment
Su, A.  3 cr.
Prereq.: 510.
A critical survey and evaluation of concepts and
techniques of assessment of intelligence, special
aptitudes, and personality. Damarin.

823+  G 3
Theory of Test Construction
W.  3 cr.
Prereq.: 511 or 611 or equiv.
Review of major approaches including traditional
mental test theory, assessment theory, and decision
theory in relation to constructing and use of various
types of tests. Damarin.

824  G 2
Seminar in Psychological Measurement
2 cr.
Prereq.: Permission of instructor.
824.01* The Measurement of Cognitive Functions
W.
Damarin.
824.02 Models for Psychophysics
W.
Issac.
824.03 Models for Psychological Scaling
Sp.
Issac.
824.04+ Models for Psychological Testing
Damarin.
824.05 Models for Interpersonal Analysis
A.
Ostrom.

825  G 4
Statistics in Psychology I
A.  3 cr., 2 lab. hrs.
Prereq.: Grad. standing in Psych.
First of a two-quarter sequence in inferential statistics;
basic concepts of sets, probability, distributions, and
foundations of inference and estimation; special
applications to psychology. Isaac.

826  G 4
Statistics in Psychology II
W.  3 cr., 2 lab. hrs.
Prereq.: 825 or equiv.
Continuation of 825; theoretical justification and uses of various inferential techniques; topics: t, X², F distributions, correlation and regression, non-parametric techniques. Briggs.

827  G 4
Analysis of Variance
Sp. 4 cl.
Prereq.: 825 and 826, or equiv.
A coverage of statistical inference in analysis of variance designs; analysis of variance designs include randomized blocks, repeated measures, mixed models, and related contrast tests.

828  G 4
Correlational Analysis
Sp. 4 cl.
Prereq.: 810 or permission of instructor.
Techniques and rationale of using quantitative and qualitative data for prediction; test and battery analysis and validation. Wherry.

829  G 4
Quantitative Foundations of Psychological Statistics
W. 4 cl.
Prereq.: 510 or equiv.
Principles and techniques for deriving statistical equations; their modification to handle special cases; clarifying assumptions and their application. Erickson.

830  G 3
Machine Programming for Psychological Research
Su. 3 cl.
Prereq.: 828, Math. 241, and permission of instructor.
An introduction to mnemonic symbolic language and loop theory; applications to the more common psychological statistical problems will be stressed. Wherry.

831  G 2
Seminars in Psychological Statistics
2 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
  a. Analysis of Variance.
     A. Briggs.
  b. Experimental Design.
     Su. W.
     Isaac.
  c. Factor Analysis.
     A. Wherry.
  d. Mathematical Models and Theory.
     Sp.
     Jones.
  e. Non-Parametric Statistics.
     W.
     Wherry.
  f. Advanced Experimental Design.
  g. Advanced Multivariate Analysis.
  h. Computer Simulation Research.

834  G 3
Psychology of Infancy
A. 3 cl.
Prereq.: 825 or permission of instructor.
Not open to students with credit for 550.
Psychological development during the first four years of life with particular reference to neonatal period and research methodology in studies involving infants. Wenar.

835  G 3
Child Development
A. 3 cl.
Prereq.: 837 or permission of instructor.
Major developmental aspects of childhood; review of theory, methodology, research studies, and historical and contemporary writing about children; consideration of interdisciplinary approaches. Thompson.

836  G 3
Adolescent Development
Sp. 3 cl.
Prereq.: 837 or permission of instructor.
Major developmental aspects of adolescence; review of theory, methodology, research studies, and historical and contemporary writing about adolescents; consideration of interdisciplinary approaches. Horrocks.

837  G 3
Nature and Direction of Human Development
A. 3 cl.
Critical consideration of human development, selected theories and methods of investigation including units of measurement; emergence of mind considered through the phylogenetic and ontogenetic sequence. Horrocks.

838  G 2
Interaction of Developmental Learning Function
W. 2 cl.
Prereq.: 550 or 835 and 680 or 671 or equiv.
Relation of empirical data on imprinting, sensory and motor deprivation, and environmental extensions upon theoretical construction designed to integrate such data. Thompson.

839*  G 3
Comparative Child Rearing Practices
A. 3 cl.
Prereq.: 835 and 836 or equiv., and Anthro. 520 and permission of instructor.
Comparative survey of familial and community childrearing practices in modern and primitive cultures; psychological and theoretical implications of various practices; review of research methodology. Angelino.

840  G 3-8
Practicum in Developmental Psychology
Prereq.: 2nd yr. grad. standing in Psychol., 837, 838 and permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Observation of children in a representative variety of clinical settings with particular reference to developmental phenomena of growth and behavior; application of research, diagnostic and intervention methodology. Helper, Leland, and Wenar.
841   G 1
Symposium in Developmental Literature
Su. 1 cl.
Prereq.: Permission of instructor.
Critical review of current research literature in
developmental psychology. Horrocks.

842   G 3
Seminar in Developmental Psychology
2 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
      W. Horrocks.
   b. Development of Dimensions of Cognitive
      Functions.
   c. Development of Social Attitudes and Values.
      Sp.
      Helper.
   d. Cultural Influences on Human Development.
      Sp.
      Clark.
   e. Psychological Variables in Growth.
      A.
      Wenar.
   f. Development of Creative Behavior.
      A.
      Clark.
   g. Deviate Behavior in Childhood and Adolescence.
      A.
      Horrocks.
   h. Phylogenesis.
   i. Aging and Senescence.
   j. Sequelal Phenomena of Growth and
      Degeneration.
      Su.
      Damarin.
   k. Developmental Aspects of Language.

843   G 3
Theories of Human Development
W. 3 cl.
Prereq.: 837.
Comparative presentation of significant major
historical and modern developmental theories
with specific evaluation of their relevance in the formulation
of a comprehensive psychological theory. Horrocks.

844   G 2
Psychopathology of Childhood
W. 2 cl.
Prereq.: 837 and permission of instructor.
A study of psychopathological conditions of childhood,
such as autism, schizophrenia, neurosis, acting out,
and behavior problems from a developmental point of
view. Wenar.

845   G 3
Child Psychotherapies
W. 1 2% cr.-hr. cl.
Prereq.: 844 or equiv. and permission of instructor.
Study of several major modes of psychotherapy with
children; consideration of theoretic foundations,
principal techniques, range of applicability, and
presumed means of effecting change. Rie.

846   G 3
Advanced Educational Psychology
A. 3 cl.
Prereq.: Permission of instructor.
Critical consideration of research and theory in
developmental learning and measurement as relevant
to education; special attention to historical positions,
assumptions, and current literature. Clark.

847†   G 2
Psychological Problems in Higher Education
Sp. 2 cl.
Designed to give graduate students preparing for
college teaching positions contact with current
educational research regarding the psychological
problems they will encounter. Horrocks.

848   G 2
Seminar in the College Teaching
of Educational Psychology
A, W, Sp. 2 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
The objectives of educational psychology in teacher
education; a presentation of practical problems in
organization, development, and evaluation of
undergraduate courses in educational psychology.
Angelino and Kaul.

849   G 2
Seminar in Educational Psychology
A, W, Sp. 2 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
Angelino and Clark.

850   G 3
Adaptive Behavior and Developmental Disability
Sp. 3 cl.
Prereq.: 857 or permission of instructor.
Overview of the psychology of adaptation and its
relationship to the classification, assessment, and
modification of mental retardation and developmental
disability. Leland.

852†   G 3
Behavioral Change Techniques with Children
W, Sp. 1 cl., 4 lab. hrs.
Prereq.: 600 or equiv. and permission of instructor.
Research and theory on behavior change methodology;
practice with behavior change techniques with
emphasis on helping children with learning and
adjustment problems in school.

852.01 Behavior Modification
Theory and practice of behavior modification;
emphasis on experience with individual children and
consultation within the school setting.

852.02 Group Behavior Modification
Theory and practice of group behavior modification,
with an emphasis on the management of classroom
behavior.
853 G 3 Psychology of the Exceptional Child and Adult
Su. 3 cl.
Review and evaluation of theoretical and research literature concerning exceptional children and adults. Leland and Edmonson.

854† G 3 Psychological and Child Study Services in the Public Schools
Su, Sp. 3 cl.
Prereq.: Permission of instructor.
Professional problems in school psychology.

855† G 3 Child Behavior Assessment and Consultation
1 cl., 4 lab. hrs.
Prereq.: Permission of instructor.
Theory of psychological assessment and consultation; practice in observation, interviewing, testing, documentation of behavior, writing reports and consulting on the learning and behavioral problems of children.

855.01 Assessment of Intelligence
Theories of cognitive functioning; practice with individual intelligence tests.

855.02 Assessment of Personality and Behavioral Disorders in Children
Cognitive, psychodynamic and phenomenological approaches to the assessment of personality in children, including practice with projective and self-report techniques.

855.03 Assessment of Sensory, Motor, and Language Impairment in Children
Theories of learning disability and practice with special techniques for the assessment of sensory, motor, and language impairments in children.

855.04 Introduction to Child Behavior Assessment and Consultation
Conceptual bases for assessment and consultation; acquisition of skills in observation and diagnostic interviewing; introduction to case records and reporting.

855.05 Advanced Practicum in Psychological Assessment and Consultation
Repeatable to a maximum of 9 cr. hrs.
Comprehensive child study and consultation under intensive supervision in selected educational and clinical settings.

856† G 1-3 Seminar in School Psychology
A, W, Sp. 3-3 cl.
Prereq.: Permission of instructor.
Two sections (a and b) are given and may be taken concurrently.

857 G 4 Psychological Problems in Mental Retardation
A. 4 cl.
Prereq.: Permission of instructor.
Advanced study of psychological aspects of mental retardation; topics include theories of mental retardation, studies of sensory and perceptual processes, cognitive chronically ill and neurologically impaired. Leland.

858† G 4 Psychological Problems in Physical Disability
Sp. 4 cl.
Prereq.: Permission of instructor.
Advanced study of cognitive and non-cognitive functioning in those with motor and sensory disabilities, and the chronically ill and neurologically impaired.

859 G 2 Seminars in the Psychology of Exceptional Children and Adults
W, Sp. 2 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
Advanced topics in research strategies and methodology; specialized topics on the growing edge of the psychology of exceptional children and adults. Angelino and Leland.

860† G 3 Theories of Personality
A. 3 cl.
Prereq.: Advanced work in personality and social psych. and permission of instructor.
A critical consideration of the theories of personality structure and origin. Mirels.

861 Clinical Psychology
Prereq.: Permission of instructor.
Introduction to the theory and use of clinical methods in psychology, designed for first-year graduate students in clinical psychology. Kaswan.

861.01 Lecture G 3
A. 3 cl.
Repeatable to a maximum of 9 cr. hrs.

861.02 Seminar and Practicum G 2
A. 1 or 2 cl. and/or 2-4 lab hrs.
Repeatable to a maximum of 6 cr. hrs.

862 Problems of Human Behavior
Prereq.: Permission of instructor.
Introduction to the study of human behavior problems; practicum involves observation and participation in field settings. Kaswan.

862.01 Lecture G 3
W. 2 cl.
Repeatable to a maximum of 6 cr. hrs.

862.02 Practicum G 1 or 2
W. 2-4 lab hrs.
Repeatable to a maximum of 6 cr. hrs.

863 Psychological Dynamics
Prereq.: Permission of instructor.
Special topics in the study of behavior.

863.01 Lecture G 3
Sp. 3 cl.
Repeatable to a maximum of 9 cr. hrs.

863.02 Practicum G 2
Sp. 2-4 lab hrs.
Repeatable to a maximum of 6 cr. hrs.
Psychological Appraisal

Prereq.: Permission of instructor.
Courses (except 864.01) ordinarily involve both classroom and practicum experiences.
Concepts and procedures for appraising human behavior.

864.01 Lecture
Sp. 3 cl.
Theories and methods of psychological appraisal; integration of different theories and approaches.

864.02 Cognitive Appraisal
Sp. 1-5 cl. and/or 8 lab. hrs.
Repeatable to a maximum of 8 cr. hrs.

864.03 Projective Appraisal
W. 1-4 cl. and/or 2-8 lab. hrs.
Repeatable to a maximum of 8 cr. hrs.

864.04 Actuarial Appraisal
W. 1-4 cl. and/or 2-8 lab. hrs.
Repeatable to a maximum of 8 cr. hrs.

864.05 Behavior Analysis
A. 1-4 cl. and/or 2-8 lab. hrs.
Repeatable to a maximum of 8 cr. hrs.

864.06 Special Topics
W. 1-4 cl. and/or 2-8 lab. hrs.
Repeatable to a maximum of 8 cr. hrs.

Group Interventions

A. Sp. 1-5 cl. and/or 2-10 lab. hrs.
Prereq.: Permission of instructor.
Courses ordinarily involve both classroom and practicum experience.
Each decimal subdivision repeatable to a maximum of 15 cr. hrs.
Principles and practices of intervention through group processes.

865.01 Group Psychotherapy
865.02 Family Therapy
865.03 Interventions in Organized Groups
865.04 Encounter Group Processes
865.05 Novel and Experimental Group Processes

Interventions with Individuals

A, W, Sp. 1-5 cl. and/or 2-10 lab. hrs.
Prereq.: Permission of instructor.
Courses ordinarily involve both classroom and practicum experience.
Each decimal subdivision repeatable to a maximum of 15 cr. hrs.
Concepts and practices of various interventions into the troubled behavior of individuals.

866.01 Individual Psychotherapy
866.02 Behavior Modification
866.03 Existential and Humanistic Approaches
866.04 Novel and Experimental Approaches

Seminar in Clinical Abnormal Psychology

A, W, Sp. 2 cl.
Prereq.: Permission of instructor.
Two sections may be offered in any one qtr.

Community Psychology

A, W, Sp. 2 cl., 6 lab. hrs.
Prereq.: 2nd yr. of grad. study; permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Given as a year sequence. No new students will normally be admitted for the Winter and Spring Quarters.
Integrate ecological, social, and interpersonal variables in the analysis and change of behavior; participant observation and research in community settings.
Kaszren

Research Methodology

W. 2 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 24 cr. hrs.
Discussion of conceptual and methodological issues related to the ongoing work of graduate students and faculty.

Advanced Social Psychology

A. 3 cl.
Prereq.: 25 cr. hrs. in psych. including 320 and 402 or 600 or equiv.
Problems of learning and perception relative to the social environment, the influence of culture in the development of individual behavior patterns, and related topics.
Brock.

Counseling and Therapy as Social Institutions

A. 3 cl.
A review of diverse counseling and therapeutic practice as belief and ritual, with emphasis upon the manifest and latent functions in American society.
Pepinsky and Schmidt.

Social Psychology Laboratory

A, W, Sp. 2 cl., 2 lab. hrs. for each additional cr. hr.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Advanced training in methods and data collection in the areas of social psychology, laboratory, and field experience. Brock, Greenwald, Latane, and Ostrom.

Seminar in Social Psychology

3 cl.
Prereq.: Permission of instructor.
a. Contemporary Attitude Theory and Research.
   W. Brock and Greenwald.
b. Social Structure and Personality.
   Sp.
   Ostrom.
   W.
   Brock.
d. The Psychology of Social Movements.
   W.
e. Current Research Trends.
   Sp.
   Greenwald.
874 G 3
Cognitive Processes
A. 3 cl.
Prereq.: 20 cr. hrs. in psych. or permission of instructor.
Theories of complex information processing functions and their acquisition; special attention to the role of language in complex perceptual and motor performances. Greenwald.

875 G 4
Practicum in Social Psychology
A, W, Sp. 2 cl., 2 lab. hrs.
Prereq.: Grad. standing in Psych. or permission of instructor.
Survey and supervised experience in using the technique and research designs of social psychology. Brock.
875.01 Practicum in Social Psychology I
A, W, Sp. 2 cl.
875.02 Practicum in Social Psychology II
W, Sp. 2 cl.
875.03 Practicum in Social Psychology III
W, Sp.

881 G 2
Administrative Leadership in Counseling and Personnel
A, W, Sp. 2 cl.
Prereq.: Permission of instructor.
Advanced graduate students relate organizational theory and concepts of interpersonal relations to administrative practice in educational and community settings. Stewart and MacMinn.

882
Psychology of Counseling
Prereq.: 13 cr. hrs. in psych., and (for the practicum) permission of instructor.
Assumptions and facts fundamental to counseling; factors in the interview situation; nature of counseling techniques; resources in counseling; relation of counseling to other personnel procedures.
882.01 Lecture
Su, A, W. 3 cl.
Schmidt.
882.02 Practicum
A. 4 lab. hrs.
Dell and Kaul.

883
Counseling Diagnostics
Prereq.: 510 or equiv., 511 or equiv., and (for lab.) permission of instructor.
Theory and application of interview data, observed behavior, test results, and biographical information as a basis for diagnostics in counseling and evaluation.
883.01 Lecture
W. 3 cl.
Fletcher.
883.02 Practicum
W. 4 lab. hrs.
Fletcher.

884 G 3
Psychology of Career Development
884.01 Lecture
Sp. 3 cl.
A survey and critical analysis of literature and research regarding effects of sequence of work activity, vocational exploration, and career development. Oasipow.
884.02 Laboratory
Sp. 1.2 hr. lab.
Prereq.: 882 or equiv. and permission of instructor.
A series of practical exercises designed to apply the principles of the psychology of career development. Oasipow.

885 G 3
Beginning Practicum in Counseling
Prereq.: 883 and permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
Supervised practice in assisting college students in their adjustment to college; emphasis on diagnosis and treatment; special help given to interviewing procedures. Stewart and Walsh.

886 G 2-3
Advanced Practicum in Counseling
A, W, Sp. 1 cl., 2 lab. hrs. for each hr. of additional cr.
Prereq.: 885 and permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Supervised practice in (a) assisting college students and adults with problems of personality adjustments or (b) supervising techniques through observation and discussion of work with other counselors.

887 G 2
Seminar in Counseling Psychology
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

888 G 3
Psychological Study of Individuals and Groups
W. 3 cl.
Prereq.: Permission of instructor.
Not open to students with 6 cr. hrs. in 650.
Basic concepts and techniques of student personnel work. Rodgers.

899 G 1-5
Interdepartmental Seminar
Sp (See under Interdepartmental Seminars.)

900 G 1-15
Supervised Field Experience in Psychology
Prereq.: Psych. 2nd yr. standing and approval of local staff of area in which student is specializing. (Supervised by member of local staff and some member of the outside agency approved by the Dept. of Psych.) Repeatable to a maximum of 30 cr. hrs.
Supervised experience, either research or operational, in any agency doing professional psychological work such as a school system, a psychological clinic, an industrial personnel department, or a counseling center.
Public Administration

Office: 302 Hagerty Hall, 1775 College Road

Professors: Oster (Director), Carroll, Hunker, Lundstedt, Lynn, Snyder, Stocker, and Widner; Associate Professors Hovey, Mullins, Retig, and Stanley; Assistant Professors Guyea and Krasniewski.

800 G 3
Research Methods in Public Administration
Sp. 1 3-hr. cl.
Methods of research in public administration including the design of thesis and dissertation proposals.

801 G 3
Introduction to Public Administration
A. 1 3-hr. cl.
Critical analysis of the environmental constraints upon the problem-solving role of the administrator in the public sector environment; examination of structure, processes, and problems. Carroll and Retig.

802 G 3
Legal Environment of Public Administration
W. 1 3-hr. cl.
An examination and analysis of the constraints imposed upon public administrative processes by the legal environment including judicial policy-making and the evolving legal order. Lynn.

803 G 3
Seminar on Public Policy Formulation
Sp. 1 3-hr. cl.
Prereq.: 801 and 802.
Study of the policy formulation process in a political setting emphasizing the management or resolution of conflict within a public bureaucracy; selected cases. Lundstedt.

804 G 3
Seminar on Governmental Information Systems Administration
A. 2 3½-hr. cl.
Prereq.: Acc. 712 or equiv. or permission of instructor.
Critical study of the administration and design of management information systems for public agencies; selected case studies. Lundstedt.

805 G 3
Seminar on Systems Analysis for Public Policy Decisions
W. 2 3½-hr. cl.
Prereq.: 801, 802, 803, 804, Econ. 501, and Bus. Admin. 801.02 or permission of instructor.

Studies in the application of systems analysis to administrative and policy problems in the public sector; selected case studies and problems. Mullins.

806 G 3
Seminar on Planning and Program Budgeting
Sp. 2 3½-hr. cl.
Prereq.: 804 or equiv. and Econ. 501 or equiv. or permission of instructor.
Critical analysis of the administration and design of a planning, programming, and budgeting system; examination of case studies emphasizing applied and theoretical problems. Mullins.

850 G 3
Policy Problem Seminar I
W.
Prereq.: Permission of instructor.
Multidisciplinary seminar integrated with field experience in the solution of actual public administrative and policy problems; organized around problem areas.

851 G 3
Policy Problem Seminar II
Sp.
Prereq.: 850.
Continuation of 850.

860 G. Arr.
Seminar on Advanced Problems in Public Administration
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs. in any one subdivision.
Special studies of selected problems which may include readings, case studies, internships, field investigations, simulation, systems analysis, role playing, team teaching, and other experimental techniques.

860.01 Comparative Administration
860.02 Correction Administration
860.03 Defense Policy Administration
860.04 Development Administration
860.05 Fiscal Administration
860.06 Health Services Administration
860.07 Information Systems Administration
860.08 Municipal Administration
860.09 Natural Resources Administration
860.10 Personnel and Labor Relations Administration
860.11 Planning Administration
860.12 Research Administration
860.13 Urban Affairs Administration
860.14 Welfare Administration
860.99 Special

998 G Arr.
Research in Public Administration: Thesis
Repeatable to a maximum of 6 cr. hrs.
Research for thesis purposes only.

999 G Arr.
Research in Public Administration: Dissertation
Repeatable to a maximum of 45 cr. hrs.
Research for dissertation purposes only.
RADIOLeGIC TECHNOLOGY

201 U 2
Introduction to Radiologic Technology
Su. 2 cl.
Prereq.: Permission of instructor.
An orientation to radiologic technology including the history of the profession, responsibilities of the technologist, professional development, radiation protection, areas of specialization, and hospital organization.

411 U 9
Radiographic Procedures I
Su. 2 cl., 1 2-hr. lab., 24 hrs. clinical experience.
Prereq.: Permission of instructor.
Analysis of theory in radiography of the chest, the abdomen, and its contents with application of theory in the laboratory and clinical facilities. Ballinger and Staff.

412 U 9
Radiographic Procedures II
A. 2 cl., 1 2-hr. lab., 24 hrs. clinical experience.
Prereq.: Permission of instructor.
Continuation of 411 emphasizing the appendicular skeleton and bony thorax. Ballinger and Staff.

413 U 9
Radiographic Procedures III
W. 2 cl., 1 2-hr. lab., 24 hrs. clinical experience.
Prereq.: 412 or permission of instructor.
A study of the radiographic process, including the vertebral column, pelvis, and skull. Ballinger and Staff.

420 U 3
Radiographic Processing
Su. 2 cl., 1 2-hr. lab.
Prereq.: Permission of instructor.
A study of the photographic process with emphasis on processing methodology and the effects of the chemical components on the radiographic film. Ballinger and Staff.

430 U 3
Radiographic Exposure
Su. 2 cl., 1 2-hr. lab.
Prereq.: Permission of instructor.
A study of radiation and its effects on the production of an acceptable radiograph. Ballinger and Staff.

471 U 3
Radiologic Physics I
A. 2 cl., 1 2-hr. lab.
Prereq.: Physics 112 or permission of instructor.
A study of the production of X rays including X-ray circuitry. Dare.

472 U 3
Radiologic Physics II
W. 2 cl., 1 2-hr. lab.
Prereq.: 471 or permission of instructor.
A continuation of 471 emphasizing the interaction of radiation with matter, units of radiation measurement, and radiation protection. Dare.

530 U 3
Advanced Radiographic Exposure
A. 2 cl., 1 2-hr. lab.
Prereq.: Permission of instructor.
In-depth study in establishing radiographic exposure values in new installations or when equipment is changed. Ballinger and Staff.

540 U 6
Clinical Experience in Radiologic Technology
Prereq.: Permission of instructor.
Clinical application of radiographic technics in the Radiology Department of The Ohio State University Hospitals. Ballinger and Staff.

555 U 5
Nuclear Medicine Technology
Sp. 1 cl., 12 hrs. clinical experience.
Prereq.: Permission of instructor.
Identification of radioactive pharmaceuticals and a study of their use in patient diagnosis with application of theory in the nuclear medicine laboratories. Esken and Riccobono.

556 U 5
Pediatric Radiography
Sp. 1 cl., 12 hrs. clinical experience.
Prereq.: Permission of instructor.
Analysis of theory in pediatric radiography with application in the clinical facilities of Children's Hospital. Gabbard and Groff.

557 U 5
Radiation Therapy Technology
Sp. 1 cl., 12 hrs. clinical experience.
Prereq.: Permission of instructor.

565 U 2
Departmental Operation
W. 1 2-hr. cl.
Prereq.: Permission of instructor.

590 U 4
Special Radiographic Procedures
W. 2 cl., 8 hrs. clinical experience.
Prereq.: Permission of instructor.
Therapy and clinical experience in cardiovascular, neurological, and other specialized radiographic procedures. Ballinger and Staff.
Radiology

Office: N-208 University Hospital, 410 West 10th Avenue

Professors Nelson (Chairman), Batley, Christoforidis, Molinar, and Meyers; Associate Professors Riccobono, Sopp, and Stockum; Assistant Professors Ehlers, Goldstein, Hart, Kartha, and Weber.

