## Courses of Instruction

This section provides descriptions of courses of instruction offered by the University at the undergraduate, graduate, and professional levels. The departments and schools, which offer the courses, are arranged in alphabetical order. The courses in each are preceded by the names of faculty members with the rank of assistant professor, associate professor, and professor in that department or school. The number preceding names signifies members of the graduate faculty who function in an advisory capacity.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
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<tr>
<td>631</td>
<td>Structural Design V</td>
<td>U G 5</td>
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</table>

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

The course number(s) or other information indicate the preparation or classification prerequisite to enrollment in the course. If no department name is listed, the course number refers to the course within the same department. The prerequisite may be satisfied by the course or courses indicated or equivalent background. 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 or department office should be consulted in cases of question as to eligibility for taking the course.

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

### A brief description of the course:
Basic theory and design of reinforced concrete structures. Instructor’s name: Tilton

### GENERAL PREREQUISITES

The abbreviated description of courses offered by the University follow in alphabetical order. The prerequisites of each course are a part of the descriptive material.

The system of numbering courses at The Ohio State University is limited to a 300 through 999 series in each course area, which breaks down in the following manner:

Below 500:
1. Primarily designed for freshmen and sophomores.
2. Do not carry credit for graduate students.

500 to 599:
1. Not open to freshmen.
2. Do