670 UPG2
Medical Radiation Physics
Sp. 2 cl.
Prereq.: Permission of instructor.
Ionizing radiations, their production, properties and interaction with materials of medical interest; physical principles of radiation therapy, radiation dosimetry, and radiation protection.

680 UPG2
Radiation Biology
A. 2 cl.
Prereq.: Permission of instructor.
Effect of ionizing radiation in biological systems at the molecular, cellular, organ, organism, and community levels with special emphasis on medical implications and radiation safety.

740 P 6, 12, 18
Clinical Radiology
1, 2, 3, or 4 months; offered all months except June, July, Aug.
Prereq.: Permission of instructor.
Repeatable to a maximum of 24 cr. hrs.
Participation in special seminars and clinics; optional research project.
a. Radiologic diagnosis.
b. Radiation therapy.

750 P 1
Advanced Radiology
1 month, offered Oct. and Feb.
Prereq.: Med. 4th yr. standing.
Clinical clerkship in the Department of Radiology, University Hospital; instruction in radiation therapy and film reading techniques.

793 P 6, 12, 18
Individual Studies
1, 2, 3, or 4 months; offered all months except June, July, and Aug.
Prereq.: Permission of instructor.
Repeatable to a maximum of 24 cr. hrs.
Graduated participation in diagnostic and therapeutic radiology; optional research project after 6 credit hours in 793.

799 P 18
Residency in Radiology
12 months full time, beginning any month.
Prereq.: Appointment as resident, University Hospital.
Repeatable to a maximum of 216 cr. hrs.
General diagnostic radiology, nuclear medicine, and radiation therapy, special diagnostic and therapeutic procedures, consultations, and conferences.

999 G Arr.
Research in Radiology
Research for thesis purposes only.

Respiratory Technology

(School of Allied Medical Professions)

Office: 431 School of Allied Medical Professions
Building, 1583 Perry Street

Instructor Haaland (Division Director) and Morgan;
Clinical Instructors Gerber and Hannan.

480 Respiratory Technology
Prereq.: Permission of instructor.

480.05 Components of Respiratory Health
Repeatable to a maximum of 3 cr. hrs.
Survey of normal respiratory mechanisms, the respirable environment, and the role of the technologist. Haaland and Staff.

480.10 Basic Respiratory Technology
Repeatable to a maximum of 3 cr. hrs.
Administration of therapeutic gases and aerosol agents. Haaland and Staff.

480.201 Respiratory Mechanics
Repeatable to a maximum of 3 cr. hrs.
Consideration of ventilatory dynamics, pulmonary circulation, and respirable gas exchange. Haaland and Staff.

480.30 Advanced Respiratory Technology
Repeatable to a maximum of 3 cr. hrs.
Consideration of design and application of mechanical ventilators. Haaland and Staff.

480.40 Interrelated Therapeutics
Repeatable to a maximum of 6 cr. hrs.
Study of mechanisms of specific disorders, as they relate to various therapeutic measures. Haaland and Staff.

480.50 Selected Studies in Respiratory Technology
Repeatable to a maximum of 5 cr. hrs.
Consideration of selected problems and procedures in respiratory technology. Haaland and Staff.

489 U 2-10
Clinical Experience in Respiratory Technology
Su, A, W, Sp. 6-30 hr. field experience a wk.
Prereq.: Permission of instructor.
Repeatable to a maximum of 34 cr. hrs.
Field experience in clinical respiratory technology and related areas. Haaland and Staff.
Romance Linguistics

Office: 248 Dieter Cunz Hall of Languages, 1841 Millikin Road

Professors Bulatkin (Chairman) and Griffin.

811 G 5
Romance Linguistics I
A. 5 cl.
Prereq.: Permission of instructor.
A general survey of the development of the Romance languages and an introduction to the basic materials and techniques of investigation. Griffin.

812 G 5
Romance Linguistics II
W. 5 cl.
Prereq.: 847 or permission of instructor.
Topics and problems, both synchronic and diachronic; special attention to the minor Romance languages. Griffin.

831* G 3-5
Seminar in Romance Linguistics
A, Sp.
Prereq.: Permission of instructor.
Griffin.

993 G 1-5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

994 G 1-15
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
Investigation of minor problems in the various fields of Romance Linguistics.

Rural Sociology

Office: 103 Agricultural Administration Building, 2130 Fyffe Road

Professors Boyne (Chairman), McCormick (Associate Chairman), Phillips (Associate Chairman), Adams, Bailey, Baker, Baker, Barr, Baumer, Cravens, Dougan, Ezell, Hadley, Ingraham, Jacobson, Jones, Mitchell, Sharp, Shaudys, Sitterley, Smith, Stout, Walker, Wayt, and Williams; Associate Professors Bauman, Darrow, Erven, Hahn, Himes, Marion, McDonald, Moore, Rask, Simmonds, Steele, Taylor, P. R. Thomas, Vandemark, and Wessel; Assistant Professors Bowen, Duvick, Francis, Glover, Henderson, Hitzhusen, Hushak, Larson, Lee, Li, Meyer, Napier, Singh, D. W. Thomas, and Watkins; Instructors Pierce, Pugh, and Tucker.

105 U 5
Introduction to Rural Sociology
A, W, Sp. 5 cl.
Not open to students with credit for Soc. 101 or 201.

RURAL SOCIOLOGY 409

110 - Socio Economic Systems in Rural America

Principles of society, major social institutions and social change; emphasizes social changes in rural life, rural organizations, population, and family living. Francis, Mitchell, Napier, Phillips, and Thomas.

265 U 3
Our Changing Rural Society
W. 3 1-hr. cl.
Prereq.: 105 or Soc. 101.
An examination of factors contributing to the maintenance of rural social systems and the conditions that facilitate change. Napier.

GENERAL PREREQUISITES FOR COURSES NUMBERED 300 AND 400

Unless otherwise indicated, the prerequisites for 300 and 400-level courses are 90 cr. hrs. in collegiate courses, exclusive of ROTC and Phys. Ed.; or specified course(s) numbered 100-399.

320 U 5
The Rural Family
A. 5 cl.
Prereq.: 105, Soc. 101, or 201.
Not open to students with credit for 310.
Structure and functions of rural families in changing societies. Phillips.

342 U 3
Rural Leadership
Su, Sp. 1 2-hr. cl., 1 2-hr. lab.
Prereq.: 105, Soc. 101, or 201.
Not open to students with credit for 317.
Basic principles and practices in the development of effective leadership in organization and community action programs; power structures and levels of leadership are examined.

GENERAL PREREQUISITES FOR COURSES NUMBERED 500

Unless otherwise indicated, the prerequisites for 500-level courses are 15 cr. hrs. in courses in the same discipline numbered 200 or higher, or 10 cr. hrs. in courses numbered 200 or higher in specified allied disciplines; or baccalaureate degree.

542 U G 5
Rural Social Organization
A. 4 cl., 1 2-hr. lab.
Not open to students with credit for 316.
Elements of social organization, functions of formal and informal social systems, process of making decisions in communities; analysis of actual rural community.

562 U G 3
Diffusion of Information on Agricultural Technology
Sp. 3 cl.
Not open to students with credit for 421.
The process by which new ideas diffuse to the farmer and homemaker; emphasis on the role of group influences, professional agricultural workers, and adoption leaders. Francis.
593 U G 2-5

Individual Studies
H593 (honors) may be available to students enrolled in a college honors program or eligible for enrollment.
Prereq.: Permission of instructor.
Each decimal subdivision repeatable to a maximum of 8 cr. hrs.
593.01 Human Population Problems
593.02 Rural Family
593.03 Rural Health
593.04 Rural Leadership
593.05 Rural Community and Institutions
593.06 Community Development
593.07 Diffusion of Technology
593.08 Research Methods in Rural Sociology
593.09 Social Organization and Administrative Problems
593.10 Sociology of Foreign Areas
593.11 Rural Church
593.12 Farmer Organizations
593.13 General Rural Sociology
593.14 Rural Social Problems

GENERAL PREREQUISITES FOR COURSES NUMBERED 600

Unless otherwise indicated, the prerequisites for 600-level courses are 15 cr. hrs. in courses in the same discipline numbered 300 or higher, or 10 cr. hrs. in courses numbered 300 or higher in the same discipline, plus 10 cr. hrs. in courses numbered 300 or higher in specified allied disciplines.

642 U G 5

Advanced Rural Sociology
W. 5 cr.
Prereq.: 15 cr. hrs. in Rur. Soc. and/or Soc. at the 300 level or higher.
Not open to students with credit for 600.
An advanced course on rural society dealing with fundamentals in rural social institutions and organizations, rural social change and nature of rural social systems. Napier.

662 U G 3

Rural Sociology of Developing Societies
W. 3 cr.
Prereq.: 105, Soc. 101, or 201.
Not open to students with credit for 422.
Sociological principles applied to analysis of present social systems and institutions of developing nations for students preparing for foreign service with rural societies. Francis.

693 U G 2-5

Individual Studies
H693 (honors) may be available to students enrolled in a college honors program or eligible for enrollment.
Prereq.: Permission of instructor.
Each decimal subdivision repeatable to a maximum of 8 cr. hrs.
693.01 Human Population Problems
693.02 Rural Family
693.03 Rural Health
693.04 Rural Leadership
693.05 Rural Community and Institutions
693.06 Community Development
693.07 Diffusion of Technology
693.08 Research Methods in Rural Sociology
693.09 Social Organization and Administrative Problems
693.10 Sociology of Foreign Areas
693.11 Rural Church
693.12 Farmer Organizations
693.13 General Rural Sociology
693.14 Rural Social Problems

694 U G 2-4

Group Studies
An intensive study of a selected area in rural sociology appropriate to the needs of the group not provided in other courses.
Each decimal subdivision repeatable to a maximum of 8 cr. hrs.
694.01 Human Population Problems
694.02 Rural Family
694.03 Rural Health
694.04 Rural Leadership
694.05 Rural Community and Institutions
694.06 Community Development
694.07 Diffusion of Technology
694.08 Research Methods in Rural Sociology
694.09 Social Organization and Administrative Problems
694.10 Sociology of Foreign Areas
694.11 Rural Church
694.12 Farmer Organizations
694.13 General Rural Sociology
694.14 Rural Social Problems

GENERAL PREREQUISITES FOR COURSES NUMBERED 700

Unless otherwise indicated, the prerequisites for 700-level courses are 15 cr. hrs. in courses in the same discipline numbered 400 or higher, plus additional specified course(s) numbered 600 or higher.

796 U G 2-4

Seminars in Rural Sociology
Prereq.: 15 cr. hrs. in Rur. Soc. and/or Soc. or permission of instructor.
Each decimal subdivision repeatable to a maximum of 8 cr. hrs.
796.01 Human Population Problems
796.02 Rural Family
796.03 Rural Health
796.04 Rural Leadership
796.05 Rural Community and Institutions
796.06 Community Development
796.07 Diffusion of Technology
796.08 Research Methods in Rural Sociology
796.09 Social Organization and Administrative Problems
796.10 Sociology of Foreign Areas
796.11 Rural Church
796.12 Farmer Organizations
796.13 General Rural Sociology
796.14 Rural Social Problems
GENERAL PREREQUISITES FOR COURSES
NUMBERED 900
Unless otherwise indicated, the prerequisites for 800 and 900-level courses are 30 cr. hrs. in courses in the same discipline, or 20 cr. hrs. in the same discipline, plus 25 cr. hrs. in specified allied disciplines.

999 G Arr.
Research
Research for thesis and dissertation purposes only.

101 U 5
Elementary Russian
Su, A, W, Sp. 5 cl.

102 U 5
Elementary Russian
Su, A, W, Sp. 5 cl.
Prereq.: 101.

103 U 5
Intermediate Russian
Su, A, W, Sp. 5 cl.
Prereq.: 102.
Reading of prose and poetry; oral and written practice; grammar review.

107 U 2
Scientific Russian Reading
A. 2 cl.
Prereq.: 103 or 112.
107, 108, and 109 may be taken in lieu of 104.
Concentration on material of general interest to all sciences.

108 U 2
Scientific Russian Reading
W. 2 cl.
Prereq.: 107 or permission of instructor.
107, 108, and 109 may be taken in lieu of 104.
Reading of unedited texts from current Soviet publications.

109 U 2
Scientific Russian Reading
Sp. 2 cl.
Prereq.: 108 or permission of instructor.
107, 108, and 109 may be taken in lieu of 104.
Specialized reading and translation of a major contribution in one of the sciences.

112 U 5, 10.15
Intensive Russian
Su. A 15 cl.
Full time of student and full fees required.
Prereq.: Permission of chairman.
Students with credit for 101 or the equiv. may not register for more than 10 cr. hrs. Students with credit for 101 and 102 or the equiv. may not register for more than 5 cr. hrs. Students with credit for 103 or the equiv. may not register for credit.
Registration limited. Early enrollment advised.
Elementary and intermediate Russian for students desiring comprehensive knowledge of Russian in the shortest possible time.

162 U 5
Elementary-Intermediate Russian for Selected Students
W. 5 cl.
Prereq.: Grade of A in 101.
Not open to students with credit for 130.

163 U 5
Elementary-Intermediate Russian for Selected Students
Sp. 5 cl.
Prereq.: 161.
Not open to students with credit for 131.
Successful completion of the sequence 101-162-163 fulfills language requirements and provides eligibility for 400-level courses.

220 U 5
Russian Literature in English Translation:
From Pushkin to Turgenev
Su. A. 4 cl., 1 hr. arr.
Not open to students with credit for 420.
An introduction to the Russian novel, drama, and poetry; major contributions of Pushkin, Lermontov, Gogol, Ostrovsky, Goncharov, and Turgenev. Sibajevs.

221 U 5
Russian Literature in English Translation:
From Dostoevsky to Blok
W. 4 cl., 1 hr. arr.
Not open to students with credit for 421.
Reading and analysis of Crime and Punishment, War and Peace, The Golovlyov Family, as well as short stories and plays by Chekhov, Gorky, Belyn, and Andreyev. Sibajevs.

222 U 5
Russian Literature in English Translation:
Introduction to Soviet Literature
Sp. 4 cl., 1 hr. arr.
Not open to students with credit for 522.
A general introduction to Soviet Russian literature from 1917 to the present, in the context of social and political developments in the U.S.S.R.
405 **U 3**  
**Russian Conversation**  
A, W, Sp. 3 cl.  
Prereq.: 104 or permission of instructor; concur. 406 recommended.  
Drill in everyday patterns of conversation.

406 **U 2**  
**Russian Composition**  
A, W, Sp. 2 cl.  
Prereq.: 104 or permission of instructor; concur. 405 recommended.  
Practice in simple writing.

407 **U 3**  
**Intermediate Conversation**  
A, W, Sp. 3 cl.  
Prereq.: 405 or permission of instructor; concur. 408 recommended.  
Drills in intonation; perfection of pronunciation; oral reports; expansion of spoken vocabulary.

408 **U 2**  
**Review Grammar and Composition**  
A, W, Sp. 2 cl.  
Prereq.: 406 or permission of instructor; concur. 407 recommended.  
Review of Russian grammar, composition on assigned topics, practice in translation.

412 **U 5 or 10**  
**Intermediate Intensive Russian**  
W. 10 cl.  
Prereq.: 103, 112, or permission of chairman.  
The equiv. of 104, 405, and 406. Students with credit for 104 may, with permission of chairman, register for 5 cr. hrs. instead of 10 cr. hrs. The course must be taken in its entirety.

522 **U G 5**  
**Russian Literature in English Translation:**  
**Soviet Literature**  
Sp. 4 cl.  
Prereq.: Graduate standing or permission of instructor.  
Not open to students with credit for 616 or 622.  
A survey of Soviet Russian literature from 1917 to the present; reading of representative authors such as Fadeyev, Leontov, Fedin, Sholokhov, and Pasternak. Oulianoff.

552 **U G 5**  
**Introduction to Russian Literature, The Early Classics: Romanticism, The Natural School, and Early Realism**  
A. 4 cl.  
Prereq.: 407 and 408, or permission of instructor.  
Conducted in Russian.  
Not open to students with credit for 475.  
Readings from representative authors such as Pushkin, Lermontov, Gogol, and Turgenev. Bolen.

553 **U G 5**  
**Introduction to Russian Literature, Impressionism, Critical Realism, Symbolism, and Socialist Realism**  
Sp. 4 cl.  
Prereq.: 407 and 408, or permission of instructor.  
Conducted in Russian.  
Not open to students with credit for 475.  
Readings from representative authors such as Chekhov, Gorky, Bunin, Blok, and Sholokhov. Bolen.

571 **G 5**  
**Basic Russian for Graduate Students**  
Su (1st term), A, W. 5 cl.  
Prereq.: Grad. standing.  
Credit does not apply to the minimum hours required for the master's or doctoral degrees.  
Basic elements of Russian grammar.

572 **G 5**  
**Russian for Research**  
Su (2nd term), W, Sp. 5 cl.  
Prereq.: Grade of C or above in 571 or equiv.  
Credit does not apply to the minimum hours required for the master's or doctoral degrees.  
Repeatable twice.  
Satisfactory completion of this course (grade A or B) will be accepted as evidence of a dictionary reading knowledge in fulfillment of Ph.D. language requirement.

608 **U G 5**  
**Review of Grammar**  
A. 4 cl.  
Concurr.: 513.  
Open only to students in the Certificate Program.  
Review of grammar with emphasis on those elements of special value to translators of factual material.

609 **U G 4**  
**Advanced Reading, Conversation, and Composition I**  
A. 3 cl., 2 hr. arr.  
Prereq.: 43 cr. hrs. in Russian or permission of instructor.  
Reading of contemporary prose and verse, presentation of oral and written reports, drill in intonation patterns, translation from English into Russian. Babenko.

610 **U G 4**  
**Advanced Reading, Conversation, and Composition II**  
W. 3 cl., 2 hr. arr.  
Prereq.: 609 or permission of instructor.  
Babenko.
611 U G 4
Advanced Reading, Conversation, and Composition III
Sp. 3 cl., 2 hr. arr.
Prereq.: 610 or permission of instructor.

613 U G 5
Translation Techniques I
A. 5 cl.
Prereq.: 45 cr. hrs. in Russian or permission of instructor.
Not open to students with credit for 513.
Translation of material from the social sciences; discussion of techniques, procedures, methodology, and the art of translation. Eilers.

614 U G 5
Translation Techniques II
W. 5 cl.
Prereq.: 613 or equiv. or permission of instructor.
Not open to students with credit for 514.
Continuation of 613; work with progressively more difficult passages. Eilers.

615 U G 5
Translation Techniques III
Sp. 5 cl.
Prereq.: 614 or equiv. or permission of instructor.
Translation of modern fiction; comparative and contrastive analysis of problems encountered in translating fiction and factual material. Eilers.

630 U G 5
Applied Linguistics for the Russian Major
A. 3 cl.
Prereq.: 45 cr. hrs. in Russian or permission of instructor.
Introduction to the categories and techniques of applied linguistics, especially phonemic and morphemic analysis; all examples drawn from Russian and English. Daniels.

635 U G 5
Practical Russian Pronunciation
W. 3 cl., 2 labs.
Prereq.: 45 cr. hrs. in Russian or permission of instructor.
Lectures and practical exercises; use of phonetic symbols; corrective exercises; problems of teaching pronunciation. Daniels.

640 U G 5
Contrastive Structures of Russian and English
Su, Sp. 3 cl.
Prereq.: 45 cr. hrs. in Russian or permission of instructor.
Comparison of the structures of the Russian and English languages stressing practical difficulties in pronunciation and grammar. Robinson.

GENERAL PREREQUISITES FOR 600 LEVEL COURSES IN LITERATURE
Nine credit hours in Russian Literature courses 400 level or above.

645* U G 5
Survey of Russian Poetry
W. 3 cl.
Prereq.: 551, 552, and 553, or permission of instructor.
Development of poetry from the 18th century to the present; readings from major periods and movements.

650* U G 5
Dostoevsky
A. 3 cl.
Prereq.: 9 cr. hrs. in literature courses at the 400 level or above.
Given in English but undergraduate majors in Slavic will do prescribed portions of the reading in the original; grad. students in Slavic must read in the original items starred on the departmental M.A. Reading List.
Critical analysis of the major novels and shorter works; intellectual and literary development of Dostoevsky.

651* U G 5
Tolstoy
W. 3 cl.
Prereq.: 9 cr. hrs. in literature courses at the 400 level or above.
Given in English but undergraduate majors in Slavic will do prescribed portions of the reading in the original; grad. students in Slavic must read in the original items starred on the departmental M.A. Reading List.
Analysis of all major works including the novels, plays, stories, and important polemical works.

652* U G 5
Turgenev and Chekhov
Su, Sp. 3 cl.
Prereq.: 9 cr. hrs. in literature courses at the 400 level or above.
Given in English but undergraduate majors in Slavic will do prescribed portions of the reading in the original; grad. students in Slavic must read in the original items starred on the departmental M.A. Reading List.
Critical analysis of the major novels, plays, and short stories of both writers; stylistic similarities and differences.

653* U G 5
Russian Drama
A. 3 cl.
Prereq.: 9 cr. hrs. in literature courses at the 400 level or above.
Given in English but undergraduate majors in Slavic will do prescribed portions of the reading in the original; grad. students in Slavic must read in the original items starred on the departmental M.A. Reading List.
Emphasis on the period from 1850 to present day; Ostrovsky, Chekhov, Gorky, Andreyev, Blok, and Soviet writers Leonov and Kataev.
654*  U G 5
Gogol
W. 3 cl.
Prereq.: 9 cr. hrs. in literature courses at the 400 level or above.
Given in English but undergraduate majors in Slavic will do prescribed portions of the reading in the original; grad. students in Slavic must read in the original items starred on the departmental M.A. Reading List.
Critical analysis of all major works including novels, plays, short stories, and important polemical works.

655*  U G 5
Writers of Satire and Byt
Sp. 3 cl.
Prereq.: 9 cr. hrs. in literature courses at the 400 level or above.
Given in English but undergraduate majors in Slavic will do prescribed portions of the reading in the original; grad. students in Slavic must read in the original items starred on the departmental M.A. Reading List.
Critical analysis of the major works of Aksakov, Goncharov, Saltykov-Shchedrin, and Leskov.

683  U G 2-10
Individual Studies in Russian
Prereq.: Permission of dept. chairman.
Repeatable to a maximum of 15 cr. hrs.
683.01 Literature to 1820
683.02 Literature 1820-1917
683.03 Literature since 1917
683.04 Morphology
683.05 Phonology
683.06 Dialectology
683.07 Old Russian
683.08 Unspecified

684  U G 2-10
Group Studies in Russian
Prereq.: Permission of dept. chairman.
Repeatable to a maximum of 15 cr. hrs.

688  U G 15
Study Tour of the USSR
Sp.
Prereq.: Minimum of 25 hrs. of Russ. or equiv. and permission of dept. chairman.
At the Ohio State University students will be given advanced work in conversation and reading in order to prepare for the tour; in the USSR only Russian will be spoken; some formal instruction will be given daily by the tour leaders. Smith.

801  G 3
College Teaching of Russian I
A. 3 cl., 2 lab. hrs.
Prereq.: 611 or equiv., or permission of instructor.
Methods and techniques for teaching Russian at the College level; selection and preparation of teaching and testing materials; the language laboratory and other aids. Smith.

802  G 2
College Teaching of Russian II
W. 2 cl., 1 lab. hr.
Prereq.: 801 or permission of instructor.
Continuation of 801; development of advanced instructional and testing materials; selection of readings and cultural materials; planning undergraduate Russian language programs; research on language teaching. Smith.

810  G 5
Old Church Slavonic
A. 5 cl.
Study of the earliest recorded Slavic language; reading and linguistic interpretation of original documents.

812*  G 5
Readings in Old Church Slavonic Texts
W. 3 cl.
Prereq.: 810 or permission of instructor.
Reading and analysis of Church Slavonic texts of the later period.

813*  G 5
Readings in Old Russian
Sp. 3 cl.
Prereq.: 810 or permission of instructor.
Reading and analysis of Old Russian texts.

820  G 3
History of the Russian Language
W. 3 cl.
A survey of phonetic, morphological, and syntactical changes from the period of Common Slavic to the present; the formation of the Russian literary language.

8231*  G 5
Development of the Russian Literary Language
A. 3 cl.
Prereq.: 820 or permission of instructor.
The formation of Russian as a literary language; the role of Church Slavonic elements in its formation and Western influences on Russian.

826*  G 5
Structure of Russian: Morphology
Su. 3 cl.
Prereq.: 640 or permission of instructor.
Analysis and description of the morphological system of contemporary standard Russian.

8271*  G 5
History of Russian: Morphology
Sp. 3 cl.
Prereq.: 820 or permission of instructor.
Development of Russian morphology from Common Slavic to contemporary Russian with consideration of the place of Russian within East Slavic.

828*  G 5
Structure of Russian: Phonology
W. 3 cl.
Prereq.: 640 or permission of instructor.
Description and analysis of the phonological system of contemporary standard Russian.
829*  G 5
History of Russian: Phonology
Sp. 3 cl.
Prereq.: 820 or permission of instructor.
Development of Russian phonology from Common Slavic to contemporary standard Russian with consideration of the place of Russian within East Slavic.

830†  G 5
Russian Literature to 1650
W. 3 cl.
Emphasis on literature of the Kievan period. Silbajors.

831*  G 5
Russian Literature 1650-1800
Sp. 3 cl.
The baroque period, classicism, and sentimentalism; emphasis on the classical period of the 18th century. Silbajors.

832*  G 5
History of Russian Literary Criticism I
A. 3 cl.
Prereq.: 2nd yr. grad. standing or permission of instructor.
From the 17th century to 1890; reading and discussion of Prokopenchik, Tretiakovsky, Sumarokov, Karamzin, Belinsky, Chernyshevsky, Pisarev, Dobroliubov, Mikhailovski, Grigor'ev, and Leont'ev.

833*  G 5
History of Russian Literary Criticism II
Sp. 3 cl.
Prereq.: 2nd yr. grad. standing or permission of instructor.
From 1890 to the present; decadents, modernists, and symbolists to 1920; Leo Tolstoy; formalism and the sociological method in the 1920's; socialist realism.

834†  G 5
Russian Folklore
Sp. 3 cl.
Prereq.: 2nd yr. grad. standing or permission of instructor.
From the beginning to present; proverbs, the oral epic, historical songs, folktales, the folk theatre; analysis of the folklore component in modern Russian literature.

840†  G 5
Pushkin and His Time
W. 3 cl.
Analysis of Eugene Onegin as poetry and an encyclopedia of the times; social, political, and cultural trends in the 1820's and 1830's; romantic Poets. Silbajors.

841*  G 5
Russian Poetry to 1890
W. 3 cl.
Readings from the major poets of the 18th and 19th centuries: Lomonosov, Zhukovsky, Pushkin, Lermontov, Trutchev, Fet, Nekrasov, Polonsky, and others.

842*  G 5
Russian Poetry from 1890 to Present
Sp. 3 cl.
Major movements and poets: Blok, Bely, Briusov, Balmont, Mayakovsky, Gumilyov, Akhmatova, Esenin, Pasternak, Tvardovsky, Evshchenko, and others.

843†  G 5
Russian Poetics and Versification
Sp. 3 cl.
Prereq.: 645, 841, 842, or permission of instructor.
Development of Russian versification from the bylina to the present; folk meter, syllabic verse, syllable-tonic versification of the 19th and 20th centuries, tonic verse.

850†  G 3-5
Seminar in Russian Literature to 1820
W. 2 cl.

851  G 3-5
Seminar in Russian Literature 1820-1917
Su, Sp. 2 cl.

852  G 3-5
Seminar in Soviet Literature
W. 2 cl.

993  G 2-10
Individual Studies
Prereq.: Permission of dept. chairman.
Repeatable to a maximum of 30 cr. hrs. in any combination of decimal subdivisions.

993.01 Literature to 1820
993.02 Literature 1820-1917
993.03 Literature since 1917
993.04 Morphology
993.05 Phonology
993.06 Dialectology
993.07 Old Russian
993.08 Unspecified

994  G 2-10
Group Studies in Russian
Prereq.: Permission of dept. chairman.
Repeatable to a maximum of 15 cr. hrs.

Serbo-Croatian
Office: 204 Dieter Cunz Hall of Languages, 1841 Millikin Road
Associate Professors Naylor and Matejic; Assistant Professor Kragolott.

601†  U G 4
Serbo-Croatian
A. 3 cl., 2 hr. arr.
Prereq.: Russ. 103 or 112 or permission of instructor.
6021*  U G 4
Serbo-Croatian
W.  3 cr. 2 hr. arr.
Prereq.: 601 or permission of instructor.

6031*  U G 4
Serbo-Croatian
Sp. 3 cr. 2 hr. arr.
Prereq.: 602 or permission of instructor.

604*  U G 3
Intermediate Serbo-Croatian
A. 3 cr.
Prereq.: 603 or equiv.
Reading of simple Serbo-Croatian texts from the 19th
century.

605*  U G 3
Intermediate Serbo-Croatian
W. 3 cr.
Prereq.: 604 or permission of instructor.
Reading of moderate difficulty, conversation, and
simple compositions.

606*  U G 3
Intermediate Serbo-Croatian
Sp. 3 cr.
Prereq.: 605 or permission of instructor.
Reading from modern Serbo-Croatian literature, practice
in writing and speaking.

620*  U G 5
Serbo-Croatian Literature in English Translation
A. 3 cr.
Prereq.: 4th yr. standing or grad. standing or
permission of instructor.
Grad. students in Slavic may be required to do some
reading in Russ. and French or Ger.
From the medieval period to the beginning of the 19th
century; religious literature; heroic songs, written epic,
the Renaissance, and classicism.

621*  U G 5
Serbo-Croatian Literature in English Translation
W. 3 cr.
Prereq.: 4th yr. standing or grad. standing or
permission of instructor.
Grad. students in Slavic may be required to do some
reading in Russ. and French or Ger.
Literature of the 19th and 20th centuries; emphasis on
Vuk Karadzic, Njegos, and Andric.

693  U G 2-10
Individual Studies in Serbo-Croatian
Prereq.: Permission of chairman.
Repeatable to a maximum of 20 cr. hrs.
680.01 Literature to 1850
680.02 Literature, 1850-1918
680.03 Literature since 1918
680.04 Morphology
680.05 Phonology
680.06 Dialectology
680.07 Old Serbian
680.08 Unspecified

722  U G 5
Contemporary Serbo-Croatian Literature
Sp. 3 cr.
Prereq.: 605 and 621, or permission of instructor.
Prose and poetry since 1945; emphasis on Andric,
Cosic, Lalic, Davico, Erich Kos, Kreiza, and Raickovic.

8211*  G 5
The Structure of Serbo-Croatian
W. 3 cr.
Prereq.: 605 or permission of instructor.
Analysis and description of the phonological and
morphological systems of contemporary literary
Serbo-Croatian. Naylor.

993  G 2-10
Individual Studies
Prereq.: Permission of chairman.
Repeatable to a maximum of 40 cr. hrs. in any
combination of decimal subdivisions.
993.01 Literature to 1850
993.02 Literature from 1850-1918
993.03 Literature since 1918
993.04 Morphology
993.05 Phonology
993.06 Dialectology
993.07 Old Serbian
993.08 Unspecified

994  G 2-10
Group Studies in Serbo-Croatian
A.
Prereq.: Permission of chairman.
Repeatable to a maximum of 15 cr. hrs.

Slavic Languages
and Literatures

Office: 204 Dieter Cunz Hall of Languages, 1841 Milikin
Road

219  U 5
Slavic Literature in English Translation
from the Beginning to the Present
Sp. 4 cr. 1 hr. arr.
Not open to students with credit for 589.
Emphasis on masterpieces of non-Russian Slavic
literatures; epic tradition, Kochanowsk, Comeius,
Obradovic, Mickiewicz, Shevchenko, Macha,
Sienkiewicz, Reymont, Franko, Ukrainka, Yazov, Capek,
Hasek, and Andric.
230       U 5
Slavic Languages and Cultures
W. 4 cl.
Taught in Eng.
Historical distribution, contemporary situation,
language policies of Slavic nations; interaction of
Slavic cultures and their congenerous and neighbors;
misual impact of Slavic languages and cultures.

683       U G 2-10
Individual Studies in Slavic
Prereq.: Permission of department chairman.
Repeatable to a maximum of 15 cr. hrs.
  683.01 Literature, East Slavic
  683.02 Literature, South Slavic
  683.03 Literature, West Slavic
  683.04 Literature, unspecified
  683.05 Linguistics, East Slavic
  683.06 Linguistics, South Slavic
  683.07 Linguistics, West Slavic
  683.08 Linguistics, unspecified
  683.09 Church Slavonic
  683.10 Linguistics, Balto-Slavic
  683.11 Unspecified

694       U G 2-10
Group Studies in Slavic
Prereq.: Permission of chairman.
  694.01 Literature, East Slavic
  694.02 Literature, South Slavic
  694.03 Literature, West Slavic
  694.04 Literature, unspecified
  694.05 Linguistics, East Slavic
  694.06 Linguistics, South Slavic
  694.07 Linguistics, West Slavic
  694.08 Linguistics, unspecified
  694.09 Church Slavonic
  694.10 Linguistics, Balto-Slavic
  694.11 Unspecified

H783       U 3-5
Honors Course
Prereq.: 4th yr. standing; a grade of A in at least half
of the Slavic courses taken and an average of B in the
remainder; permission of instructor under whose
supervision the work is to be completed and the
College Committee on Honors. Failure to receive a
grade of B in this course is a disqualification for
special honors.
Repeatable to a maximum of 15 cr. hrs.

794       U G 2-10
Group Studies in Slavic
Prereq.: Permission of chairman.

800       G 3
Bibliography and Method
A. 2 cl.
Not open to students with credit for 686.
Required of all candidates for grad. degrees; to
acquaint grad. students with the tools, problems, and
methods of linguistic and literary research.

860       G 3
Introduction to the Slavic Languages
W. 3 cl.
A general survey of all the Slavic languages and their
common features. Robinson.

8611*     G 5
History of South Slavic Languages
A. 3 cl.
Prereq.: Good command of Russ. and acquaintance with
a second Slavic language or permission of instructor.
Bulgarian, Macedonian, Serbo-Croatian, and Slovenian,
with emphasis on Serbo-Croatian and its relation to
the other South Slavic Languages. Naylor.

862*     G 5
History of the West Slavic Languages
A. 3 cl.
Prereq.: Good command of Russ. and acquaintance with
a second Slavic language or permission of instructor.
Polish, Czech, Slovak, Polabian, Kashub, and Sorbian,
with special emphasis on Polish and its relation to
the other West Slavic languages. Robinson.

8641*     G 5
Comparative Slavic Grammar
Sp. 3 cl.
Prereq.: 860 or permission of instructor.
Development of Indo-European phonology and
morphology into Common Slavic, and the developments
in contemporary Slavic languages.

870       G 3-5
Seminar in Slavic Philology
A. 2 cl.
Historical and comparative studies in the Slavic
languages and related language families, including
Baltic and Finno-Ugric.

871       G 3-5
Seminar in Slavic Linguistics
Su, Sp. 2 cl.
Descriptive and transformational studies in Russian and
the other Slavic languages.

875       G 3-5
Seminar in Slavic Literature
A. 2 cl.
Selected topics from medieval and modern literature.

Medieval and Renaissance Culture
(See Medieval and Renaissance Studies 888.)

Medieval and Renaissance Literature
(See Medieval and Renaissance Studies 889.)

993       G 2-10
Individual Studies
Prereq.: Permission of chairman.
Repeatable to a maximum of 40 cr. hrs. in any
combination of decimal subdivisions.
  993.01 Literature, East Slavic
  993.02 Literature, South Slavic
993.03 Literature, West Slavic
993.04 Literature, unspecified
993.06 Linguistics, East Slavic
993.07 Linguistics, West Slavic
993.08 Linguistics, unspecified
993.09 Church Slavonic
993.10 Linguistics, Balto-Slavic
993.11 Unspecified

994 G 2-10
Group Studies
Prereq.: Permission of dept. chairman.
Repeatable to a maximum of 10 cr. hrs.
994.01 Literature, East Slavic
994.02 Literature, South Slavic
994.03 Literature, West Slavic
994.04 Literature, unspecified
994.05 Linguistics, East Slavic
994.06 Linguistics, South Slavic
994.07 Linguistics, West Slavic
994.08 Linguistics, unspecified
994.09 Church Slavonic
994.10 Linguistics, Balto-Slavic
994.11 Unspecified

999 G Arr.
Research in Slavic
Research for thesis purposes only.

Social Work

Office: 300 Stillman Hall, 1947 College Road
Professors Medhurst (Director), Batchelor (Emeritus), Cornell, Hoffer, Livingston, Mark (Emeritus), Nichols (Emeritus), Parnicky, Rosner, L. Schneiderman, and Shimp; Associate Professors Allen, Andrews, Bailey, Behling, Bilups, Blackburn (Emeritus), Bounous, Crymes, D'Angelo, Daykin, Decker, Dixon, Hamilton, Hayward, Longo, McMullin, Mueller, Ross, and H. Schneiderman; Assistant Professors Benekovic, Bush, Blumenstein, Curtis, Foster, Gilbert, Good, Hoppes, Jones, Keller, Pantulio, Pillow, Rindfleisch, Sze, and Van der Does; Instructors Ain, Benedict, Bussell, Danduran, Dutton, and Scott.

325 U 4
Problems, Policies, and Programs in Social Welfare I
W, Sp. 2 2-hr. cl.
Prereq.: Social Welfare major; non-majors with permission only.
An introduction to the values, value conflicts, and major goals in the American social welfare system.

325 U 4
Problems, Policies, and Programs in Social Welfare II
A, W. 2 2-hr. cl.
Prereq.: 323; Social Welfare major; non-majors with permission only.
Examination of the interrelationships among various social problems, social welfare programs, policy issues, and the role of social work in terms of the American social welfare system.

380 U 5
Introduction to Research Methods in Social Work
A, W, Sp. 3 cl., 1 2-hr. lab.
Prereq.: Math. 121 or equiv.
Science and society; research design; measuring variables; data collection, processing and analysis; participation in a research project is required.

415 U 1-15
Introduction to Field Practice
Prereq.: Social Welfare 3rd or 4th yr, standing and permission of Social Welfare Counselor.
Repeatable to a maximum of 15 cr. hrs.
Observation and analysis of social welfare organizations and their service functions; assumption of a progressively responsible service-giving role within an organization used by the school as a teaching center.

431 U 4
Determinants of Social Functioning I
A, W. 2 2-hr. cl.
Prereq.: Social Welfare major; non-majors with permission only.
Introduction to individual, group, organizational, and community determinants of social functioning with attention to stress and sub-cultural processes and conditions.

432 U 3
Determinants of Social Functioning II
W, Sp. 2 1½-hr. cl.
Prereq.: 431, Social Welfare major; non-majors with permission only.
Introduction to the basic determinants of individual and family social functioning, using a life cycle approach from marriage through children's latency.

433 U 3
Determinants of Social Functioning III
A, W. 2 1½-hr. cl.
Prereq.: 432, Social Welfare major; non-majors with permission only.
Introduction to the basic determinants of individual and family functioning, using a life cycle approach, from children's latency through aging years of parents.

443 U 3
Social Work Practice I
A, W. 2 1½-hr. cl.
Prereq.: Social Welfare major; non-majors with permission only.
The structure of social work, its dimensions, parameters, and functions.
445  U 3
Social Work Practice II
W, Sp. 2 1/2-hr. cl.
Prereq.: 443, Social Welfare major; non-majors with
permission only.
Social worker roles, activities, and responsibilities.

447  U 3
Social Work Practice III
A, W. 2 1 1/2-hr. cl.
Prereq.: 445, Social Welfare major; non-majors with
permission only.
Development of a conceptual framework for social
work practice.

503  U G 5
Juvenile Delinquency:
Its Treatment and Prevention
A, W, Sp. 2 2-hr. cl.
Prereq.: 325, Anthrop. 261, Soc. 410 or equiv.
Juvenile delinquency as a social problem; methods of
treatment and prevention, including juvenile courts,
clinics, probation, parole, correctional institutions, child
placement, and recreational programs.

505  U G 3
Social Implications in Rehabilitation
A, Sp. 3 cl.
Prereq.: 3rd or 4th yr. standing and permission of
instructor.
Not for grad. credit to students in Soc. Work.
The significance of disability and employment in their
social, medical, and industrial application;
rehabilitation as a process; current concepts.

507  U G 3
Social Work and Health Services
W. 3 cl.
Prereq.: 4th yr. standing or permission of instructor.
The nature, organization, and function of programs,
facilities in the health practice field; the social and
economic implication of chronic disease.

509  U G 3
Legal Aspects of Social Work
A, W, Sp. 3 cl.
Prereq.: 3rd or 4th yr. standing or permission of
instructor.
Not for grad. credit to students in Soc. Work.
Law as a means of social control; study of case,
statute, and constitutional law most frequently
involved in social work practice; legal aid.

593  U 1-5
Individual Studies
Prereq.: Permission of instructor and approval of the
Bachelor of Science in Social Welfare coordinator.
Repeatable to a maximum of 10 cr. hrs.
Individual study projects on problems and services in
selected areas of social welfare; report required.

594  U 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Group study projects on problems and services in
selected areas of social welfare; report required.

615  P G 3-8
Field Practice I
Prereq.: Soc. Work 1st yr. grad. standing.
Arranged by the student's faculty adviser.
Repeatable to a maximum of 18 cr. hrs.
Planned visits to social agencies; group analysis of
observation, followed by assignment to specific agency
for beginning responsibilities with recipients of agency
service.

620  P G 4
Social Welfare Policies and Programs I
W. 2 2-hr. cl.
Historical and comparative analysis of social welfare
systems; their relationship to change in the basic
social institutions of family, church, government, and
economic institutions.

621  P G 4
Social Welfare Policies and Programs II
Sp. 2 2-hr. cl.
Prereq.: 620 or equiv.
The development of a conceptual model for social
welfare policy and program analysis.

631  P G 4
Dynamics of Social Functioning I
A. 2 2-hr. cl.
Prereq.: Grad. standing and permission of instructor.
Dynamics of social functioning examined at the
individual, group, and community levels of analysis,
with attention to stress, subcultural, and
socio-economic processes and conditions.

632  P G 3
Dynamics of Social Functioning II
W. 2 1 1/2-hr. cl.
Prereq.: 631 or permission of instructor.
Dynamics of individual and family social functioning
as typically experienced and as occurs in response to
stress, from conception through latency.

633  P G 3
Dynamics of Social Functioning III
Sp. 2 1 1/2-hr. cl.
Prereq.: 632 or permission of instructor.
Dynamics of individual and family social functioning
as typically experienced and as occurs in response to
stress, from adolescence through aging years of
parents.
641 P G 3
Social Work Practice Theory I
A. 2 ½ hr. cl.
Prereq.: See Work grad. standing: concur. 615.
Fundamentals of social work practice; practice
components, interactional processes, units of attention,
and framework of practice.

642 P G 3
Social Work Practice Theory II
W. 2 ½ hr. cl.
Prereq.: Soc. Work grad. standing and 641; concur. 615.
Strategies for intervention: differential modes of
practice to affect functioning and development of
individuals and groups.

643 P G 3
Social Work Practice Theory III
Sp. 2 ½ hr. cl.
Prereq.: Soc. Work grad. standing and 642; concur. 615.
Analysis of practice concepts: formulation and
operationalization of conceptual hypotheses.

680 P G 5
Research Methods in Social Work
A. 2 ½ hr. cl., 1 ½ hr. lab.
Prereq.: Soc. Work grad. standing, 380 or equiv.
Formulating researchable questions and hypothetical
answers for testing, measurement, research design,
data collection and processing, statistical analysis, and
reporting results.

693 P G 1-5
Individual Studies
Prereq.: Soc. Work grad. standing and permission of
instructor.
Repeatable to a maximum of 15 cr. hrs.
Directed readings and tutorials related to specific
problems in the following areas:
c. Social Welfare Policy and Programs.
d. Social Functioning.
e. Research.
f. Other.

703 P G 2
Seminars in Social Welfare Policy
and Program Analysis
A, W. 1 ½ hr. cl.
Prereq.: 621 or equiv. and permission of instructor.
Repeatable to a maximum of 8 cr. hrs.
a. Aging
b. Family Planning
c. Health Care
d. Housing and Urban Development
e. Income Maintenance
f. International Social Welfare
g. Mental Retardation
h. Other

715 P G 6-15
Field Practice II
Prereq.: Soc. Work 2nd yr. grad. standing and 615 or
equiv.
Repeatable to maximum of 26 cr. hrs.
Application of social work theory in selected social
agency settings; joint direction and evaluation by
agency staff and faculty.

730 P G 3-5
Seminars in Social Functioning
A, W. 2 ½ hr. cl.
Prereq.: Soc. Work grad. standing, 633 or equiv.
Repeatable to a maximum of 9 cr. hrs.
Presentation and critical examination of personality,
interactional, small group, organizational and
community concepts and approaches used in analyzing
social dysfunctioning.

732 P G 3
Seminars in Application of Personality Theory
to Social Work Practice
Sp. 1 ½ hr. cl.
Prereq.: Soc. Wk. grad. standing and 633 or equiv.
Assessment of the utility and applicability of
personality theories to social work practice.

741 P G 3-9
Seminars in Clinical Aspects
of Social Work Practice
A, W, Sp. 2 ½ hr. cl.
Prereq.: Soc. Work grad. standing and 643.
Repeatable to a maximum of 9 cr. hrs.
Concepts and strategies for enhancing social
functioning and human realization of individuals,
families, and groups; subjects ranging from clinical
practice formulations through treatment milieux.

742 P G 3-9
Seminars in Administrative Aspects
of Social Work Practice
A, W, Sp. 2 ½ hr. cl.
Prereq.: Soc. Work grad. standing and 643.
Repeatable to a maximum of 9 cr. hrs.
Concepts and strategies for transforming organizational
resources into effective delivery of services; topics
include administrative, supervisory, consultative, and
inter-organizational practitioner roles.

743 P G 3-9
Seminars in Social Change Aspects
of Social Work Practice
A, W, Sp. 2 ½ hr. cl.
Prereq.: Soc. Work grad. standing and 643.
Repeatable to a maximum of 9 cr. hrs.
Concepts and strategies for affecting institutional
functioning and development at local, regional,
national, or international levels; subjects range from
community development formulations through social
planning and deployment of resources to political and
para-political activities.
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>746</td>
<td>P G 3</td>
<td>Seminar in Social Work Practice Issues&lt;br&gt;Sp. 1 cl.&lt;br&gt;Prereq.: Soc. Work grad. standing and 643. Reexamination, critical examination, and development of a point of view concerning selected issues arising in or impinging upon social work.</td>
</tr>
<tr>
<td>785</td>
<td>P G 1-6</td>
<td>Seminar in Social Work Research Critique&lt;br&gt;A, W, Sp. 1 cl.&lt;br&gt;Prereq.: Soc. Work grad. standing, 680 or equiv. Repeatable to a maximum of 6 cr. hrs. Evaluation of selected research reports with reference to their relevance to social work and soundness of methodology; written and oral presentation required.</td>
</tr>
<tr>
<td>786</td>
<td>P G 1-6</td>
<td>Group Research Project&lt;br&gt;A, W, Sp.&lt;br&gt;Prereq.: Soc. Work grad. standing, 680 or equiv. Repeatable to a maximum of 6 cr. hrs. Student and faculty participation in the development of a research project at the School or a teaching center; jointly authored research report required.</td>
</tr>
<tr>
<td>787</td>
<td>P G 3</td>
<td>Seminar on the Application of Experimental Designs to Social Work Research&lt;br&gt;Sp. 1 3-hr. cl.&lt;br&gt;Prereq.: 680 or equiv. Evaluating the plausibility of findings from research using experimental designs as compared with the plausibility of findings from other designs when an experimental design was not feasible.</td>
</tr>
<tr>
<td>797</td>
<td>P G 2-5</td>
<td>Interdisciplinary Seminars in Family-Social Medicine&lt;br&gt;Prereq.: Permission of instructor. Limited to 30 students. Students assigned in interdisciplinary pairs or groups to families with complex medical/social problems with resource faculty.</td>
</tr>
<tr>
<td>802</td>
<td>G 3</td>
<td>Seminar in Social Work Education&lt;br&gt;Sp. 3 cl.&lt;br&gt;Prereq.: M.S.W. or permission of instructor. Development of social work education in North America; problems and issues in curriculum building, teaching methods, and class and field instruction.</td>
</tr>
<tr>
<td>820</td>
<td>G 3-5</td>
<td>Seminar in Social Welfare Policies and Programs I&lt;br&gt;A. 3 cl.&lt;br&gt;Prereq.: M.S.W. or permission of instructor. Historical view of policy formation as influenced by political, economic, and social conditions; analysis and evaluation of processes involved in major developments.</td>
</tr>
<tr>
<td>821</td>
<td>G 3-5</td>
<td>Seminar in Social Welfare Policies and Programs II&lt;br&gt;W. 2 cl.&lt;br&gt;Prereq.: 820 or permission of instructor. Analysis of demographic, political, economic, and other influences upon social policy planning; evaluation of policy planning effectiveness.</td>
</tr>
<tr>
<td>822</td>
<td>G 3-5</td>
<td>Seminar in Social Welfare Policies and Programs III&lt;br&gt;Sp. 3 cl.&lt;br&gt;Prereq.: 821 or permission of instructor. Critical analysis of selected current issues in social policy such as population control, income maintenance, federal, state, and local role in comprehensive social service programs.</td>
</tr>
<tr>
<td>830</td>
<td>G 3-5</td>
<td>Seminar in Social Functioning I&lt;br&gt;W. 3 cl.&lt;br&gt;Prereq.: M.S.W. or permission of instructor. Critical examination of selected biological, psychological, and social determinants of social functioning and dyadic, small group, organizational, and community levels of analysis.</td>
</tr>
<tr>
<td>831</td>
<td>G 3-5</td>
<td>Seminar in Social Functioning II&lt;br&gt;Sp. 3 cl.&lt;br&gt;Prereq.: 830 or permission of instructor. Problems in knowledge selection and conceptualization as related to social work practice and the biological, behavioral, and social sciences.</td>
</tr>
<tr>
<td>840</td>
<td>G 3-5</td>
<td>Seminar in Social Work Practice I&lt;br&gt;W. 3 cl.&lt;br&gt;Prereq.: M.S.W. or permission of instructor. Examination of the nature of social work practice; critical analysis of the underlying assumptions and theoretical base of social work methods.</td>
</tr>
<tr>
<td>841</td>
<td>G 3-5</td>
<td>Seminar in Social Work Practices II&lt;br&gt;Sp. 3 cl.&lt;br&gt;Prereq.: 840 or permission of instructor. Comparative analysis of social work methods; selected problems and issues.</td>
</tr>
</tbody>
</table>
Sociology

Office: 112 Hagerty Hall, 1775 College Road

Professors McDonagh (Chairman), Tien (Vice Chairman), Berry (Emeritus), Bullock, Clarke, Corwin, Cuber, Dinitz, Dynes, Hinkle, Jonassen, Mangus (Emeritus), Nagi, Oyler (Emeritus), W. Peterson, Quaranfell, Reckless (Emeritus), Schwirian, and Sietto; Adjunct Professor Folkman; Associate Professors Helrich, Nissen (Emeritus), and VanderZanden; Assistant Professors Cletworthy, Curry, Franklin, Friday, Kerr, Li, D. Peterson, and Walum; Instructors Aveni, Himmelfarb, Sebo, and Seidee; Lecturers G. Hinkle and C. Tien.

101† U 5
Introductory Sociology
Su, A, W, Sp. 5 cl.
Not open to students with credit for 201 or equiv. or Rur, Soc. 105 or equiv.
Fundamental concepts of sociology and an introduction to the analysis of social problems. Cuber and Staff.

201 Y V O U 5
Fundamentals of Sociology
A, W, Sp. 5 cl.
Not open to students with credit for 101 or equiv.
Nature of society and the factors affecting its development, culture, personality; groups and institutions; selected social problems.

202 U 5
Social Trends and Problems
Su, A, W, Sp. 5 cl.
Prereq.: 5 cr. hrs. in Soc. or equiv. with permission of instructor.
Analysis of recent social trends and contemporary social problems. Dinitz and Staff.

206 U 3
Social Implications of Low Income
Sp. 3 cl.
Prereq.: 5 cr. hrs. in Soc. or equiv. with permission of instructor.
A study of low-income peoples, especially concerning the effect of low-income on them, and their consequent social participation.

208 U 3
Contemporary Social Criticism
W. 3 cl.
Prereq.: 101 or 201 or equiv.
A critical analysis of intellectual controversies and issues underlying a variety of contemporary movements and ideologies.

220 U 4
Sociology of Education
Su, A, Sp. 4 cl.
Prereq.: 5 cr. hrs. in Soc.
Current social trends as they affect education; backgrounds of school children, social status of teachers, role of power and bureaucracy. Corwin and Sebo.
250 U 5 Types of Sociological Inquiry
A, W, Sp. 3 cl., 2 2-hr. lab.
Prereq.: 6 cr. hrs. in Soc. or equiv. with permission of instructor.
Introduction to sociological research techniques, methodological approaches, and relevant quantitative procedures. Aveni, Bullock, Li, Kerr, and C. Tien.

280 U 4 American Minority Relations
A, Sp. 4 cl.
Prereq.: 101 or equiv., and permission of instructor.
Not open to students with credit for 408 or equiv.
Survey of attitudes and relationships arising from the contacts of various racial and ethnic groups in the United States. VanderZanden.

290 U 5 The Sociology of Urban Life
A, Sp. 4 cl., 1 2-hr. lab.
Prereq.: 5 cr. hrs. in Soc. or equiv. with permission of instructor.
The place of the city in social organization; the emergence, nature, and problems of modern urbanism; projects based on census and field data. Jonassen and Schwirian.

294 U 3-5 Group Studies
A.
Prereq.: 101.
Repeatable to a maximum of 10 cr. hrs.
Topics vary each quarter offered.

330 U 3 Varieties of Modern Marriage
Su, A, W, Sp. 3 cl.
Examination of sociological and social-psychological research describing and interpreting emerging pluralistic patterns of man-woman and parent-child relationships. Cuber and Clatworthy.

405 U 5 Collective Behavior and Social Movements
A, Sp. 3 cl.
Examination of the dynamic social processes characteristic of mass societies through an analysis of crowds, mobs, cults, publics, and the initial stages of social movements. Quarantelli.

407 U 5 Social Change
A, W. 5 cr.
Prereq.: 5 cr. hrs. in Soc. or equiv. with permission of instructor.
Not open to students with credit for 207.
Recent social changes, especially in Western civilization and the United States; types of societies in historical perspective; requirements of a good society. Sebo.

410 U 5 Criminology
Su (1st term), A, W; Sp. 5 cl.
Prereq.: 3rd yr. standing.
The nature, variation, and causes of crime and delinquency; studies of criminal liability, criminal careers, and organized racketeering. Dist. Z, Friday, and D. Petersen.

411 U 5 Penology
A, Sp. 5 cl.
Prereq.: 410 or equiv.
The treatment of adult offenders in detention and incarcerations; short and long term institutions; field trips required. D. Petersen. Fee.

430 U 4 Sociology of the Family
A, Sp. 4 cl.
Analysis of relationships between the family and the larger society including mate selection, status of women, and patterns of husband-wife and parent-child relationships. Clarke and Cuber.

434 U 4 The Child and Society
W. 4 cl.
A study of the ways in which society socializes children; current breakdown in the socializing processes and implications for the school and other educational agencies. Clarke and G. Hinkle.

435 U 5 Sociology of Women
Sp. 5 cl.
Analysis of sex-roles and social structure with emphasis on modern social movements concerned with redefining sex-role relationships. Walum.

462 U 3 Sociology of Organizations
W. 3 cl.
Prereq.: 10 cr. hrs. in Soc. or permission of instructor.
Functioning of large complex social groupings: goals, structures, coordination, dispersion, survival, change as seen in various organizations: e.g., governmental, educational, religious, business, and occupational organizations. Corwin and Kerr.

463 U 4 Social Stratification
Su (1st term), A, W, Sp. 4 cl.
Class distinction as a phase of social differentiation; origin and characteristics of social class; significance for modern society of class consciousness, class struggle, and social mobility. Kerr and Dynes.

464 U 3 Human Relationships in Industry
W, Sp. 3 cl.
Social processes and problems associated with contemporary industry including growth of formal and informal organizational structure, communication processes, attitude problems, and morale. Hettrich.

465 U 4 Work and Leisure in Mass Society
Sp. 4 cl.
An analysis of current relationships between work and leisure, emphasizing social implications of increased leisure time and changing conceptions of work and leisure. Clarke.
467 U 3
Religious Institutions in Modern Society
W, Sp. 3 cl.
The social role of religious institutions and beliefs, with particular reference to the United States; the relation between religion and other aspects of society. Dykema.

470 U 5
Social Factors in Personality
W, Sp. 5 cl.
Prereq.: Junior standing and 101.
Analysis of relationships between social structure and personality; language; its consequences for social behavior; socialization: learning of motives and social roles; personality: development, organization, and disorganization. Franklin and G. Hinkle.

480 U 3
Comparative Race Relations
A, W, 3 cl.
Prereq.: Junior standing and 101.

488 U 5
Development of Sociological Thought
A, W, Sp. 5 cl.
Prereq.: 15 cr. hrs. in Soc. or equiv.
A survey of major concerns and conceptions in sociology in relation to their social-historical setting from 1800 to the present time. Walum and Hinkle.

503 U G 5
Contemporary Soviet Society
Sp. 5 cl.
Prereq.: 10 cr. hrs. in Soc. and 15 cr. hrs. in other social sciences, or permission of instructor.
Not open to students with credit for 403.
Organization, development, and problems of the Communist Party, the collective farm, the school, professional occupations, economic planning, and other contemporary Soviet institutions.

Culture Patterns and Personality
(See Anthro. 520.)

545 U G 5
American Society
W. 5 cl.
H545 (honors) may be available to students enrolled in a College Honors Program or by permission of dept.
Prereq.: Junior standing with a cumulative point-hour ratio of at least 3.0.
An exposition of the structural patterns of American society, using sociological theories and data but integrating them into a general view.

550 U G 3
Introductory Human Population
W. 3 cl.
Prereq.: 15 cr. hrs. in Soc. or grad. standing.
A general, mainly non-technical, introduction to population studies; the social determinants and consequences of fertility, mortality, and migration. Li and Tien.

551 U G 3
Intermediate Human Population
Sp. 3 cl.
Prereq.: 550.
A continuation of 550. Schuurman.

560 U G 5
Comparative Social Organizations
A. 4 cl.
A comparative analysis of organizational characteristics and functioning in different cultural settings. Dykema.

590 U G 5
The Community
W. 4 cl.
Development of the modern community; approaches to the study of communities; significance of processes and value systems for community organization and disorganization. Jonassen and Schuurman.

592 U G 5
The School and the Community
W. 3 cl.
Not open to students with credit for 492.
The school as a social institution in the American community; the sociological importance of community structures, processes and problems in determining school-community relationships. Sebo.

601 U G 5
Comparative Family Organization
W. 4 cl.
Prereq.: Junior standing and 101.
Not open to students with credit for 432.
Analysis of family organizations in various societies, emphasizing the impact of changing world conditions on family and kinship structures. Clarke and Cuber.

608 U G 5
Sociological Aspects of Mass Communication
W. 5 cl.
Prereq.: 20 cr. hrs. in Soc. or related fields.
Examination of structure and functions of mass communication systems in contemporary mass societies, including the relationship between mass media organizations and other institutions.

610 U G 5
Sociology of Deviant Behavior
Sp. 5 cl.
Prereq.: 20 cr. hrs. in Soc. or related fields.
An examination of the nature, types, and societal reactions to deviant behavior; special emphasis on the process of stigmatization and the emergence of deviant subcultures. Dintz.

612 U G 5
The Sociology of Economic Life
A. 3 cl., 2 hrs. arr.
Study of the relationship between economic and noneconomic aspects of life; theory will be supplemented by related research. Helfrich.
615  U G 5  
Control and Prevention of Crime and Delinquency  
A. 1 2-hr. cl. One field project.  
Prereq.: 410 or equiv.  
Analysis of the operational effectiveness of special  
measures and programs pointed toward the control  
and prevention of crime and delinquency. Dinitz.

623  U G 5  
Advanced Sociology of Education  
W. 5 cl.  
Not open to students with credit for 523.  
Comparisons of the structures and functions of  
educational systems, elementary through university;  
recruitment and allocation of personnel and resources,  
power, conflict, and boundary maintenance. Corwin.

650  U G 5  
Introduction to Quantitative Research  
Techniques in Sociology  
A, W. 3 cl.  
An introduction to the analysis of sociological data;  
measurement theory and techniques of interpretation;  
sampling procedures in sociological research and  
implications for inference and generalization.  
Li, Schwanian, Sletto, and C. Tien.

651  U G 5  
Approaches to Sociological Inquiry  
A, W. 3 cl., project.  
Theory and practice in essentials of the research  
process; comparison of alternative approaches and  
design models; questionnaire construction, interview  
techniques, and related problems. Bullock and Li.

666  U G 5  
Political Sociology  
Sp. 3 cl.  
Examination of structural and cultural factors as  
related to the nature of political systems; consideration  
of the organization and roles of political and  
para-political groups.

693  U G 1-5  
Individual Studies  
Prereq.: Sociol. majors and permission of instructor.  
Repeatable to a maximum of 15 cr. hrs. for each  
decimal subdivision.

694  U G 3-5  
Group Studies  
Repeatable to a maximum of 15 cr. hrs. for each  
decimal subdivision.  
Topics vary each quarter offered.

695  U G 5  
Seminar in Sociological Perspectives  
on Modern Education  
A. 3 cl.  
Repeatable to a maximum of 9 cr. hrs.  
A seminar involving survey and analysis of sociological  
literature and research regarding the structure,  
function, personnel and performance of the  
educational institution in modern society.

GENERAL PREREQUISITES FOR COURSES  
NUMBERED 700  
Unless otherwise indicated, the prerequisites for  
700-level courses are 30 cr. hrs. in the same discipline  
numbered 400 or higher of which 15 hrs. must be at  
the 600 level.

Introduction to National Security  
(See Nat. Sec. Pol. S. 702.)

704  U G 5  
Problems in the Design of Sociological Research  
A, W, Sp. 3 cl., project.  
Prereq.: 250 or equiv.  
Repeatable to a maximum of 10 cr. hrs.  
Bullock.

705  U G 5  
Construction and Verification of Theory  
A. 3 cl., project.  
Prereq.: 250 or equiv.  
Not open to students with credit for 704.01.  
Repeatable to a maximum of 10 cr. hrs.  
The actual practice of theory construction and its  
underlying logic. Bullock.

706  U G 5  
Experimental Research Methods  
W. 3 cl., project.  
Prereq.: 250 or equiv.  
Not open to students with credit for 704.02.  
Repeatable to a maximum of 10 cr. hrs.  
Survey and analysis of research designs and statistical  
techniques permitting control and/or assessment of  
error variance in sociological research by experimental  
method. Bullock.
707  UG 5
Problems in Quantitative Analysis
S.  5 cl.
Prereq.: 250 or equiv.
Not open to students with credit for 704.03.
Repeatable to a maximum of 10 cr. hrs.
A survey of advanced problems in the multivariate
analysis of sociological data; topics covered include
elaboration and specification, causal inference in
nonexperimental research and path analysis.
Schwirian and Bullock.

708  UG 5
Problems in Qualitative Analysis
Sp.  5 cl.
Problems and techniques of non-quantitative data
analysis including case studies, participant observation,
field diary, autobiography, and historical records.
Dynes and Quarantelli.

730  UG 5
Medical Sociology
W.  5 cl.
Prereq.: 25 cr. hrs. in Soc. or permission of instructor.
Not open to students with credit for 440.
Sociological analysis of health and illness behavior,
the social ecology of illness, health organization, and
the health professions. Kerr.

751  UG 4
Introduction to Human Population Studies
A.  4 cl.
Not open to students with credit for 550 or equiv.
A more intensive introduction to demography parallel
with parallel, more rapidly for population in Sociology
who lack undergraduate training in the field and want
to continue in it.

752  UG 5
Principles and Techniques of Scale Construction
W.  3 cl., project.
Prereq.: 650 or equiv. or Soc. Work 540.
Approaches and techniques in the development and
testing of social measurement instruments. Bullock
and Sletto.

753  UG 4
General Human Population Studies
W.  4 cl.
Prereq.: 551 or 751.
A continuation of 751 with an introduction to migration
analysis and historical demography; more intensive
study of basic population processes.

754  UG 5
Demographic Analysis
W.  5 cl.
Prereq.: 1 course in general statistics.
Not open to students with credit for 639.
An exposition of census data and vital statistics,
demographic rates, life tables, cohort analysis, and
similar elementary techniques and data sources in
demography. Li and Tien.

755  UG 4
The Social Context of Human Fertility
A.  4 cl.
Prereq. or concur.: 551 or 751, and 754, or equiv.
A critical and methodological analysis of fertility, with
special emphasis on the social context of reproductive
behavior in American society. Tien.

756  UG 4
Internal Human Migration
A.  3 cl., 1 lab. hr.
Prereq. or concur.: 551 or 751, and 754, or equiv.
Theories and models of internal migration, based on
data in various types of societies.

770  UG 5
Individual in Society
W.  5 cl.
Analysis and synthesis of the major theories and
findings of social psychology. Franklin and G. Hinkle.

772  UG 5
Small Groups
A.  5 cl.
Not open to students with credit for 661.
Analysis of group structure and processes; examination
of roles, interpersonal structure, leadership;
observer of groups in laboratory and non-laboratory
settings. Curry.

780  UG 5
Racial and Ethnic Differentiation
A.  3 cl.
An analysis of the origin, persistence, adaptation and
change of systems and racial and ethnic differentiation.
VanderZanden.

781  UG 5
The Traditions of Social Thought and Research
A.  2 2-hr. cl.
The history of Sociology with special emphasis on
ideas relevant to current theoretical issues and
research methods. Walum.

782  UG 5
Contemporary Theoretical Orientations
in Sociology
W.  2 2-hr. cl.
Not open to students with credit for 891.
Analysis of current schools, outlooks, and issues.
Hinkle and Walum.

Research Principles and Techniques
in National Security
(See Nat. Sec. Pol. S. 785.)

790  UG 5
Seminar in Community Organization
A.  3 cl.
An examination of the nature, structures, processes,
and trends of social organization of modern
SOCIOLOGY 427

781 U G 5
Sociological Methods of Community Analysis
Sp. 3 cl.
Prereq.: 290 or 590 or equiv., and permission of instructor.
Not open to students with credit for 484.
Methods, techniques, sources of data, and objectives of community analysis. Jonassen and Schwirian.

782 U G 5
Structural Sociology
A. 5 cl.
Prereq.: Grad. standing in Soc.
Key concepts, issues, recent trends in the study of social structure with special emphasis on formal social organizations, social stratification, comparative social systems, groups and research methods. Corwin and Dynes.

GENERAL PREREQUISITES FOR COURSES NUMBERED 800
Unless otherwise indicated, the prerequisites for 800-level courses are 30 qtr. hrs. in the same discipline at the 600-level or higher, of which 15 hrs. must be at the 700-level.

800 G 2
Pro-seminar in Sociology
A. 2 cl.
Open only to 1st year grad. students in Soc.
Each week an area of specialization within sociology will be discussed by a professor whose major interest is in that area; provides an overview of special topics and current issues. Hinkle and McDonagh.

801** G 5
Seminars in the Comparative Study of Society: Latin America
Sp. 3 cl.
Selected problems in the changing interrelationships among social institutions in Latin American Countries: politics, economy, education, religion, kinship, and mass media.

802** G 5
Seminars in the Comparative Study of Society: The Middle East
Sp. 3 cl.
Selected problems in the changing interrelationships among social institutions in the Middle Eastern Countries: politics, economy, education, religion, kinship, and mass media.

803* G 5
Seminars in the Comparative Study of Society: The Slavic Countries
A. 3 cl.
Selected problems in the changing interrelationships among social institutions in the Slavic Countries: politics, economy, education, religion, kinship, and mass media.

804* G 5
Seminars in the Comparative Study of Society: Advanced Societies
W. 3 cl.
Analysis of emerging problems in the social order of advanced societies, with special emphasis on the Atlantic Community

805 G 5
Social Movements
Sp. 5 cl.
An examination of theories and research on non-traditional group efforts to change social systems and institutions; emphasis on contemporary societies and movements. Guarantors.

811 G 1-5
Seminar in Industrial Sociology
A.
Repeatable to a maximum of 10 cr. hrs.
Selected topics in sociology of industrial and work relations: organizational types, change, effectiveness, management, control, administration, leadership, occupations: theoretical approaches to study of industrial relations. Bullock and Heftir.

818 G 5
Advanced Criminology
Sp.
Prereq.: 410 or equiv.
A critical study of the most important aspects of criminology. Dinitz.

820 G 5
Seminar in the Sociology of Education
Sp. 3 cl.
Repeatable to a maximum of 10 cr. hrs.
Special problems will be considered in different quarters, including urban education, student movements, bureaucratic-professional problems, school-community relations, and innovation.

825* G 5
Seminar in the Sociology of Science
Sp. 3 cl.
Selected problems in the study of science as a changing social institution including its relations to other institutional realms viewed in a cross-national context. Corwin.

830* G 5
Seminar in Medical Sociology: Problems in the Sociology of Health Organization
Sp. 3 cl.
Prereq.: 730 or permission of instructor.
Analysis of theory and research bearing upon the role of medicine in society and the health organizations on national, community, and institutional levels.

831** G 5
Seminar in Medical Sociology: Problems in the Sociology of Mental Illness
W. 3 cl.
Prereq.: 730 or permission of instructor.
Analysis of the sociological concepts of mental illness, the socio-cultural factors in these disorders, and the structure of mental care institutions.

832** G 5
Seminar in Medical Sociology: Problems in the Social Ecology of Illness
Sp. 3 cl.
Prereq.: 730 or permission of instructor.
Analysis of current research and literature about socio-cultural factors in disease and illness; emphasis placed upon methodological problems.
831*  G 5  Seminar in Medical Sociology: Problems in Social Gerontology
A.  3 cl.
Prereq.: 720 or permission of instructor.
Analysis of the social processes and demographic changes associated with aging, and the place of the aged in the social structure.

8361*  G 5  Seminar in the Professions
W.  3 cl.
Advanced comparative analysis of various professions in the United States and other societies; professionalization and the organization and influence of professions. Clarke, Corwin, and McDonagh.

837  G 5  Seminar in Public Opinion and Political Sociology
A.  5 cl.
Prereq.: Permission of instructor.
Selected problems in the study of opinions and opinion climates, with special emphasis on their relation to elections and political institutions in a cross-national context.

840*  G 5  Social and Cultural Foundations of Cities and Urbanization
W.  5 cl.
Examination of cultural, material, social, organizational, and political and psychological factors associated with the genesis and nature of urbanization. Jonassen and Schuurian.

841+  G 5  Sociology of Urban Sub-Communities
W.  5 cl.
Examination of society and culture of sub-communities such as ethnic and racial ghettos, suburbs; generalizations about the pattern of integration with larger systems. Jonassen and Schuurian.

842  G 5  Human Ecology
A.  5 cl.
Repeatable to a maximum of 10 cr. hrs.
Selected problems of urban structure from the ecological perspective. Schuurian.

846  G 5  Seminar in the Demography of Urbanization
Sp.  5 cl.
Prereq.: Grad. standing in Soc. or related discipline; 1 course in population or urban sociology recommended.
Analysis of urban phenomena using demographic data and techniques; an analysis of the effect of urbanization on demographic processes. W. Petersen.

848*  G 5  Seminar in the Sociology of Religion
Sp.  3 cl.
An analysis of selected contemporary problems in the sociology of religion; religious organization and involvement. Dynes.

850  G 1-5  Seminar in Sociological Research Methods
Repeatable to a maximum of 30 cr. hrs.
Special topic seminars in research methodology.

851  G 4  Population for Non-Demographers
W, Sp.
Prereq.: One course in population.
851.01*  Population Theories
An analysis in depth of major population theories, including Malthus, Marxists, and exponents of the transition theory.
851.02*  Comparative Population Policy
Analysis of the sociological, political, economic, and ideological factors affecting demographic decisions of selected countries, including the control of size, distribution, and composition of population. Tien.

853  G 5  Formal Demography
Sp.  5 cl.
Prereq.: 754.
853.01  Advanced Demographic Analysis
An exposition of advanced applications of the life table, stable population models, estimates from incomplete data, projections and interpolations, and similar demographic techniques. Li.

854  G 5  Professional Population Training
W, Sp.
854.01  Comparative Sociology of Fertility
Prereq. or concur.: 551 or 751, and 754, or equiv.
Comparative analysis of fertility in different societies at different historical periods; analysis of sources of human reproduction in institutions, interactional, and developmental perspectives; data and techniques of fertility analysis. Tien.
854.02  International Migration
Prereq.: 756.
Analysis in historical depth of international migration, its statistics, its effects on the two countries and the migrants, and policies to inhibit or encourage international movements. Tien.
854.03  Mortality and Morbidity
Prereq. or concur.: 551 or 751, and 553.01, or equiv.
Advanced sociological analysis of mortality and morbidity in global perspective, emphasizing the determinants and consequences of illness and mortality trends and theories of mortality differentials; statistical techniques are stressed. Schuurian.

855  G 5  Area Training in Population
A, Sp.
Prereq.: 753 or permission of instructor.
855.01*  The Population of China
An assessment of the size, growth, diversity, and distribution of the Chinese population, including some analysis of Chinese populations outside mainland China. Tien.
855.02*  The Population of Latin America
Comparative analysis of components of demographic structure and change in Latin America; stress on institutional context of fertility, mortality, and migration.
859 G 1-15
Practicum in Sociological Research
W, Sp.
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Supervised practical experience in the independent execution of sociological research, the application of appropriate analytical techniques, and preparation of research reports.

861* G 5
Seminar in Social Stratification
W. 3 cl.
Repeatable to a maximum of 10 cr. hrs.
Major theoretical approaches, differing bases of stratification and methods of analysis. Dynes and McDonagh.

862 G 5
Seminar in Complex Organizations
A. 3 cl.
Analysis of bureaucratization, structure, boundary problems, resource allocation, organizational change and conflict. Corwin and Dynes.

863 G 5
Seminar in Small Groups
Sp.
A critical examination of theoretical and methodological issues in research on small groups; focus on sociological contributions.

871 G 5
Symbolic Interaction
A. 5 cl.
Analysis of the relationship between the individual and the social structure; particular reference paid to the symbolic interaction orientation. Franklin and G. Hinkle.

872 G 5
Social Psychology in a Comparative Sociological Perspective
W. 4 cl.
Contemporary social psychological research in other nations; major consideration of the value and normative structures which help to explain discrepant findings.

873 G 5
Current Research in Social Psychology of Relevance to Sociology
Sp. 4 cl.
Analysis of theoretical developments, methodological approaches and empirical findings on special recent topics.

880* G 5
Seminar in Contemporary Issues in American Race Relations
A. Sp. 5 cl.
Prereq.: 780.
Repeatable to a maximum of 10 cr. hrs.
Issues in contemporary American race relations are examined to facilitate theoretical clarification; specific seminar topics vary from quarter to quarter. Vander Zanden.

881** G 5
Seminar in Theoretical Issues in Comparative Race Relations
Sp. 3 u.l.
Prereq.: 780.
Repeatable to a maximum of 10 cr. hrs.
Cross-cultural examination of stability and change in patterns of race and ethnic relations; specific seminar topics vary from quarter to quarter.

882 G 5
Systematic Social Theory in Progress
Sp. 2 2-hr. cl.
Examination of the logical structure and empirical status of current and emerging theories. Hinkle.

883 G 5
Seminar in Classical Sociological Theory
W. 2 2-hr. cl.
Prereq.: Permission of instructor.
Discussion of ten classical works in sociological theory. Hinkle.

884 G 1-5
Seminars in Sociology
Repeatable to a maximum of 15 cr. hrs. for each decimal subdivision.

884.01 Sociological Theory
884.02 Social Organization and Planning
884.03 Medical Sociology
884.04 Criminology and Penology
884.05 Sociology of Education
884.06 Race Relations
884.07 Social Psychology
884.08 The Family
884.09 Research Methodology
884.10 Urban Sociology
884.11 Graduate Seminar on Contemporary Sociological Issues
884.12 Unclassified
884.13 Population
884.14 Collective Behavior

885 G 5
Seminar in Comparative Family Structures
Sp. 5 cl.
Examination of problems, issues and trends in family organization in different societies; emphasis on present knowledge and the development of new hypotheses and research designs. Clarke and Cuber.

888 G 1-5
Seminar in the American Family
A. 5 cl.
An examination of relevant issues, trends, and problems with emphasis on theoretical orientations and research findings. Clarke and Cuber.

889 G 5
Interdepartmental Seminar
(See under Interdepartmental Seminars.)
Spanish

Office: 245 Dieter Unz Hall of Languages, 1841 Millikin Road

Professors Bulatkin (Chairman), Armitage, Babcock, Fouch, Griffin, and Rogers (Emeritus); Associate Professors Garcia, Levit, and Pardo; Assistant Professors Angelo, Benett, Egea, and Iglesias.

101 U 5
Elementary Spanish
Su, A, W, Sp. 5 cl.
Elements of Spanish grammar, with oral and written exercises; attention to ear training and oral practice; elementary reading based on Spanish geography, history, and customs.

102 U 5
Elementary Spanish
Su, A, W, Sp. 5 cl.
Prereq.: 101.
The elements of Spanish grammar with abundant oral and written exercises; development of conversational skill; reading vocabulary building, attention to Spanish idioms.

103 U 5
Intermediate Spanish
Su, A, W, Sp. 5 cl.
Prereq.: 102 or 110.
Course conducted in Spanish.
Continuation of Spanish grammar, attention to idioms; reading of short stories, plays, and novels.

104 U 5
Intermediate Spanish
Su, A, W, Sp. 5 cl.
Prereq.: 103 or 112.
Course conducted in Spanish.
Reading of Spanish plays, short stories, and novels; emphasis on oral practice and Spanish idioms.

105 U 5
Elementary Spanish Conversation
and Composition
Su, A, W, Sp. 5 cl.
Prereq.: 104.
Course conducted in Span.
Intensive practice in oral and written Spanish, based on texts and periodicals concerned with contemporary Spain and Spanish America; Grammar and Idiom review.

110 U 10
Intensive Elementary Spanish
A, W, Sp. 10 cl.
Prereq.: Permission of dept.
Not open to students with credit for 101 or 102.
Elementary Spanish for students wishing to acquire the basic skills in one quarter; intensive drill in form, syntax, vocabulary, and idiom; equivalent to 101 and 102.

112 U 5, 10, 15
Intensive Spanish
Su. 15 cl. Enrollment limited to 25 students.
Full time of student and full fees required.
Prereq.: Permission of dept. chairman.
Equiv. of 101, 102, and 103.
Students with credit for 101 or the equiv. may not register for more than 10 cr. hrs; Students with credit for 101 and 102 or the equiv. may not register for more than 5 cr. hrs. Students with credit for 103 or the equiv. may not register for credit.
Elementary and intermediate Spanish; intensive drill in forms, syntax, vocabulary, and idiom; reading of short stories and plays in Spanish.

162 U 5
Elementary-Intermediate Spanish
for Selected Students
W, 5 cl.
Prereq.: Grade of A in 101 and permission of dept.
Successful completion of 101-162-163 fulfills language requirements and satisfies prereq. for 400-level literature courses.

163 U 5
Elementary-Intermediate Spanish
for Selected Students
Sp. 5 cl.
Prereq.: 162.
Successful completion of 101-162-163 fulfills language requirements and satisfies prereq. for 400-level literature courses.
Continuation of 162.

193 U 1-15
Individual Studies
Prereq.: Permission of dept.
Repeatable to a maximum of 30 cr. hrs.

194 U 1-15
Group Studies
Prereq.: Permission of dept.
Repeatable to a maximum of 30 cr. hrs.

271 U 5
Spanish Literature in English Translation
A, Sp. 5 cl.
Prereq.: Eng. 100 or equiv.
Not open to Span. majors.
Selection of major works in Spanish literature in English translation from the early Renaissance period to the present.
401 U 3
Review Grammar and Composition
Su, A, W, Sp. 3 cl.
Prereq.: 105.
Review of Spanish grammar; composition on assigned topics and practice in translation.

402 U 3
Intermediate Spanish Conversation and Composition
A, Sp. 3 cl.
Prereq.: 105.
Vocabulary building, practice in speaking Spanish, conversation and composition dealing with aspects of Spanish life.

403 U 3
Intermediate Spanish Conversation and Composition
Su (2nd term), W. 3 cl.
Prereq.: 105.
Vocabulary building, practice in speaking Spanish, conversation and composition dealing with aspects of Spanish and Spanish American life.

404 U 5
Spanish Pronunciation
Su, A, W, Sp. 5 cl.
Prereq.: 105.
Abundant practice with corrective exercises; some attention to problems of teaching pronunciation.

421 U 5
Introduction to Modern Spanish Literature
Su, A, W, Sp. 5 cl.
Prereq.: 104.
Spanish literature and literary movements of the 19th and 20th centuries and their relation to modern Spain.

422 U 5
Spanish Literature: Middle Ages through Golden Age
A, W, Sp. 5 cl.
Prereq.: 421.
Reading and discussion of the principal works in Spanish literature from the Cid through the Golden Age.

423 U 5
Introduction to Modern Spanish-American Literature
A, W, Sp. 5 cl.
Prereq.: 421.
Selections from Spanish-American literature of the late 19th and 20th centuries.

571 G 5
Basic Spanish for Graduate Students
A. 5 cl.
Prereq.: Grad. standing.
Credit does not apply to the minimum number of hours required for the master's or doctoral degree. No audit.
Designed primarily for students who have no formal preparation in Spanish covering basic grammar and vocabulary.

572 G 3
Spanish for Research I
W. 3 cl.
Prereq.: Grade of C or above in 571, or equiv.
Preparation demonstrated by a placement test.
Credit does not apply to the minimum number of hours required for the master's or doctoral degree.
No audit.
Repeatable twice.
Satisfactory completion of this course (grade of A or B) will be accepted as evidence of a dictionary reading knowledge in fulfillment of Ph.D. language requirement.

573 G 3
Spanish for Research II
Sp. 3 cl.
Prereq.: Grade of A or B in 572, or equiv.
Preparation demonstrated by a placement test.
Credit does not apply to the minimum number of hours required for the master's or doctoral degree.
No audit.
Repeatable twice.
Satisfactory completion of this course (grade of A or B) will be accepted as evidence of a through reading knowledge in fulfillment of Ph.D. language requirement.

605 U G 3
Advanced Composition and Conversation
Su (1st term), A, W, Sp. 3 cl.
Prereq.: 401 and 402 or 403.
Conducted in Spanish. History, customs, and manners of Spain and Spanish America. Iglesias.

607 U G 5
Modern Spanish Syntax
Su, A, W, Sp. 5 cl.
Prereq.: 421, 401, and 402 or 403.
Systematic study of Spanish grammar with composition and other exercises based on contemporary authors; modern tendencies in syntactic analysis. Egea and Iglesias.

608 U G 3
Spanish Translating
W. 3 cl.
Prereq.: 607 or equiv.
Translation from Spanish to English and from English to Spanish. Bennett.

609 U G 5
Spanish Phonetics
A, Sp. 4 cl., 1 hr. lab.
Prereq.: 421 or 401, 404 and 402 or 403.
A detailed analysis of the phonological structure of Spanish and a contrastive comparison with English; practical problems of pronunciation and of teaching are stressed. Egea and Pardo.

610 U G 5
The Contrastive Structures of Spanish and English
A. 5 cl.
Prereq.: 401, 402 or 403, 404, and 421.
Phonetics, phonemics, morphology, and syntax of Spanish contrasted with English. Egea.
620 U G 5
Main Currents in the Development of Spanish Literature
Sp. 5 cl.
Prereq.: 10 cr. hrs. of Span. literature at the 400 level or permission of instructor.
Not for grad. credit for majors in Spain.
Spanish literature from the Middle Ages to the present with emphasis on the evolution of major movements. Bennet.

621 U G 5
Cervantes
A, Sp. 4 or 5 cl.
Prereq.: 421, and 422 or 423.
An intensive study of Don Quixote. Levisi.

622* U G 3
Romanticism in the Hispanic World
A. 3 cl.
Prereq.: 421, and 422 or 423.
A study of dramatists, poets, novelists, and essayists designed to bring out the literary unity of the Hispanic world in the Romantic period. Bennet.

623* U G 5
The Spanish Novel of the 19th Century
W. 4 or 5 cl.
Prereq.: 421, and 422 or 423.
A study of the development of the modern Spanish novel with particular attention to the works of Perez Galdos.

624* U G 3
Contemporary Spanish Fiction
A. 3 cl.
Prereq.: 421, and 422 or 423.
A study of Spanish narrative prose from the generation of '98 to the present time. Froshch.

625* U G 3
Modern Drama
A. 3 cl.
Prereq.: 421, and 422 or 423.
A survey of European drama at the beginning of the century and a detailed study of the Spanish dramatists from Benavente to Alfonso Sastre. Froshch.

626* U G 5
Spanish American Literature
W. 5 cl.
Prereq.: 10 cr. hrs. in Span. literature at the 400 level.
A study of the chronicles and main trends in colonial Spanish American literature; works of the Inca Garcilaso, Sor Juana and Alarcon will be included. Bennet and Froshch.

627* U G 5
Spanish American Literature Since Romanticism
Sp. 5 cl.
Prereq.: 10 cr. hrs. in Span. literature at the 400 level.
The advent of 'americanismo literario'; a study of the romantics and the schools that followed up to 'modernismo.' Froshch.

628 U G 3
Contemporary Spanish American Fiction
W. 3 cl.
Prereq.: 421, and 422 or 423.
The development of narrative prose in Spanish American from the second World War to the present. Fronch.

629 U G 3
The Generation of 1898
Sp. 3 cl.
Prereq.: 421, and 422 or 423.
Readings in fiction, poetry, and the essay from such authors as Unamuno, Azorin, Valle-Inclan, Baroja, A. Machado, and J. R. Jimenez. Garcia.

630* U G 5
Contemporary Hispanic Poetry
A. 5 cl.
Prereq.: 421, and 422 or 423.
Currents of Spanish and Spanish American poetry from Ruben Dario to the present time. Bennet.

631 U G 2-5
Spanish Literature
Su. 5 cl.
Prereq.: 421, and 422 or 423.
Repeatable to a maximum of 15 cr. hrs.

632 U G 3
Early Spanish American Fiction
Sp. 3 cl.
Prereq.: 421, and 422 or 423.
The origin and development of the Spanish American novel to the 1930's. Froshch.

633 U G 1-15
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.

634 U G 1-15
Group Studies in Spanish
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.

635 U G 15
Study Tour of Hispanic America
Sp.
Prereq.: Minimum of 25 cr. hrs. in Span., and permission of dept. chairman.
Not open for grad. credit for majors in Spain.
The first five weeks will be devoted to intensive study of Spanish on this University campus; the remainder of the course will be spent in travel in South America; while traveling, formal language instruction will be given by the tour leader; in South America, only Spanish will be spoken.
721**
Drama of the 16th and 17th Centuries
Sp. 5 cl.
Prereq.: 421 and 422 or 423.
An intensive study of a limited number of plays of the representative dramatists of the 16th and 17th centuries. Levith.

722**
Poetry of the 16th and 17th Centuries
W. 5 cl.
Prereq.: 10 cr. hrs. in Span. literature at the 400 level.
Major poets and movements of the 16th and 17th centuries. Levith.

723*
Prose of the 16th and 17th Centuries
W. 4 or 5 cl.
Prereq.: 421, and 422 or 423.
Selected prose works by major Renaissance and Baroque authors. Levith.

H783
Honors Course in Spanish
Conference, library or phonetics laboratory arr.
Prereq.: 4th yr. standing with a record of A in at least half of the Span. courses and an average of 8 in the remainder, and permission of dept. and the Honors Committee of the College.
Repeatability to a maximum of 15 cr. hrs.
This course offers undergraduates with special aptitudes a greater opportunity to do independent study than is possible in the ordinary course. Bennett.

811
History of the Spanish Language
W. 3 cl.
Prereq.: M.A. candidacy or permission of instructor.
Basic concepts of historical linguistics; the major factors of change in the history of the Spanish language from Roman times to the present. Griffin.

812
Old Spanish I
A. 3 cl.
Prereq.: Knowledge of Latin.
The development of Old Spanish phonology and morphology with an introduction to the reading of Old Spanish texts. Griffin.

813
Old Spanish II
W. 3 cl.
Prereq.: 812.
A continuation of Old Spanish I, with attention to syntax, vocabulary, and dialectology. Griffin.

814*
The Structure of the Spanish Language
A. 5 cl.
Prereq.: 610 or permission of instructor.
Examination of the structure of Spanish; the contributions of statistics, computers and generative (transformational) grammar to the study of language. Egea.

815*
Spanish Language in America
W.
Prereq.: 620 or permission of instructor.
A linguistic approach to the theoretical and practical problems of Spanish-American dialecology. Egea.

820
Introduction to Medieval Literature
Sp. 3 cl.
Prereq.: M.A. candidacy or permission of instructor.
Selected readings in Spanish poetry and prose from the beginning to the end of the 15th century, partly in modernized versions. Pardo.

821
Old Spanish Literature
A. 3 cl.
A literary approach to medieval poetry and prose. Pardo.

822
Topics and Problems in Spanish Literature: Golden Age
A. 3 cl.
Prereq.: 20 cr. hrs. of Span. literature at the grad. level. Qualified M.A. candidates may register with permission of instructor.
Intensive exploration of a special topic or problem. Levith.

823**
Topics and Problems in Spanish Literature: 15th Century
W. 3 cl.
Prereq.: 20 cr. hrs. of Span. literature at the grad. level. Qualified M.A. candidates may register with permission of instructor.
Intensive exploration of a special topic or problem.

824*
Topics and Problems in Spanish Literature: 20th Century
Sp. 3 cl.
Prereq.: 20 cr. hrs. of Span. literature at the grad. level. Qualified M.A. candidates may register with permission of instructor.
Intensive exploration of a special topic or problem.

825*
Topics and Problems in Spanish Literature: Spanish American Literature
W. 3 cl.
Prereq.: 20 cr. hrs. of Span. literature at the grad. level. Qualified M.A. candidates may register with permission of instructor.
Intensive exploration of a special topic or problem. Frosch.

831
Seminar in Spanish Literature
Su (1st term), A.
Prereq.: Permission of instructor. Frosch.
Speech Communication

Office: 205 Derby Hall, 154 North Oval Drive

Professors Brooks (Chairman), Berquist, Black (Regents), Bonner, Douglas, Emery, Fetteringham, Golden, Hull, Irwin, Knowler, Lewis, Mall, Moser (Emeritus), Riley (Emeritus), Smallwood Summers (Emeritus), Wagner, Wiley (Emeritus), and Yeager (Emeritus); Adjunct Professor Abernathy; Associate Professors Brown, Egabri, Ewing, Goff, Monaghan, and Schoen, Assistant Professors Bennett, Brunt, Deal, Dorrell, Foley, Hairston, Hawes, Le Duc, MacDonald, Makay, Melnick, Nilo, Niswander, Powers, Reynolds, Schweikart, and Wilcox.

035 U 5
American Speech for International Students
A. 5 cl.
5 cr. hrs. will be added to graduation requirements.
Often taken in conjunction with Engli. 01.
Assignment to both English and the appropriate speech communication course is made on the basis of examinations given at the beginning of each quarter to all new students whose native language is not English. Goff. Fee.

040 U 0 or 3
Personal Speech and Hearing Rehabilitation
A, W, Sp. 5 cl.
Credit shall not count toward graduation.
For students with speech or hearing disorders.
Repeatable.
Personal speech and hearing rehabilitation for individuals with articulation, voice, or stuttering problems of speech or with impaired hearing. Goff.

105 U 5
The Communication of Ideas and Attitudes
Su, A, W, Sp. 5 cl.
The analysis, formulation, organization, development, and delivery of ideas and attitudes within contemporary issues by means of audience analysis and dialogue. Makay. Fee.

110 U 5
Group Discussion
Su, A, W, Sp. 5 cl.
Designed to develop the attitudes, skills, and knowledge of methods favorable to effective participation in discussion by conferences, committees, and other small groups.

115 U 3
Broadcasting in America
Su, A, W, Sp. 3 cl.
The development and structure of broadcasting to stimulate critical appreciation and understanding of the role and influence of television and radio in American life. Le Duc and Monaghan.

120 U 3
Training the Speaking Voice
A, W, Sp. 3 cl.
Not open to students with credit for 335.
Study and application of principles basic to the development of above-average skills for public speaking, acting, oral interpretation, and broadcasting activities.
125 U 3
Parliamentary Law
A, W, Sp. 3 cl.

135 U 3
Voice and Diction
A, W, Sp. 3 cl.
Not open to students with credit for 120.
Introductory study of the principles of a satisfactory speaking voice; designed for the student concerned about the adequacy of his speech. Goff.

201 U 5
Introduction to Speech Communication
A, W, Sp. 5 cl.
Designed for students who wish to have a broad overview and understanding of the field of speech communication. Brooks.

205 U 1
Communication Co-Curricular Activities
Each category repeatable to a maximum of 6 cr. hrs.
Prereq.: Permission of instructor.
Participation in specialized activities.
  a. Communication Laboratory Projects, Cegala.
  b. Forensics.
  c. Oral Interpretation, Brooks.
  d. Television and Radio Broadcasting.

209 U 3
Communication Theories and Models
A, W, Sp. 3 cl.
Communication model characteristics; structure and function, general principles; basic processes and major types of activities; receivers and effects; motivations, value systems, and norms, Cegala and Hawes.

213 U 5
Rhetoric in Western Thought
A, W, Sp. 5 cl.
Rhetorical theories as they reflected and affected society from Greece to modern times; relations to logic, ethics and poetics; the classical tradition versus sophistical concepts. Golden.

217 U 5
Rhetoric of American Issues
A, W, Sp. 5 cl.
A study of selected American orators, their speeches, and the audience reactions on significant issues during 1830-1962. Berquist and Rown.

221 U 5
Fundamentals of Oral Interpretation
A, W, Sp. 5 cl.
Introductory course to develop understanding and appreciation of literature through oral re-creation of literary materials and critical listening. Brooks.

225 U 5
Persuasive Communication
A, W, Sp. 5 cl.
Analysis of persuasive communication as a form of influence; the process and functions involved, its potential and limitation for individuals and organizations. Cegala.

229 U 3
Television and Radio Performance
A, W, Sp. 3 cl.
Role, function, and responsibilities of the performer in television and radio; non-dramatic and dramatic performance before the microphone and camera; critical evaluation. Foley and Le Duc.

235 U 3
Speech Functions and Responsibilities of the Teacher
A, W, Sp. 3 cl.
A study of speech and hearing deviations commonly found in the classroom and of the role of the teacher. Deal, Powers, and Wilcox.

240 U 3
Bases of Oral Communication
Su, A, W, Sp. 3 cl.
A study of the theories of the production and perception of speech. Powers and Takefuta.

250 U 3
The Development of Speech and Language in Children
A, W, Sp. 3 cl.
The growth of speech and language in children; theories of speech and language development; causes of speech and language aberrations. Goff.

305 U 5
Argumentation and Debate
A, W, Sp. 5 cl.
Principles of reasoned discourse and their application to controversial issues.

315 U 3
Informative Communication
A, W. 3 cl.
Analysis of potentials and limitations of informative communications for individuals and groups as communicators or communicators; processes and functions of informative communications in diverse situations. Douglas.

325 U 3
Communications and Society
A, W, Sp. 3 cl.
Communications and the role of government, pressure groups, and other segments of society; the impact of communications on individual and collective behavior. Emery and Foley.

330 U 3
Rhetoric of Black Americans
W, Sp. 3 cl.
Examination of the rhetoric of Black Americans in connection with such strategies as assimilation, separation, and revolution, to establish a role or identity in American society. Hale and Smallwood.
410
Program Processes in Radio
A, W, Sp. 3 cl.
The program functions in radio broadcasting, including the planning, production, and direction of programs.

420
Symbol Systems and Communication Behavior
Su, A, Sp. 3 cl.
Study of the nature and forms of symbolic behavior; the human uses of symbols, particularly in communication. Fotheringham.

440
Anatomy and Physiology of the Ear and Vocal Mechanisms
Su, A, W. 5 cl.
Prereq.: 240. Study of the organs and systems of the body related to the processes of speech and hearing. Deal. Fee.

505
Forms of Public Address
Su, A, W. 5 cl.
The organization, style, and delivery of speeches for special occasions. Berquist.

510
Program Processes in Television
A, W, Sp. 5 cl.
Creating, planning, producing, and directing of the television program; development of program forms, program sources, programming organization, and program evaluation. Fee.

515
Organizational Communication
W, Sp. 3 cl.
A study of the communicator and communication systems in organizations with emphasis on theory, relationships, and objectives. Hawes.

520
Communication and Social Behavior
Sp. 3 cl.
Communication processes underlying social and cultural pressures on the individual; communication analysis of behavior; techniques of inquiry into forms of symbolic influence. Douglas.

525
Broadcasting and Written Messages
A, W. 3 cl.
Analysis of program types in relation to writing effectiveness; communication significance of content and style elements in television and radio. Foley and Monaghan.

530
Communication and the Task-Oriented Group
Sp. 5 cl.
Prereq.: 110 or equiv.
Information gathering, processing, and communicating phases of small group communication on recent, socially significant task forces and on group reports generated in class.

540
Introduction to Audiology
A, Sp. 5 cl.
Prereq.: 240; concurr. 440.
The study of hearing, both normal and abnormal, with information on the nature, causes, identification, and rehabilitative treatment of persons with hearing disorders. Brunt. Fee.

545
Principles of Phonetics
A, W, Sp. 3 cl.
Prereq.: 240 recommended.
The available descriptions of the sounds of speech and a comparative study of the systems of representing the sounds. Black and Takefuta.

550
Introduction to Speech Pathology
A, W, Sp. 3 cl.
Prereq.: 240, 245, and 250.
A study of disorders of speech; information on prevalence, causes, types, and effects. Goff and Powers.

555
International Broadcasting
Sp. 3 cl.
Dimensions of national and international broadcasting; satellite communication, types of programming; problems of effective transmission and reception of foreign broadcasts—organizational, cultural, political, and economic. Emery.

The Teaching of Speech in Secondary Schools
(See Ed. 556.)

611
Advanced Oral Interpretation
W, Sp. 3 cl.
Prereq.: 221 or grad. standing.
A study of programming non-dramatic literature for communications by groups: novel, short story, and verse stressed; laboratory experiences in Readers Theatre and Chamber Theatre. Brown.

614
Tests and Measurements of Communication Variables
Sp. 3 cl.
Prereq.: Psychol. 510.
Not open to students with credit for Psych. 512.
Procedures in developing, using and evaluating measuring processes and tests of communication variables of significance to the areas of speech and hearing science and communication. Fotheringham.

616
Communication in Decision-Making
W. 5 cl.
Discussion and debate as critical instruments of social decisions; critical analysis and social influence in committee, conference, negotiation, and debate. Hawes.

621
Theories of Rhetoric
A. 5 cl.
Reading and detailed study of the theories of principal rhetoricians from ancient to modern times. Golden.
626 U G 5
Broadcast Audience Analysis
Su, A, W, 4 cl.
Introduction to various inquiry methods which may be
used for understanding and developing communication
processes involving the media producer and his
intended audiences. Foley and Monaghan.

Teaching Dramatics and Oral Interpretation
in Secondary Schools
(See Ed. 631.)

632 U G 3
Theories of Auditory Rehabilitation
A, W, Sp., 3 cl., 2 1-hr. labs.
Prereq.: 540.
A study of the major theories and procedures for
teaching speech reading and auditory training.
Wilcox.

633 U G 2
Psychology of the Audience
W.
Prereq.: 10 cr. hrs. in speech communication or
permission of instructor.
Not open to students with credit for Psych. 633.
Descriptive and experimental studies of audience
behavior; dimensions and patterns of audience
stimulation; measurements of affects of
communication, communication analysis, listening.

636 U G 3
Principles of Audiometry
Su, W, Sp., 3 cl.
Prereq.: 540.
A study of the techniques of hearing assessment in
clinical, educational, industrial, and medical settings.
Brunt.

640 U G 5
Speech Pathology: Disorders Associated
with Physical Anomalies
Su, W., 5 cl.
Prereq.: 440 and 550.
Consideration of theories, principles, and procedures
for appraisal and treatment of deviant voice and
articulation that accompanies cleft palate, cerebral
palsy, maxillofacial injuries, and other physical
disabilities. Fee.

644 U G 3
Theories of Language Development of the Deaf
A., 3 cl.
Prereq.: 250 and Ed. 651.
Study of the communicative processes of acoustically
handicapped individuals: symbolization, meaning,
syntax. Wilcox.

648 U G 3
The Pre-School Deaf Child
Su., 3 cl.
Prereq.: 250, Ed. 659, and 660.
Study of the problems of communication of the deaf
child. Wilcox.

652 U G 5
Stuttering: Theories and Therapies
W, Sp., 5 cl.
Prereq.: 450 and 10 cr. hrs. in psych.
Theories, principles, and procedures for the appraisal
and treatment of persons with dysfluencies in speech.
Irwin and Powers. Fee.

655 U G 3
Speech Pathology: Appraisal
Su, W., 2 cl., 2 lab. hrs.
Prereq.: 550 and 9 cr. hrs. in psych.
Not open to students with credit for 655.
Basic principles, procedures, and techniques in
interviewing and the evaluation of articulation, voice,
language, rhythm; experience in appraisal and writing
examination reports. Irwin.

660 U G 5
Speech Pathology: Articulation and Voice
Su, W., 5 cl.
Prereq.: 135 and 550.
Not open to students with credit for 655.
Principles and procedures and techniques for the
treatment of speech disorders with emphasis on vocal
and articulatory deviations not associated with physical
disabilities. Irwin.

Advanced Methods in School Speech
and Hearing Therapy
(See Ed. 663.)

670 U G 3
Psychology of Speech
Su, Sp.
Prereq.: 10 cr. hrs. in psych. and 10 cr. hrs. in speech
communication.
Not open to students with credit for Psych. 670.
Descriptive and experimental studies of speech
processes and activities; learning, personal and social
adjustments, vocal and visible symbolisms, language
and semantics, thinking; speech behavior patterns.
Knower.

693 U G 1-5
Individual Studies in Speech Communication
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Conference, library, and laboratory work.

698 U G 6-15
International Study Tour
Sp.
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
Intensive five-week study on campus followed by
six-week study abroad; topics to be announced.

705 U G 3
Principles of Rhetorical Criticism
W., 3 cl.
Principles, functions, and methods of rhetorical
criticism as it relates to public address. Brown.
715 U G 3
Broadcasting and the Public Interest
Su, Sp. 3 cl.
Communication significance of "public interest" concept in broadcasting; effect on program standards, self-regulation, government regulation. Emery and Foley.

725 U G 3
Creative Television Production and Direction
Sp. 2 cl., 1 3-hr. lab.
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
Advanced theories of television production and direction; evaluation of program forms; creation and production of experimental programs under broadcast conditions. Foley.

735 U G 3
Hearing Aids and Auditory Training
Su. 3 cl.
Prereq.: 540 and 636.
Operational principles of individual and group amplification systems for those with hearing impairments. Brunt.

745 U G 3
Theories of Speech Development of the Deaf
W. 3 cl.
Prereq.: 240, 545, and 644.
Study of the development of speech under conditions of minimum auditory stimulation and acoustic feedback. Wilcox.

755 U G 3
Beginning Practicum in Speech and Hearing
Su, A, W, Sp. 2 cl., 7 1-hr. labs.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
Supervised practice in appraisal and treatment.
   a. Speech Pathology
   b. Audiology
   c. Language Disorders in Children

771 U G 3
Teaching of American Speech to Speakers of Other Languages I
W. 3 cl., 2 lab. hrs.
Concur.: Engl. 777.
Approaches to teaching American speech and special study of the perception and motor production of the acoustic patterns of English (TESOL Program). Goff.

771 U G 3
Teaching of American Speech to Speakers of Other Languages II
Sp. 1 cl., 4 lab. hrs.
Prereq.: 777; concur. Engl. 778.
Techniques for improving listening and speaking skills of speakers of other languages learning American English; development of materials and use of audio laboratories (TESOL Program). Goff.

H783 U 3-15
Honors Course
Prereq.: 4th yr. standing, with a grade of A in at least half of the speech communication courses and an average of B in the remainder; permission of the instructor under whose supervision the work is to be completed and the Honors Committee of the College. Repeatable to a maximum of 15 cr. hrs.
A program of independent study for the student with special aptitudes; individual conferences and reports. Fee.

794 U G 3
Group Studies in Speech
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

797 U P G 3
Interdepartmental Seminars
W, Sp.
Prereq.: Permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
   a. Language Disorders in Children. W. MacDonald.
   b. Audiometric Assessment in Mental Retardation. W. Niswander.
   c. Language Therapy in Mental Retardation. Sp. MacDonald.
(See under Interdepartmental Seminars.)

801 G 3
Aesthetics of Broadcast Communication
A. 3 cl.
Aesthetic and creative processes in program evaluation; theories of response to artistic elements of style, content, and treatment. Foley.

802 G 3
Communication Theories and Models
A. 1 3-hr. cl.
The formal principles of theory and model construction function as criteria for examining the strengths and weaknesses of four classes of interpersonal communication models. Hawes.

803 G 3
Contemporary Persuasion Theory
Su, W. 3 cl.
Study of the viewpoints and theoretical explanations of persuasive effects found among major contemporary authors in the field. Fotheringham.

806 G 3
Advanced Studies in Television and Radio
W, Sp.
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Seminars in History and Criticism of Public Address
Prereq.: Permission of instructor.
Repeatable to a maximum of 40 cr. hrs.

Seminars in Rhetorical Theory
A. W. Sp.
Prereq.: Permission of instructor.
Repeatable to a maximum of 25 cr. hrs.

Seminars in Television and Radio
Su. A. W.
Prereq.: Permission of instructor.
Repeatable to a maximum of 40 cr. hrs.
d. Media Technology and Developing Countries. A. Emery.
f. Theories and Simulation Models of the Media Manager. A. Monaghan.

Seminars in Communication Behavior
Su., A. W. Sp.
Prereq.: Permission of instructor.
Repeatable to a maximum of 40 cr. hrs.
g. The Image. W. Douglas.

Experimental Phonetics
Sp. 3 cr., 2 2-hr. labs.
Prereq.: 545, 856, or permission of instructor.
A study of experimental investigations of acoustic, physiological, and psychological aspects of speech and related laboratory experiments. Black. Fee.

Disorders of Communication Associated with Neuropathologies
Sp. 5 cr.
Study of the nature, diagnosis, prognosis, and treatment of speech manifestations in dysarthria and aphasia. Fee.

Curricular and Instructional Adjustment for the Deaf Child
Sp. 3 cr.
Prereq.: 648.
Laboratory projects directed toward the development of language, silent reading, lip-reading among deaf children. Wilcox.

Advanced Practicum in Speech and Hearing
A. W. Sp. 1 cr., 3 clinical hrs. for each hour of credit per week.
Prereq.: Permission of instructor.
Repeatable to a maximum of 45 cr. hrs.
Advanced practicum in speech, hearing, and language. Brun. Fee.

Interdisciplinary Functioning in Disorders of Oral Communication
W. 4 cr.
Prereq.: 616, 836, and 844.
The diagnosis and treatment of profound speech and hearing disorders and the joint rehabilitation treatment accorded pathological ear and vocal mechanisms by ancillary disciplines. Grimm.

Advanced Study of American Phonetics
A. 3 cr., 2 2-hr. labs.
Prereq.: 545.
Comparative phonetics, dialects and other variations of American speech; lecture, field work, and spectrography. Fee.

Speech and Hearing
W. 3 cr.
Prereq.: 540 or equiv. and Physics 501.
Repeatable to a maximum of 6 cr. hrs.
Theoretical concepts and physiological and psychophysical data relative to hearing with particular reference to the perception of speech. Black. Fee.

Seminars in Education
(See Ed. 925.09.)
G 3 Interdepartmental Seminar
Prereq.: Permission of instructor.
(See Interdepartmental Seminars.)

G 3 Advanced Studies in Speech and Hearing Science
Prereq.: Permission of instructor.
Repeatable to a maximum of 45 cr. hrs.
Fee.
  a. Design of Experiments in Speech and Hearing, A. Black.
  b. Interpreting Audiometric Results, W. Nils.
  c. Instrumentation in Speech and Hearing, A. Takefuta.
  e. Advanced Audiology, W. Brunt.
  f. Disorders of Voice, A. Deal.
  h. Motor Speech Disorders, Deal.
  i. Studies in Vocalizing of Infants, Goff.

G 3 Seminar in Speech and Hearing Science
Prereq.: Permission of instructor.
Repeatable to a maximum of 45 cr. hrs.
Fee.
  c. Management and Supervision, A. Goff.
  e. Supervision and Counseling, Irwin.
  g. Information Theory as Related to Speech and Hearing, Black.
  h. Psychological Disorders of Speech, Irwin.
  i. Appraisal and Diagnosis, Irwin.
  j. Laryngectomy, Powers.
  k. Aphasia, Deal.

G 3 Areas and Techniques of Research in Speech Communication
Su, A, 3 cr.
Prereq.: 25 cr. hrs. in speech communication.
A review and critical commentary on typical methods of research in each of the principal areas of graduate research in speech; research reports. Douglas.

G 3 Group Studies in Speech Communication
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

U 5 Research in Speech Communication: Thesis
Repeatable to a maximum of 5 cr. hrs.
Research for thesis purposes only.

U 5 Research in Speech Communication: Dissertation
Research for dissertation purposes only.

Statistics
Office: 128 Cockins Hall, 1958 Neil Avenue

Professors Whitney (Chairman) and Rustagi (Associate) Professors Srivastava and Wilkie; Assistant Professors Anderson, Singh, and Wolfe.

Elementary Mathematical Statistics
A, W, Sp., 5 cr.
Prereq.: Math. 116 or 150.
Not open to students with credit for Math. 125.
Elementary principles of probability and introduction to the use of the binomial and normal distributions.

U 5 Elementary Decision Theory
Su, W, 5 cr.
Prereq.: Math. 116, 121 or 150.
Descriptive statistics, probability, utility, Bayes strategies, minimax strategies, and statistical inference.

U 3 Introduction to Statistics
W, 2 cr., 1 2-1 hr. lab.
Prereq.: Math. 251 or permission of chairman.
Combinatorial probability, fundamental concepts of probability distributions, sample statistics, estimation and testing hypotheses, roots of statistical theory.

U 5 Probability and Statistics I
A, W, Sp., 4 cr., lab. hr.
Prereq.: Math. 254 or permission of chairman.
Elements of discrete and continuous probability; introduction to estimation and testing of hypotheses.
426  U 5
Probability and Statistics II
A, W, Sp.  4 cl., 1 lab. hr.
Prereq.: 425 or Math. 426.
Not open to students with credit for Math. 426.
Continuation of 425.

494  U 3-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
Designed to give groups of students an opportunity to
pursue special studies not otherwise offered.

505  U 5
Introduction to Analysis, Probability,
and Statistics I
A.  5 cl.
Prereq.: Permission of instructor or graduate standing
in M.B.A. or M.P.A. programs and previous training in
calculus.
Not open to students with credit for Math. 123 or any
higher level mathematics or statistics course.
Mathematical methods and concepts related to
applications in the business and social sciences.

506  U 5
Introduction to Analysis, Probability,
and Statistics II
W.  5 cl.
Prereq.: 505.
Not open to students with credit for Math. 123.
Continuation of 505.

518  U 3
Statistical Theory in Medical Research I
A.  3 cl.
Prereq.: Permission of instructor, special grad.
students in medical sciences.
Not open to students with credit for Math. 528.
Fundamental concepts of probability, random
variables, statistical inference, regression and
correlation analysis; topics selected from bioassay,
life table techniques, computers in medicine.

519  U 3
Statistical Theory in Medical Research II
W.  3 cl.
Prereq.: 518 or Math. 528.
Not open to students with credit for Math. 529.
Continuation of 518.

521  U 5
Mathematical Statistics II
Su, W, Sp.  5 cl.
Prereq.: 520 or Math. 520.
Not open to students with credit for Math. 521 or (673).
Testing simple hypotheses; applications of t test,
chi-square tests, F tests, nonparametric tests;
confidence intervals.

525  U 5
Statistical Methods
A.  4 cl., lab. hrs. arr.
Prereq.: Math. 254 or equiv. and permission of
instructor; or Math. 254 or equiv. and grad. standing.
Not open to students with credit for 425, 426, 520, or
521.
Basic concepts of probability and statistical inference;
application to models involving binomial, Poisson, and
normal distributions, and linear regression.

528  U 3
Data Analysis I
Su, A.  2 cl., lab. hrs. arr.
Prereq.: Permission of instructor or grad. standing.
Not open to students with more than 5 cr. hrs. in
Statistics.
Non-calculus treatment of descriptive statistics,
statistical inference, goodness of fit, use of t, F, X^2
in one sample situation.

529  U 3
Data Analysis II
Su, W.  2 cl., lab. hrs. arr.
Prereq.: 528.
Two sample tests, non-parametric one and two sample
procedures, regression analysis, one and two way
analysis of variance.

532  U 3
Discrete Probability
W.  3 cl.
Prereq.: 520 or Math. 520.
Not open to students with credit for Math. 522.
Discrete probability spaces, random walk, Markov
chains, stochastic processes, strong laws of
probability.

593  U 2-5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

594  U 2-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

600  U 1-5
Statistics Laboratory
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Experience is given the student in working with real
data through association with current projects in the
Statistics Laboratory.
632  U G 3
Applied Stochastic Processes
W. 3 cl.
Prereq.: 530 or Math. 520.
Not open to students with credit for Math. 620.
Normal processes and covariance stationary processes, counting processes and Poisson processes, renewal processes.

635  U G 3
Statistical Analysis of Time Series
Sp.
Prereq.: 521 or Math. 521 or permission of instructor.
Time series models; estimation of the spectral density function; transformations of time series; prediction theory, applications.

641  U G 3
Linear Models
A, Sp. 3 cl.
Prereq.: 426 or 521, and an elementary knowledge of matrix theory and notation.
Not open to students with credit for Math. 621.
The general linear model for regression and experimental designs; properties of least square estimates; distribution of quadratic forms and the analysis of variance table.

645  U G 5
Design of Experiments
Su, A, Sp. 3 cl., lab. hrs. arr.
Prereq.: 426 or 521 or 525.
Polynomial and multiple regression; factorial balanced incomplete block, nested designs and others; analysis of covariance; prepared computer programs used on sample data in laboratory periods.

651  U G 3
Survey and Sampling Theory
Su. 3 cl.
Prereq.: 521 or Math. 521 or permission of instructor.
Not open to students with credit for Math. 622.
Sampling from finite populations, multistage sampling, stratification, regression and ratio estimates, non-sampling errors, applications to large scale sample surveys.

693  U G 1-5
Individual Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Individual conferences, assigned readings, and reports on minor investigations.

694  U G 2-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Designed to give groups of students an opportunity to pursue special studies not otherwise offered.

725*  U G 3
Sequential Procedures in Statistics
A. 3 cl.
Prereq.: 521 or Math. 521, and Math. 550.
Not open to students with credit for Math. 725.
Sequential tests of hypotheses and their operating characteristics, Wald's SPRT tests, sequential estimation, sequential designs and multiple decision procedures.

742  U G 3
Analysis of Variance
A. 3 cl.
Prereq.: 521 or Math. 521, and Math 550, and 571.
Not open to students with credit for Math. 726.
General linear hypothesis, random components, mixed models.

746  U G 3
Design and Analysis of Experiments
W. 3 cl.
Prereq.: 742 or Math. 720.
Not open to students with credit for Math. 721.
Experimental designs, efficiency, Latin squares, balanced blocks, power functions, planned experiments.

755  U G 3
Multivariate Analysis I
W. 3 cl.
Prereq.: 521 or Math. 521, and Math. 571, and 551 or 653.
Not open to students with credit for Math. 726.
Multivariate normal distribution, Wishart distribution, Hotelling's T² multivariate analysis of variance, multiple correlation, roots of determinant equations, discriminant functions, and applications.

756  U G 3
Multivariate Analysis II
Sp. 3 cl.
Prereq.: 755 or Math. 726.
Not open to students with credit for Math. 727.
Continuation of 755.

761  U G 3
Order Statistics
A. 3 cl.
Prereq.: 521 or Math. 521, and 551 or 653.
Not open to students with credit for Math. 728.
Exact and asymptotic distributions and moments of order statistics, estimating parameters and testing hypotheses using order statistics, confidence intervals, and tolerance regions.

763  U G 3
Nonparametric Statistics
Sp. 3 cl.
Prereq.: 761 or Math. 728.
Not open to students with credit for Math. 729.
Theory of testing hypotheses, single, double and k sample problems, rank orders, measures of correlation, large sample properties.

777*  U G 3
Optimizing Methods in Statistics
Sp. 3 cl.
Prereq.: Permission of instructor.
Survey of classical optimizing techniques with applications in statistics, mathematical programming and constrained estimation, variational methods and dynamic programming applied to statistical problems, miscellaneous applications.

794 U G 2-5

Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

821 G 3
Statistical Inference I
W. 3 cl.
Prereq.: 521 or Math. 521, and Math. 722.
Not open to students with credit for Math. 824.
Classical and modern statistical inference from advanced point of view, estimation, principles of maximum likelihood, asymptotic theory; completeness, sufficiency and invariance.

822 G 3
Statistical Inference II
Sp. 3 cl.
Prereq.: 821 or Math. 824.
Not open to students with credit for Math. 825.

824 G 3
Statistical Decision Theory I
A. 3 cl.
Prereq.: Permission of instructor.
Not open to students with credit for Math. 826.
Introduction to the theory of games, statistical games, admissibility and completeness, complete class theorem, principles of sufficiency and invariance, sequential games.

825 G 3
Statistical Decision Theory II
W. 3 cl.
Prereq.: 824 or Math. 826.
Not open to students with credit for Math. 827.
Continuation of 824.

829 G 3
Statistical Multiple Decision Procedures
Sp. 3 cl.
Prereq.: Permission of instructor.
Not open to students with credit for Math. 828.
Comparisons with a standard, the ranking of parameters different formulations, same multivariate and non-parametric problems of ranking and selection.

832 G 3
Applied Probability Models
A. 3 cl.
Prereq.: Math. 722.
Birth and death processes, Queueing Theory, Branching processes and other applied probability models.

834 G 3
Statistical Inference for Stochastic Models
W. 3 cl.
Prereq.: 832.
Theor of statistical inference for Markov Chains and other applied probability models.
Surgery

Office: N.747 University Hospital, 410 West 10th Avenue


715 Clinical Surgery
P 6 or 12

Clinical Surgery
Offered all months.
Prereq.: Med. 3rd yr. standing.
Must repeat to 12 cr. hrs.
The student serves as clinical clerk both in inpatient and outpatient departments on the General Surgical Services, with instruction in total patient care.

736 Clinical Surgery
P 5, 6, or 11

Clinical Surgery
Offered all months.
Prereq.: Med. 4th yr. standing; concur. Anes. 737 when registration is for 5 or 11 cr. hrs.
Must repeat to 11 cr. hrs.
Total inpatient and outpatient management of surgical disease; emergency room, orthopaedics, neurosurgery, thoracic surgery, plastic surgery, urology, and general surgery.

793 Individual Studies in Surgery
1, 2, 3, or 4 months.
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs. for grad. credit.

793.02 General Surgery
P 6, 12
1 or 2 months; offered all months except June.
Repeatable to a maximum of 12 cr. hrs. for professional credit.

793.03 Neurological Surgery
P 6, 12, 18
1, 2, or 3 months; offered all months except June.
Repeatable to a maximum of 18 cr. hrs. for professional credit.

793.04 Orthopaedic Research
P 6, 12, 18
2, 3, or 4 months; offered all months.
Must repeat to a minimum of 12 cr. hrs.; may repeat to a maximum of 24 cr. hrs. for professional credit.

793.05 Pediatric Surgery
P 6, 12
1 or 2 months; offered all months.
Repeatable to a maximum of 12 cr. hrs. for professional credit.

793.06 Urology
P 6, 12
1 or 2 months; offered all months.
Repeatable to a maximum of 12 cr. hrs. for professional credit.

794 Plastic and Reconstructive Surgery
P 6, 12, 18
1, 2, 3, or 4 months; offered all months.
Repeatable to a maximum of 24 cr. hrs. for professional credit.

793.08 Thoracic Surgery
P 6, 12, 18
1, 2, or 3 months; offered all months.
Repeatable to a maximum of 18 cr. hrs. for professional credit.

794 Group Studies in Surgery
Prereq.: Permission of instructor.

794.04 Emergency Room
P 6
1 month, offered all months except June.

794.05 Neurological Surgery
P 6, 12, 18
1, 2, or 3 months; offered all months except June.
Repeatable to a maximum of 18 cr. hrs.

794.06 Clinical Orthopaedics
P 6, 12, 18
1, 2, 3, or 4 months; offered all months.
Repeatable to a maximum of 24 cr. hrs.

794.07 Pediatric Surgery
P 6
1 month, offered all months.

794.08 Pediatric Surgery, Preceptorship
P 6 or 12
2 months, offered all months.
Must repeat to 12 cr. hrs.

794.09 Plastic Surgery
P 6, 12, 18
1, 2, or 3 months; offered all months except July and Oct.
Repeatable to a maximum of 18 cr. hrs.

794.10 Surgical Laboratory
P 6, 12, 18
University Hospitals or Children's Hospital, 1, 2 or 3 months; offered all months.
Repeatable to a maximum of 18 cr. hrs.

794.11 Thoracic Surgery
P 6
1 month, offered all months except June.

794.12 Thoracic Surgery-Cardiovascular
P 6
1 month, offered all months except June.

794.13 Urology
P 6
1 month, offered all months except June.

798 Internship in Surgery
P 18

Internship in Surgery
Prereq.: Appointment as Intern, College of Medicine.
Repeatable to a maximum of 72 cr. hrs.
Broad exposure to surgical principles and practices one-half general surgery, one-half surgical specialties; experience in operating rooms, wards, and emergency room; rounds, conferences.

799 Residency in Surgery
P 18

Residency in Surgery
12 months full time, beginning July 1.
Prereq.: Appointment as Resident, College of Medicine.
Repeatable to a maximum of 360 cr. hrs.
Rotation through general surgery and surgical specialties rounds, and conferences.
**Theatre**

Office: Drake Union, 1449 Cannon Drive

Professors Walker (Chairman), Bowen, Craneau, Lewis, McDowell, and Ritter; Associate Professors Morrow and Schreck (Emeritus); Assistant Professors Ayers, Glancy, Hastings, and Kirk; Instructors Bergman and Payer; Lecturer C. Williams.

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**205**  U 1

Theatre Co-Curricular Activities


Prereq.: Written permission of instructor.

Repeatable to a maximum of 6 cr. hrs. including cr. hrs. in Speech (E) and Speech 205.

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**275**  U 3

Art of the Theatre

Su, A, W, Sp.  3 cl.

Not open to students with credit for 103 or Speech 275.

Nature of theatre art; relationships between playwright, audience, actor, designer, and director; forms and styles of production.

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**280**  U 3

Acting Fundamentals I

Su, A, W, Sp.  2 2-hr. cl.

Prereq.: 103 or permission of instructor.

Not open to students with credit for Speech 280.

The actor's resources and methods, basic body movement, and vocal interpretation.

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**281**  U 3

Acting Fundamentals II

A, W, Sp.  2 2-hr. cl.

Prereq.: 280 or equiv.

Not open to students with credit for Speech 365.

Scene study and development of technical acting skills.

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**285**  U 5

Great Ages of the Theatre

Su, A, Sp.  5 cl.

Not open to students with credit for Speech 285.

Concepts and characteristics of the great periods of the theatre of the Western World.

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**310**  U 5

Stage Directing I

Su, A, Sp.  3 2-hr. cl.

Not open to students with credit for Speech 365 or Speech 365.

Techniques of play analysis, interpretation, composition, movement, rhythm, and tempo; their integration in stage direction.

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**320**  U 3

Stage Management

A, Sp.  2 cl., 1 lab. hr. arr.

Prereq.: 270 or equiv.

Research, discussion, and application of the principles of organizing and managing stage productions; experience in actual performance.

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**350**  U 2

Introduction to Stage Make-up

A, W, Sp.  2 cl.

Practical application of the theories and techniques of theatrical make-up.

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**351**  U 3

Stage Costuming I

A, Sp.  3 cl.

Not open to students with credit for Speech 365 or Speech 465.

Introduction to history and techniques of stage costume and stage costume design.
380 U 3
Intermediate Acting I
A. 2 2-hr. cl.
Prereq.: 281 or equiv.

381 U 3
Intermediate Acting II
W. 2 2-hr. cl.
Prereq.: 380.

510 U G 5
Stage Directing II
W. 4 cl.
Prereq.: 310.
Analysis of staging problems in scenes from selected modern dramas; techniques for staging.

520 U G 3
Technical Production II
W. 3 cl.
Prereq.: 220 and 320.
Staging methods in non-typical scenic styles and periods for dramatic and musical productions.

530 U G 3
Stage Lighting Technology
A. 3 cl.
Prereq.: 220 or equiv.
Study of electrical, mechanical, and electronic elements of lighting for the stage as prerequisite for the study of stage lighting design.

540 U 2
Drawing for Theatrical Production
A. 2 2-hr. labs.
Prereq.: 220 or equiv.
Not open to students with credit for 340.
Execution and interpretation of specialized techniques of mechanical and perspective drawing for use in design, planning, and construction for the stage.

545 U G 3
Introduction to Scenic Design
Sp. 3 cl.
Prereq.: 540.
Study of fundamental principles and techniques of scenic design with experience in design for project productions.

565 U G 5
Children’s Theatre: Production and Direction
Su, A, W. 5 cl.
Prereq.: 220.
Not open to students with credit for Speech 565.
Selection, production, and direction of plays for children.

571 U G 3
Theatre Repertory I
A. 3 cl.
Survey of representative realistic plays in the repertory of modern Western Theatre.

572 U G 3
Theatre Repertory II
W. 3 cl.
Survey of representative non-realistic plays in the repertory of modern Western Theatre.

573 U G 3
Theatre Repertory III
Sp. 3 cl.
Survey of representative classical and romantic works in the repertory of the Western Theatre.

645 U G 3
Scenic Design in Staging Styles
Sp. 3 cl.
Prereq.: 545 or permission of instructor.
Study of the application of major stylistic trends in scenic design to modern theatrical productions through lecture-discussion and specific design projects.

650 U G 2
Advanced Stage Make-up
W. 2 cl.
Prereq.: 350.
Advanced theories and techniques of theatrical make-up with emphasis on problems in modern theatre styles.

655 U G 3
History of Costuming for the Stage
A. 3 cl.
Study of historical origins, uses, and modifications of clothing styles in the western world with emphasis on their application in modern theatrical productions.

671 U G 3
History of the Theatre
Su, W. 3 cl.
Prereq.: Engl. 220 or 262, Engl. 649 recommended.
Not open to students with credit for Speech 671.
Greek, Roman, Medieval, and Commedia dell’arte Theatre.

672 U G 3
History of the Theatre
Sp. 3 cl.
Prereq.: Engl. 220 or 262, Engl. 649 recommended.
Not open to students with credit for Speech 672.
Renaissance, Elizabethan, and Restoration Theatre.

673 U G 3
History of the Theatre
A. 3 cl.
Prereq.: Engl. 220 or 262, Engl. 649 recommended.
Not open to students with credit for Speech 673.
18th, 19th, and 20th-Century Continental, English, and American Theatre.

675 U G 5
American Theatre History
W. 5 cl.
Prereq.: 285 or permission of instructor.
Development of the American Theatre from 1752 to the present; consideration of principal actors, managers, playwrights, directors, and designers.
680  U G 3
Acting in Period Drama
Sp.  2-2 hr. cl.
Prereq.: 381 or equiv.
Not open to students with credit for 660.
Textual and character analysis, vocal and physical
skills requisite for the acting of selected period drama.

685†*  U G 3
Comparative Comedy
W.  3 cl.
Variation in the form of the comic genre from Greek
terce to contemporary comedy.

686*  U G 3
Comparative Tragedy
W.  3 cl.
Variations in the form of the tragic genre from
Aeschylus to the present.

693  U G 1-5
Individual Studies in Theatre
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Conference, library, and laboratory work.

694  U G 1-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

755  U G 3
Stage Costume Design
Sp.  3 cl.
Prereq.: 655.
Theory, methods, and materials of costume design with
emphasis on design problems for the stage. Chappell.

770  U G 3
Theatre Styles
A.  3 cl.
Prereq.: 510 or permission of instructor.
Not open to students with credit for Speech 770.
Study and analysis of significant styles of production
in the theatre.

780  U G 3
Advanced Acting Theory
Su, W.  2-2 hr. cl.
Prereq.: 310 or equiv.
Not open to students with credit for Speech 780.
A study of the major theories of the art of acting and
their application.

H783  U 3-5
Honors Course
Prereq.: 4th yr. standing; a grade of A in at least half
of the theatre courses taken and an average of B in
the remainder; permission of instructor under whose
supervision the work is to be completed and the
College Committee on Honors.

Failure to receive a grade of B in this course is a
disqualification for special honors. Repeatable to a maximum of 15 cr. hrs.
An individual program of study, with conferences,
reports, and honors thesis.

786  U G 1
Stage Speech
A, W, Sp.  4 1-hr. labs.
Repeatable to a maximum of 3 cr. hrs.
Advanced study of voice; phonetics; development of
special vocal techniques required for stage
performance.

789  U G 1
Advanced Actors Workshop
A, W, Sp.  4 1-hr. labs.
Repeatable to a maximum of 12 cr. hrs.

865  G 5
Advanced Theatre Direction
Sp.  3 2-hr. cl.
Prereq.: 510 or permission of instructor.
Not open to students with credit for Speech 865.
Principles and techniques of direction and integration of
technical elements in the educational theatre.
Fee.

870  G 5
Bibliography and Methods of Research in Theatre
Su.  A.  2-2 hr. cl., lab. arr.
Methods and tools of research in all areas of theatre.
Fee.

871  G 5
Modern Seminal Dramatists
Sp.  5 cl.
Consideration of modern dramatists who have most
influenced the content and the technique of
contemporary drama.

875  G 5
Theatrical Criticism
Sp.  5 cl.
Prereq., or concurr.: One of the following: Engl. 520, 624,
or 649.
Not open to students with credit for Speech 875.
Critical theories from the Greek to the modern period
with particular reference to the influence of the
theorists, church, state, and press.

876†*  G 5
Classical Critical Theories of the Theatre
W.  5 cl.
Prereq., or concurr.: 875 or equiv.
Detailed analysis of the classical sources of critical
theory of the theatre.

877†  G 5
Modern Critical Theories of the Theatre
W.  2-2 hr. cl.
Prereq., or concurr.: 875 or equiv.
Concentrated analysis and discussion of recent critical
theories of the theatre, especially since 1945;
examination of pivotal books in the field.
University College

Freshman Survey
Su, A, W, Sp. 2 1-hr. cl.
Prereq.: Enrollment in University College.
Academic requirements and organization of the University, nature of scholarly study, characteristics of academically successful students, study techniques, selection of degree programs, academic coping skills. (Students schedule a section of Freshman Survey corresponding to their curricular academic program.)
100.01 Administrative Science Survey
100.03 Agriculture Survey
100.05 Allied Medical Professions Survey
100.07 Architecture Survey
100.09 Art Survey
100.11 Arts and Sciences Survey
100.13 Dentistry Survey
100.15 Dental Hygiene Survey
100.17 Education Survey
100.19 Engineering Survey
100.21 General Baccalaureate Survey
100.23 Home Economics Survey
100.25 Medicine Survey
100.27 Music Survey
100.29 Nursing Survey
100.31 Optometry Survey
100.33 Pharmacy Survey
100.35 Social Work Survey
100.37 Veterinary Medicine Survey

Veterinary Anatomy
Office: 102-A Sisson Hall, 1900 Coffey Road
Professors Venzke (Chairman) and Diesem; Associate Professors Andres, deWet, and Soothorn; Assistant Professors Hunter and Rowland.

Veterinary Anatomy
A. 5 cl.
Prereq.: Zool. 101 or equiv.
Lectures and demonstrations on specimens from the various anatomical systems of domestic animals.
Fee.

Veterinary Endocrinology
Su, A, W, Sp. 3 cl., 4 lab. hrs.
Special consideration is given to correlation of endocrine control of cellular metabolism. Venzke.
683 P 2-5

Individual Studies
Su., A. W., Sp., 1 cl., 6-15 lab. hrs.
Training in laboratory investigation of special problems.
Venke, Diesem, and Andres.

700 P 6

Comparative Functional Neuroanatomy
W., 3 cl., 6 lab. hrs.
A detailed comparative gross and microscopic study of the external and internal structure of the central nervous systems and sense and effecter organs and their organization into functional divisions in infra-primates (domestic mammals and fowl) and primates. Fee.

704 P 2-6

Group Studies in Veterinary Anatomy
Su., A. W., Sp.
Prereq.: Permission of instructor.
Repeatable to a maximum of 24 cr. hrs. for prof. cr. and 2-28 cr. hrs. for grad. cr.
Provides flexibility in the veterinary professional program by offering selected topics in Veterinary Anatomy.

784.01 Equine Surgical Anatomy
Emphasis on blood and nerve supply to common surgical sites; special emphasis involving methods of anesthetizing selected surgical areas and areas useful in diagnostic procedures for lameness.
Diesem.

784.02 Ophthalmie Anatomy
The comparative anatomy, histology, neuroanatomy, and embryology of the orbit and its contents in mammals, birds, and reptiles. Diesem.

784.03 Gross Anatomy, Birds, and Rodents
Gross anatomical dissection of common birds and rodents. Diesem and Venke.

784.04 Comparative Developmental Anatomy
Stresses the comparative development of the embryos of domestic animals, the fetal membranes and anomalies. Andres and Venke.

784.05 Microscopic Anatomy
Comprehensive investigation of basic tissue groups; involving the light microscopic examination of tissues within the selected group; and current literature reviews, in addition to lectures, demonstrations, and discussion. Andres and Johnson.

784.06 Microscopic Anatomy
Comprehensive investigation of selected areas of histology of particular interest to the student, involving laboratory work, lectures, and discussions. Andres and Rowland.

784.07 General Histopathology Techniques
Gives the student a basic understanding of the preparation of biological material for light microscopy; laboratory experience includes the standard techniques of fixation, embedding, sectioning, staining, mounting, and viewing of biological material. Andres.

784.08 General Embryological Techniques
Provides a basic understanding of the methods of preparation of embryos for investigations in developmental anatomy and teratology; laboratory experience will be required in all phases of preparations including fixation, embedding, sectioning, and staining. Andres.

784.09 Ultrastructural Anatomy
Provides a basic understanding of the cell and its organelles as they relate to function and permits experience in the preparation of biological materials for electron microscopy; limited use of the electron microscope. Rowland.

801 G 2-5

Anatomical Techniques
Su., 1 cl., 6-15 lab. hrs.
Prereq.: Vet. Med., Coll. of 521, 531 or equiv. and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Theory and practice of macroscopic and microscopic methods, including specimen preparation for dissection, fixing, embedding, sectioning, mounting, and staining of animal tissue. Diesem, Venke, and Andres. Fee.

810 G 3-5

Anatomy of Laboratory Animals
Su., 3-5 cl., 2 hrs. each.
Open by special permission to students who have not specialized in Vet. Med.
Anatomy of laboratory animals, including primates, rodents, and avian species; emphasis on application of anatomy to surgical procedures and research techniques. Diesem. Fee.

999 G Arr.

Research in Veterinary Anatomy
Su., A. W., Sp.
Research for thesis or dissertation purposes only.

Veterinary Clinical Sciences

Office: 1009 Veterinary Clinic, 2578 Kenny Road


660 P G 3

Ophthalmology
A., W., 2 cl.
Prereq.: Vet. Med. 4th yr. standing or permission of instructor.
Not open to students with credit for Vet. Med. 610.
A study of the eye of domestic animals, with emphasis upon diagnosis of the eye and the relation of this organ to general diseases. Donovan and Wyman. Fee.
<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
<th>Prerequisites/Comments</th>
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</thead>
<tbody>
<tr>
<td>Laboratory Animal Medicine</td>
<td>P G 5</td>
<td>A study of the diseases of laboratory animals with emphasis on colony management, diagnosis, and treatment. Pakes and Stilson. Fee.</td>
</tr>
<tr>
<td>Hospital Out-Patient Clinic</td>
<td></td>
<td>Clinical instruction designed to improve the student's proficiency in client relations, diagnosis, treatment, and prevention of diseases in out-patients.</td>
</tr>
<tr>
<td>Large Animal Medicine</td>
<td></td>
<td>Clinical instruction and experience in the diagnosis, treatment, and prevention of diseases of horses, cattle, swine, and sheep.</td>
</tr>
<tr>
<td>Ambulatory Clinic</td>
<td></td>
<td>The application of the principles of management, diagnosis, treatment, and prevention of disease in farm and exotic animals in the environment in which they are produced.</td>
</tr>
<tr>
<td>Large Animal Surgery</td>
<td></td>
<td>The application of principles of surgery to treatment of diseases of farm and other large species of animals.</td>
</tr>
<tr>
<td>Small Animal Surgery</td>
<td></td>
<td>The application of principles of surgery to treatment of diseases of companion animals.</td>
</tr>
<tr>
<td>Veterinary Clinical Radiology</td>
<td></td>
<td>Diagnostic and therapeutic techniques that will broaden the student's knowledge in clinical diagnosis and treatment.</td>
</tr>
<tr>
<td>Companion Animal Medicine</td>
<td></td>
<td>The application to companion animal patients of the latest knowledge concerning diagnosis, treatment, and prevention of diseases.</td>
</tr>
<tr>
<td>Individual Studies</td>
<td>P G 2-8</td>
<td>Su, A, W, Sp. Prereq.: Vet. Med. 4th yr. standing, adequate clinical training and permission of instructor. Repeatable to a maximum of 20 cr. hrs. A supervised critical investigation of some aspects of animal disease about which there is a mutual curiosity on the part of both the student and faculty.</td>
</tr>
<tr>
<td>Advanced Canine and Feline Medicine</td>
<td></td>
<td>Special consideration will be given to applying the knowledge gained in the core curriculum to special diseases of the organ systems of the dog and cat.</td>
</tr>
<tr>
<td>Advanced Canine and Feline General Surgery</td>
<td></td>
<td>Designed to increase the student's knowledge and skills necessary for the diagnosis and surgical treatment of diseases of dogs and cats.</td>
</tr>
<tr>
<td>Equine Medicine and Surgery</td>
<td></td>
<td>Current concepts of diagnosis, treatment, and prevention of diseases of horses presented in conferences and demonstrations.</td>
</tr>
<tr>
<td>Bovine and Ovine Medicine Surgery</td>
<td></td>
<td>Current concepts of diagnosis, treatment, and prevention of diseases of ruminants presented in conferences and demonstrations.</td>
</tr>
<tr>
<td>Swine Medicine and Surgery</td>
<td></td>
<td>Current concepts of diagnosis, treatment, and prevention of important diseases of swine presented in conferences and demonstrations.</td>
</tr>
<tr>
<td>Avian Diseases</td>
<td></td>
<td>Prevention, diagnosis, and treatment of diseases of poultry, game birds, and caged pet birds or zoologic specimens.</td>
</tr>
<tr>
<td>Laboratory Medicine</td>
<td></td>
<td>Assignment of patients for in-depth independent study of diagnosis and disease course with emphasis on the laboratory parameters, their selection and interpretation.</td>
</tr>
<tr>
<td>Clinical Microbiology</td>
<td></td>
<td>Assignment of patients for in-depth study of diagnosis and course of disease with emphasis on selection and interpretation of laboratory parameters.</td>
</tr>
<tr>
<td>Special Diagnost Radiography</td>
<td></td>
<td>Special techniques including contrast studies, fluoroscopy, catheterization procedures, and special positioning techniques.</td>
</tr>
<tr>
<td>Therapeutic Radiology</td>
<td></td>
<td>Dosimetry, tissue susceptibility, and reactions to radiation applied to clinical patients with neoplasia or chronic inflammation.</td>
</tr>
<tr>
<td>Advanced Nuclear Medicine</td>
<td></td>
<td>Application of radioisotopes in diagnostic or therapeutic procedures.</td>
</tr>
<tr>
<td>Veterinary Ophthalmology—Disease of the Eye</td>
<td></td>
<td>Discussion of disease recognition, pathophysiology, diagnosis, and therapy, both medical and surgical; a laboratory for surgical procedures will be conducted.</td>
</tr>
</tbody>
</table>
794.13 Advanced Physiology of Reproduction and Diseases of the Reproductive System
The advanced study of all aspects of mammalian reproduction.

794.14 Advanced Cardiology
Advanced study of the diagnosis, treatment, and prevention of diseases of the cardiovascular system.

794.15 Advanced Thoracic Surgery
Consideration of advanced surgical techniques for treatment of diseases of the thorax requiring surgery.

794.16 Advanced Neurology
Advanced study of diagnosis, treatment, and prevention of diseases affecting the nervous system.

794.17 Advanced Neurosurgery
Practical application of advanced surgical techniques for treatment of diseases of the nervous system requiring surgery.

794.18 Advanced Orthopedic Surgery of Companion Animals
Practical application of advanced surgical techniques for treatment of disease of the skeletal system requiring surgery.

794.19 Advanced Orthopedic Surgery of Equine
Practical application of advanced surgical techniques for treatment of diseases of the skeletal system requiring surgery.

794.20 Advanced Equine Lameness
Study of the methods used for diagnosis and treatment of diseases causing lameness in horses; includes radiographic and surgical techniques.

794.21 Diseases of Hemic and Lymphatic Systems
Clinical care and laboratory studies of patients with hematologic disorders.

794.22 Advanced Dermatology
Studies of diagnosis, treatment, and prevention of diseases of the skin; emphasis on definitive diagnostic techniques, therapy, and patient care.

794.23 Advanced Gastroenterology
Study of diagnosis, treatment, and prevention of diseases of the gastrointestinal system.

794.24 Advanced Urology
Study of diagnosis, treatment, and prevention of disease of the urinary system.

794.25 Advanced Study of Diseases of the Respiratory System
Study of diagnosis, treatment, and prevention of diseases of the respiratory system.

794.26 Advanced Study of Diseases of the Endocrine System and Metabolic Diseases
Study of diagnosis, treatment, and prevention of diseases of the endocrine system and metabolic diseases.

794.27 Advanced Clinical Pharmacology and Toxicology
Conferences, demonstrations, and clinical patients will be used to study basic and applied pharmacology; study of the action, metabolism, and excretion of drugs.

794.28 Physiological Basis of Clinical Dietetics
Composition and energy content of feedstuffs, respiratory quotient, calometric measurement, BMR and effect of age, species, sex, body weight, body size, and specific dynamic action of feedstuffs.

794.29 Nutrient Requirements and Modern Nutritional Practice in Domestic Animals
Nutritional requirements and practices in the dog, cat, equine, dairy cow, beef cow, swine, poultry, and laboratory and exotic animals.

794.30 General Medical Considerations in Clinical Dietetics
Calories, nutrition and infection, inherited metabolic deficiencies, food intolerances among species, parenteral nutrition in surgical and medical diseases, the role of prescription diets in the prevention and treatment of disease.

794.31 Laboratory Animal Medicine
Presentation of the basic principles of care and biology of rodents, rabbits, and other exotic pets and the prevention, recognition, and treatment of diseases.

794.32 Primatology
The basic principles of the care and biology of nonhuman primates and the prevention, recognition, and treatment of their common diseases.

798 P 18
Residency in Veterinary Clinical Sciences
Su, A. W. Sp.
12 months full-time, beginning July 1
Prereq.: Appointment as Resident, University Veterinary Hospital.
Repeatable to a maximum of 216 cr. hrs.

798.01 Residency in Veterinary Surgery
Rotation through general surgery and sub-specialties; rounds, conferences, and seminars.

798.02 Residency in Veterinary Radiology
General diagnostic radiology, radiation therapy, nuclear medicine, special diagnostic and therapeutic procedures, conferences, and seminars.

798.03 Residency in Veterinary Ophthalmology
Rotation through medicine and surgery of the eye and adenex of all animal species; rounds, seminars, conferences, and didactic programs.

798.04 Residency in Veterinary Medicine
Rotation through general medicine and medical sub-specialties; rounds, conferences, seminars, and didactic programs.

Veterinary Medicine

Office: 1009 Veterinary Clinic, 2578 Kenny Road

Professors Murdock (Chairman), Krill (Emeritus), Donham, Donovan, Rheins, Tharp, Yenke, Wearsly, and White; Associate Professors Gardner, Gisler, Loeb, and Ray; Assistant Professors Capen Carson, Heider, Stilson, Wilson, and Wyman; Instructors Allen, Dickey, Hathaway, Hoffis, Hunter, Kerns, Pikes, Smetzer, and Webster.

999 G Air.
Research in Veterinary Medicine
Su, A. W. Sp.
Research for thesis or dissertation purposes only.
Veterinary Medicine, College of

Office: 101A Sisson Hall, 1900 Coffey Road

510 P 4
Animals and Their Environments
A.
Prereq.: Vet. Med. 1st yr. standing.
Consideration of the composition of the whole animal body, the internal and external environments, homeostasis, biological variation and measurement, and animal behavior. Smith.

520 P 6
Comparative Topographic Anatomy
A.
Prereq.: Vet. Med. 1st yr. standing.
The dynamic comparative study of the form, relationship, and mechanical functioning of component body parts as they relate to modern veterinary medicine. Diesem.

521 P 4
Comparative Topographic Anatomy
W.
Prereq.: Vet. Med. 1st yr. standing.
Continuation of 520. Diesem.

530 P 5
Comparative Structure and Function of Tissues
A.
Prereq.: Vet. Med. 1st yr. standing.
The interdisciplinary study of tissue structure and development of the four tissue classes, involving concepts of embryology, histology, endocrinology, and physiology. Venzke.

531 P 3
Comparative Structure and Function of Tissues
W.
Prereq.: Vet. Med. 1st yr. standing.
Continuation of 530. Venzke.

540 P 4
Comparative Cellular Biology
A.
Prereq.: Vet. Med. 1st yr. standing.
Introduction to principles of structure, function, and malfunction at the cellular level, including enzymes, energetics, metabolism, and growth. Nagode.

550 P 11
Comparative Biology of Disease
W.
Prereq.: Vet. Med. 1st yr. standing.
An interdisciplinary study of the interactions between disease producing agents, body systems, tissues, cells, subcellular units, and selected drugs. Shadduck.

560 P 2
Basic Elements of Veterinary Medical Practice and Hospital Orientation I
A.
Prereq.: Vet. Med. 1st yr. standing.
The identification of disease via history, physical, and laboratory examinations and special diagnostic techniques and orientation in therapeutic procedures in a hospital environment.

561 P 3
Basic Elements of Veterinary Medical Practice and Hospital Orientation II
W.
Prereq.: Vet. Med. 1st yr. standing.
Continuation of 560.

562 P 2
Basic Elements of Veterinary Medical Practice and Hospital Orientation III
Sp.
Prereq.: Vet. Med. 2nd yr. standing.
Continuation of 561.

563 P 2
Basic Elements of Veterinary Medical Practice and Hospital Orientation IV
Su.
Prereq.: Vet. Med. 2nd yr. standing.
Continuation of 562.

564 P 2
Basic Elements of Veterinary Medical Practice and Hospital Orientation V
A.
Prereq.: Vet. Med. 2nd yr. standing.
Continuation of 563.

600 P 6
The Cardiovascular System
Su.
Prereq.: Vet. Med. 1st yr. standing.
A comparative study of the structure, function, and dysfunction of the cardiovascular system including arrhythmias, abnormal flow, congenital disease, etiologic agents, diagnostic methods, and therapeutic approaches. Bishop.

601 P 6
The Respiratory System
Su.
Prereq.: Vet. Med. 1st yr. standing.
A comparative study of the structure, function, and dysfunction of the respiratory system including reaction to injury, ventilation defects, pneumonias, neoplastic disease, radiological diagnosis, and therapeutic approaches. Farrell.

602 P 6
The Urinary System
Su.
Prereq.: Vet. Med. 1st yr. standing.
A comparative study of the structure, function, and dysfunction of the urinary system including diseases of the kidney, bladder, and urethra, and their diagnosis and treatment. Powers.
The Nervous System

Prereq.: Vet. Med. 2nd yr. standing.
A comparative study of the structure, function, and dysfunction of the nervous system including the pathogenesis, pathophysiology, diagnosis, prevention, and treatment of nervous system diseases. Koestner.

The Endocrine System

Prereq.: Vet. Med. 2nd yr. standing.
A comparative study of the structures, function and dysfunction of the endocrine system including diseases of each endocrine organ and their relationships to whole body functions. Capen.

The Reproductive System

Prereq.: Vet. Med. 2nd yr. standing.
A comparative study of the structure, function, and dysfunction of the reproductive system including etiologic, pathogenic, pathophysiologic, therapeutic, and preventive aspects of reproductive diseases. Murdock.

The Integumentary System

Prereq.: Vet. Med. 3rd yr. standing.
A comparative study of the structure, function, and dysfunction of the integumentary system including important infectious and parasitic diseases, diagnosis, treatment, and prevention. Wilson.

The Musculoskeletal System

Prereq.: Vet. Med. 2nd yr. standing.
A comparative study of the structure, function, and dysfunction of the musculoskeletal system including congenital, and acquired diseases, their radiographic diagnosis, treatment, and prevention. Hoff.

The Hemic-Lymphatic System

Prereq.: Vet. Med. 1st yr. standing.
A study of basic principles of the hemic-lymphatic system with emphasis on structure and function. Smith.

Digestive System

Prereq.: Vet. Med. 2nd yr. standing.
A comparative study of the structure, function, and dysfunction of the digestive system including relevant physiology, pathology, pharmacology, microbiology, parasitology, medicine, surgery, and preventive medicine. Smith.

Preventive Medicine and Public Health

Prereq.: Vet. Med. 3rd yr. standing.

The structure of public programs and the role of comparative medicine in health maintenance and disease prevention in animals, including man.

The Hemic-Lymphatic System

Prereq.: Vet. Med. 609 and 2nd yr. standing.
A comparative study of the hemic-lymphatic system with emphasis on dysfunction immunologic diseases diagnosis, treatment and prevention of hemopoietic disease; continuation of 608.

Applied Veterinary Medicine (Clinical Experience)

Su, Sp. 7 days 24-hr. lab. duty, 1 cl.
Intense training in clinical work for one term.

Applied Veterinary Medicine—Surgery

Prereq.: Vet. Med. 3rd yr. standing.
Clinical instruction in each of the surgery services with emphasis on practical experiences.

Applied Veterinary Medicine—Medicine

Prereq.: Vet. Med. 3rd yr. standing.
Clinical instruction in each of the medical and preventive medicine services with emphasis on practical experiences.

Applied Veterinary Medicine—Diagnostic Laboratory Medicine

Prereq.: Vet. Med. 3rd yr. standing.
Clinical instruction in each of the diagnostic laboratory services with emphasis on practical experiences.

Group Studies in Veterinary Medicine

Prereq.: Permission of instructor.
Group studies in selected areas of veterinary medicine.
Veterinary Microbiology and Parasitology

Office: 304 Sisson Hall, 1900 Coffey Road
Professor Groves; Associate Professor Scobourn (Acting Chairman); Assistant Professors Kahn, Milo, and Wehrle; Instructor Chatfield.

610 P G 2-5
Advanced Veterinary Parasitology
Prereq.: Vet. Med., Coll. of 561 or equiv., and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

693 P G 2-8
Individual Studies
Laboratory and library investigations of special problems concerning animal parasitic diseases. Groves.

850 G 1
Seminar in Veterinary Parasitology
Repeatable to a maximum of 16 cr. hrs.

999 G Arr.
Research in Veterinary Parasitology
Research for thesis or dissertation purposes only.

Veterinary Pathology

Office: 207 Veterinary Pathology, 1925 Coffey Road
Professors Koestner (Acting Chairman), Capen, Cole (Regents), Farrell, Liss, Marsh, and Yohn; Associate Professors Long and Shadduck; Assistant Professors Bishop, Davis, George, Nagode, Olsen, and Swenberg.

625 P G 2-10
Pathology Techniques
Prereq.: Permission of instructor.
Theory and application of technical methods employed in modern animal disease research; coordinated approach to animal disease investigation, including functional, chemical, gross, and histopathology. Farrell, Yohn, and Olsen. Fee.

640 P G 3
Pathobiology
A.
Prereq.: Permission of instructor.
(Of offered in cooperation with the Department of Pathology.)
Presentation of up-to-date seminars on topics in comparative cellular pathology by faculty in the College of Veterinary Medicine and Medicine. Bishop.

693 P G 1-10
Individual Studies
Prereq.: Permission of instructor.
Laboratory, library, conference, and reports concerning animal disease problems. Cole, Koestner, and Capen.

710 P G 2-10
Advanced Systemic Pathology
Prereq.: Permission of instructor.
An advanced study of animal diseases as they affect all organ systems of the body. Swenberg and Shadduck. Fee.

715 P G 2-10
Veterinary Surgical Pathology
Sp.
Prereq.: 710 and permission of instructor.
Biopsy methods and diagnosis; surgical specimens are studied, and emphasis is placed upon the correlation of lesions and functional pathoogy. Koestner, Long, and Davis. Fee.

720 P G 2-10
Animal Oncology
A.
Prereq.: 710 and permission of instructor.
A study of neoplasms occurring in animals, including identification, epidemiology, experimental production, cell culture, transplantation, and biological behavior. Koestner and Yohn. Fee.

794 P G 1-8
Group Studies in Veterinary Pathology
Repeatable to a maximum of 24 cr. hrs.
794.01 Applied Pathology
Correlation of functional morphological, and chemical abnormalities in disease of domestic and companion animals.
794.02 Comparative Pathology
The comparative response of animal species to injury caused by toxic and radioactive materials, nutritional, and metabolic disturbances, and infectious agents.

850 G 1
Seminar in Veterinary Pathology
Repeatable to a maximum of 16 cr. hrs.
Fee.

999 G Arr.
Research in Veterinary Pathology
Research for thesis or dissertation purposes only.
Veterinary Physiology and Pharmacology

Office, 301 Glasgow Hall, 2000 Geary Road

Professors: Powers (Acting Chairman), Davis, Hamlin, Marks, and Smith; Associate Professor Yearly; Assistant Professors Hensel, Sajduddin, and Smetzer; Instructor Wright.

210     U 5
Animal Physiology
A. 4 cl., 1 3-hr. lab.
Prereq.: Chem. 102 or 122.
Not open to students with credit for 410 or 411.
Consideration of concepts and principles involved in the function of various body systems and principles of growth and aging. Fee.

211     U 5
Animal Physiology
W. 4 cl., 1 3-hr. lab.
Prereq.: Chem. 102 or 122.
Not open to students with credit for 532.
Comparative study of physiological concepts and principles involved in reproduction and metabolism in various species of domestic animals. Fee.

640     P G 3
Design and Analysis of Comparative Biomedical Research I
A.
Prereq.: Permission of instructor.
Theory and application of basic statistical concepts as they affect design, analysis, and interpretation of veterinary medical research. Hensel, Powers, and Hamlin. Fee.

641     P G 3
Design and Analysis of Comparative Biomedical Research II
W.
Prereq.: Permission of instructor.
Theory and application of basic statistical concepts as they affect design, analysis, and interpretation of veterinary medical research. Hensel, Powers, and Hamlin. Fee.

693     P G 3-15
Individual Studies
Prereq.: Permission of instructor.
Laboratory and library investigations concerning animal physiology and pharmacology problems. Smith, Powers, Hamlin, and Yearly.

694     P G 2-5
Group Studies
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.

779     P G 5
Comparative Mammalian Toxicology
Sp. 4 cl., 2-hr. lab.

780     P G 5
Antimicrobial and Endocrine Therapy
Sp. 3 cl., 2 2-hr. lab.
Prereq.: Permission of instructor.
A detailed study of the basic principles and clinical application of endocriines and antimicrobial drugs in veterinary medicine. Powers. Fee.

790     P G 3
Veterinary Physiology
A. 2 cl., 2 lab. hrs.
Prereq.: Permission of instructor.
Comparative electrophysiology. Hamlin and Smith. Fee.

791     P G 3
Veterinary Physiology
W. 2 cl., 2 lab. hrs.
Prereq.: 790 or permission of instructor.
Comparative hemodynamics and cardiovascular sound. Hamlin and Smith. Fee.

792     P G 3
Veterinary Physiology
Sp. 2 cl., 2 lab. hrs.
Prereq.: 791 or permission of instructor.
Advanced comparative cardiovascular physiology with emphasis upon circulatory response to stress of various congenital and acquired cardiovascular defects. Hamlin and Smith. Fee.

795     P G 3-5
Advanced Comparative Electrophysiology
A.
Prereq.: 790 or permission of instructor.
Cellular and cardiac electrophysiologic and clinical features of complex cardiac arrhythmias and conduction disturbances. Hamlin and Smetzer. Fee.

799     P G 2
Seminar
A, W, Sp. 1 2-hr. conf. and lec.
Prereq.: Permission of instructor.
Repeatable to a maximum of 30 cr. hrs.
Lectures and conferences on selected topics in veterinary physiology and pharmacology. Fee.

999     G Arr.
Research in Veterinary Physiology and Pharmacology
Research for thesis or dissertation purposes only.
Veterinary Preventive Medicine

Office: 252 Sisson Hall, 1900 Coffey Road

Professors Helwig (Chairman), Bohr, Ferguson, Jones, and Tynni
Associate Professor Kreier, Assistant Professors Buller, Dahl, Robinson, and Wittich.

200 U 3
Basic Animal Hygiene
A. 3 cl.
Causes of disease and the relationship of these causes to the animal's environment. Helwig and Dahl.

201 U 3
Applied Animal Hygiene
W. 3 cl.
Prereq.: 200 or equiv.
Various common diseases responsible for losses to the livestock industry, with emphasis on control. Helwig and Robinson.

616 P G 5
Germfree and Gnotobiotic Animals
W, Sp. 3 2-hr. cl. and lab.
Prereq.: Advanced standing in Biological Sciences, Microbiol. 607, or equiv., and permission of instructor.
The instrumentation of biological research through application of germfree and gnotobiotic animals.
Fee.

693 P G 2-5
Individual Studies
Prereq.: Permission of instructor.
Laboratory and library investigations of animal disease problems involving Veterinary Preventive Medicine.
Helwig and Jones.

785 P G 3
Biological Research Techniques
A, W, Sp. 2 2-hr. cl. and lab.
Prereq.: Advanced standing in Biological Sciences, Microbiol. 607, or equiv., and permission of instructor.
The more common laboratory animals used in biological research and testing will be dealt with as they relate to research purposes, design, and application. Fee.

810 G 3-8
Veterinary Public Health
Su, A, W.
Prereq.: 610.
Laboratory and library investigation of veterinary public health problems. Helwig, Jones, and Russell.
Fee.

850 G 1
Seminar in Veterinary Preventive Medicine
Repeatable to a maximum of 3 cr. hrs.

999 G Arr.
Research in Veterinary Preventive Medicine
Research for thesis or dissertation purposes only.

Welding Engineering

Office: 124 Welding Engineering Laboratories, 190 West 19th Avenue

Professors McCauley (Chairman), R. Green, and McMaster (Regents); Associate Professors Funk and Jackson; Assistant Professors W. Green and Libby.

240 U 4
Forging, Heat Treating, and Welding
Su, A, W, Sp. 3 cl., 3 1-hr. lab.
Safety glasses must be worn in laboratory.
Welding fundamentals and applications; intended for students not having an engineering background; laboratory work designed to augment classroom discussions and provide basic welding skills. Fee.

302 U 4
Introduction to Welding Engineering
W. 3 cl., 1 3-hr. lab.
Prereq.: Indus. E. 301 or permission of instructor.
Safety glasses must be worn in laboratory.
An introduction to welding engineering for undergraduate students to familiarize them with the broad field of welding engineering and particularly welding processes. Jackson. Fee.

340 U 3
Welding Science and Its Application
Sp. 3 cl.
Prereq.: 240 or permission of instructor.
Not open to students majoring in Weld. E. Not open to students with credit for 640.
A study of the engineering fundamentals of welding, design, materials, and processes are considered as related to the welding field. W. Green.

430 U 4
Applied Engineering Analysis
Sp. 3 cl., 1 3-hr. lab.
Prereq.: Physics 133 and Math. 255.
The analysis of engineering systems by the application of fundamental principles of conservation of matter and energy, and operational techniques. McMaster.

488 U 1
Welding Engineering Inspection Trip
Safety glasses are required.
A group visit to various industrial plants, the plants selected are generally grouped in one community; a written report is required.

489 U 2
Practical Experience in a Welding Organization
A. 10 wks., during Su.
Prereq.: Permission of chairman.
Experience in an engineering organization and the preparation of an acceptable report on the organization and the work done.
501 U G 4
Principles of Welding
A. 3 cl., 1 3-hr. lab.
Prereq.: 302, 430, and Elect. E. 500.
Safety glasses must be worn in laboratory.
Theory, equipment, techniques, and control of fusion welding with electric arc, gas, and other processes; welding codes and specifications; application of electrodes and processes. Libby. Fee.

502 U G 4
Principles of Resistance Welding
A. 3 cl., 1 3-hr. lab.
Prereq.: 430 and Elect. E. 520.
Not open to students with credit for 602.
Safety glasses must be worn in laboratory.
Theory and operation of resistance welding equipment, power supplies, electronic controls, welding codes and schedules, and process controls. McMaster. Fee.

510 U G 4
Physics of Welding
Sp. 3 cl., 1 3-hr. lab.
Not open to students with credit for 610.
Safety glasses must be worn in laboratory.
The application of basic principles in the welding processes. Funk. Fee.

588 U 1
Welding Engineering Inspection Trip
Safety glasses are required.
A group visit to various industrial plants; the plants selected are generally grouped in one community; a written report is required.

589 U 2
Practical Experience in Welding Industry
A. 10 wks. during Su.
Prereq.: Permission of chairman.
Experience in an engineering organization and the preparation of an acceptable report on the organization and the work done.

601 U G 4
Semi-Automatic Welding Processes
W. 3 cl., 1 3-hr. lab.
Prereq.: 501 and Elect. E. 520.
Laboratory and lecture study of welding power supplies utilized in semi-automatic arc-welding process including metal-inert-gas, tungsten-inert-gas, and submerged-arc process. Libby.

611 U G 4
Theory of Welding
A. 4 cl., 1 3-hr. lab.
Prereq.: 501 and Met. E. 500.
Safety glasses must be worn in laboratory.
The application of basic metallurgical principles in the welding processes; the weldability of metals is studied; laboratory work involves physical and metallurgical examination of welded specimens. Jackson. Fee.

612 U G 4
Application of Welding Engineering
W. 3 cl., 1 3-hr. lab.
Prereq.: 611.
Safety glasses must be worn in laboratory.
The principles by which manufacturing procedures for materials may be developed; an analysis of processing methods; material, physical and mechanical properties, inspection, and performance and service testing. McCauley. Fee.

630* U G 3
Analysis of Continuous Systems
A. 3 cl.
Prereq.: 430 or permission of instructor.
An energy analysis of analogous one-dimensional linear distributed systems with applications to welding process and control systems. McMaster.

631 U G 4
Nondestructive Testing
W. 3 cl., 1 3-hr. lab.
Prereq.: Elect. E. 520.
Safety glasses must be worn in laboratory.
Principles, equipment, techniques, and interpretation of nondestructive tests with X-rays, radionuclides, magnetic fields, penetrants, ultrasonics, eddy currents, and other probing media. McMaster. Fee.

680* U G 1
Continuous Systems Laboratory
A. 1 3-hr. lab.
Concur.: 630.
Laboratory exercises in measurement of transients in continuous systems, their analog computer solutions where feasible.

704* U G 3
Theory of High Energy Density Welding Processes
Sp. 3 cl.
Prereq.: 501; and Elect. E. 520 or equiv.; or permission of instructor.
Theory of physical and thermal processes in high-pressure arc, plasma, electron beam, laser, and other high-energy-density welding processes. McMaster.

705* U G 3
Principles of Welding Process Control Systems
Sp. 3 cl.
Prereq.: 430, 501, 502, and Elect. E. 520 and 550; or permission of instructor.

720 U G 4
Welding Design
A. 3 cl., 1 3-hr. lab.
Prereq.: Civil E. 530.
The analysis and design of statically determinate and indeterminate members and structures; study of welding procedures for shop fabrication and field erection. W. Green. Fee.
Welding Design
W. 3 cr., 1 3-hr. lab.
The analysis and design of machine elements and frames to a given set of shop conditions and facilities; emphasis on cost factor considerations. W. Green.

Welding Design
Sp. 3 cr., 1 3-hr. lab.
Prereq.: 502 and 721.
The design of resistance welded products; a selection of process and equipment and a study of tooling used in high production work. W. Green.

Welding Process Control Laboratory
Sp. 1 3-hr. lab.
Concurs.: 705.
Laboratory experiments in basic instrumentation and control systems for welding processes such as arc, resistance, electron-beam, and others.

Individual Studies in Welding Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

Group Studies in Welding Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

Thesis
Prereq.: 4th yr. standing and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Undergraduate research providing an opportunity to publish a report in appropriate technical publications.

Advanced Problems in Welding Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 24 cr. hrs.
Special studies not offered in the fixed curriculum; work may be taken under one or more of the special topics in the field including theory of welding processes and their physical mechanics, weldability of materials, advanced studies in welding design, theory and methodology of nondestructive testing, and fundamental application of welding processes to industrial technology.

Research in Welding Engineering
Research for thesis or dissertation purposes only.

Zoology
Office: 104 Botany and Zoology Building, 1735 Neil Avenue

Professors Peterle (Chairman), Bookhout, Borror, Britt, Collins, Crites, Giltz, Haub, Kissler, Smith, and Troutman; Associate Professors Carey, Gault, Hillis, Mismer, Parris, Stevens, and Valentine; Assistant Professors Berra, Curnow, Fairbanks, Gault, Hillis-Colmaux, Martin, St. John, K. Smith, and Tassava; Instructors Addis, Burnard, Jezerinac, Taub, and Troutman.

General Zoology
A, W, Sp. 2 cr., 3 1-hr. labs.
Prereq.: Biol. 100.
Not open to students with credit for 101.
A study of the variety of animals with emphasis on organismic systems and their functions, the interrelationships of each other, space, and time. Haub. Fee.

Invertebrate Zoology
Sp. 3 cr., 2 3-hr. labs.
Prereq.: 201 or equiv.
Not open to students with credit for 402.
A survey of the invertebrates with emphasis on morphology and relationships of representative types. Mitchell. Fee.

Ornithology
Sp. 2 cr., 1 2-hr. lab.
Prereq.: 201 or equiv. 10 additional cr. hrs. in biological sciences.
A study of the general biology and classification of birds, with emphasis on field identification of local species; field trip each Saturday. Giltz. Fee.

Functional Anatomy and Physiology I
A, W. 3 cr., 2 2-hr. labs.
Prereq.: Biol. 100.
The dermal, skeletal, and muscular systems with emphasis on man. Kessler. Fee.

Functional Anatomy and Physiology II
W, Sp. 3 cr., 2 2-hr. labs.
Prereq.: 231.
The metabolic systems with emphasis on man. Fairbanks. Fee.
240  U  4
Introductory Ethology
Sp.  4 cl.
Prereq.:  201.
Observations of animal behaviors, and introductory
analysis of their adaptive value, physiological
mechanisms, development, and evolution; emphasis on
movie presentations, reading, and small-group
discussions. Rothenbuhler.

Introduction to Ecology
(See Biol. 313.01 and 313.02.)
313.01
313.02

430  U  5
Vertebrate Embryology
Sp.  3 cl., 2 3-hr. labs.
Prereq.:  434 or equiv.
Not open to students with credit for Anat. 616.
Embryology of representative amphibians, birds, and
lower mammals from fertilization through
organogenesis. Tassava. Fee.

432  U  5
General Physiology
W.  2 cl., 2 3-hr. labs.
Prereq.:  Chem. 242 or equiv., Physics 113 or equiv., and
15 cr. hrs. in biological sciences.
A laboratory survey of physiological mechanisms in
animals. Lustick. Fee.

434  U  5
Problems in Vertebrate Structure
A, W.  3 cl., 2 3-hr. labs.
Prereq.:  5 cr. hrs. in zool., or Physics 111 or equiv.,
or permission of instructor.
Not open to students with credit for 231 or 234.
Exploration of interactions of historical, mechanical,
and functional factors that have selected for structures
of present vertebrates; emphasis on the comparative

500*  U  5
Basic Concepts and Recent Advances
in Zoology
W.  3 2-hr. cl.
Prereq.:  High school teacher status and 15 cr. hrs.
natural science at the 200 level.
Animal functions and genetic and environmental
interrelationships in time and space as illustrated by
selected animal types. Tidd. Fee.

530  U  5
General Histology
W.  3 cl., 2 3-hr. labs.
Prereq.:  434 or equiv.
Not open to students with credit for Anat. 607.
A detailed study of the tissues of vertebrate animals,
and a general survey of the microscopic structure of
various organs. J. N. Miller. Fee.

531  U  5
Principles of Physiology
Sp.  3 cl., 2 2-hr. labs.
Prereq.:  Academic Year Science Institute students only.
15 cr. hrs. Biological Sciences, 15 cr. hrs. Chem., and/or
Physics, and permission of instructor.

510  U  5
Animal Parasites
A, W.  2 cl., 3 2-hr. labs.
Prereq.:  201 or equiv., Jr. standing or above, and
permission of instructor.
The general principles of parasitology, the morphology,
life history, and classification of parasites, and their
host relationships; recommended for students preparing
for medical or zoological work. Miller. Fee.

611*  U  4
Animal Parasitology
Su (2nd term).  Franz Theodore Stone Lab., 3 all-day
ci. per wk.
Prereq.:  201 or equiv.
Emphasis on the parasites infesting freshwater
vertebrates, including field and laboratory experiences,
host examination, and techniques dealing with staining,
fixing, and mounting of specimens.

612  U  4
Invertebrate Zoology
Su (2nd term).  Franz Theodore Stone Lab., 3 all-day
ci. per wk.
Prereq.:  201 or equiv.
The collection and identification of invertebrate
animals, development of methods of classification, and
use of keys.

620  U  5
Zoology of Vertebrates
A, Sp.  3 cl., 2 2-hr. labs.
Prereq.:  201 or equiv.
A study of the various vertebrate groups, emphasizing
their origin, phylogeny, classification, life histories,
habits, distribution, and economic importance.
Downhower. Fee.

621  U  4
Ichthyology
Su (1st term).  Franz Theodore Stone Lab., 3 all-day cl.
per wk.
Prereq.:  201 or equiv.
Study of the distribution and classification of fishes,
which includes methods of identification, collection,
and preservation.

622*  U  4
Herpetology
Su (2nd term).  Franz Theodore Stone Lab., 3 all-day
ci. per wk.
Prereq.:  201 or equiv.
Local species of reptiles and amphibians, their habits,
life histories, ecology, and classification. Britt.

623  U  3
Biology of Birds
Sp.  2 cl., 1 2-hr. lab.
Prereq.:  201 or equiv.
The aspects of anatomy, physiology, taxonomy, and
behavior which are pertinent to the study of birds.
Putnam. Fee.
624 U G 4
Advanced Ornithology
Su (1st term). Franz Theodore Stone Lab., 3 all-day cl. per wk.
Prereq.: 201 or equiv.
Topics include instinctive behavior in the life of birds, the breeding cycle, social relations, territory, ecology, characteristics of population, and techniques in field study of birds. Putnam.

625 U G 5
Mammalogy
W. 3 cl., 2 2-hr. labs.
Prereq.: 201 or equiv.
The comparative morphology, taxonomy, life histories, distribution, and importance of the mammals. Good.
Fee.

626 U G 5
Biology of Fishes
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 201, 15 cr. hrs. in biological sciences, and permission of instructor.
The laboratory emphasizes ecological and systematic ichthyology; lectures emphasize the behavior, migration, distribution, and evolution of fishes. Cavender. Fee.

630 U G 5
Comparative Embryology
W. 3 cl., 2 2-hr. labs.
Prereq.: 201 or equiv.
A survey of various modes of embryonic development, illustrated with both invertebrate and vertebrate type material with emphasis on fundamental aspects and processes. Tassava. Fee.

633 U G 5
Vertebrate Physiology
Sp. 2 cl., 3 3-hr. labs.
Prereq.: Chem. 521; undergraduates must have credit for Zool. 432.
The physiology of vertebrate animals with emphasis on exchange rates, metabolic rates, energetics, and homeostasis. Lustick. Fee.

640 U G 5
Animal Behavior
W. 3 cl., 2 2-hr. labs.
Prereq.: 201 or equiv.

650 U G 5
Principles of Animal Ecology
Sp. 3 cl., 2 2-hr. labs., Sat. field trips.
Prereq.: Biol. 313.01.
Principles and methods of animal ecology and their application to other closely related biological sciences. Stansbery. Fee.

651 U G 4
Field Zoology
Su (1st term). Franz Theodore Stone Lab., 3 all-day cl. per wk.
Prereq.: 201 or equiv.
Field and laboratory identification of aquatic and terrestrial vertebrates and invertebrates of the region, in relation to habitats occupied; of special interest to biology teachers.

652 U G 4
Limnology
Su (1st term). Franz Theodore Stone Lab., 3 all-day cl. per wk.
Prereq.: 201 or equiv., 10 cr. hrs. in chem., 10 cr. hrs. in physics.
Study of physical, chemical, and biological factors influencing fresh water life; field and laboratory techniques for determining area, chemical, natural flora, and fauna are emphasized. Britt.

653 U G 4
Fish Ecology
Su (2nd term). Franz Theodore Stone Lab., 3 all-day cl. per wk.
Prereq.: 621 or equiv.
Studies of life histories and interspecific relationships of fishes and of the various factors influencing their abundance.

6541 U G 4
Ecological Physiology of Aquatic Animals
Su (2nd term). Franz Theodore Stone Lab., 3 all-day cl. per wk.
Prereq.: 201 or equiv., and 10 cr. hrs. of chem., physics, or physiol.
Study of the aquatic habitat includes physical and chemical adjustment, tolerance, and acclimatization to environment of vertebrates and invertebrates.

655 U G 5
Limnology
A. 3 hr. lec.—seminar, 1 4-hr. lab.
Prereq.: 10 cr. hrs. chem., 20 cr. hrs. in biological sciences, and permission of instructor.
A study of the physical, chemical, and biological factors influencing the biological productivity of inland waters and of techniques and equipment used in evaluating them. Britt and Tubb. Fee.

660 U G 5
Fisheries Biology
A. 3 cl., 2 2-hr. labs.
Prereq.: Biol. 313.01 or equiv.
The productivity of fish populations and the ecological relationships between fishes and other aquatic organisms. Momot. Fee.

661 U G 5
Wildlife Biology
A. 3 cl., 2 2-hr. labs.
Prereq.: 201 or equiv.
An introductory course in the biology and importance of wildlife, emphasis on biological principles as they relate to birds and mammals.

662 U G 5
Wildlife Biology Techniques
W. 3 cl., 2 2-hr. labs., Sat. field trips.
Prereq.: 15 cr. hrs. in biol. or zool. above the 200 level, including Biol. 313.01.
Techniques employed in the field of wildlife biology, with emphasis on game birds and mammals; designed for zoology majors specializing in wildlife biology. Bookhout. Fee.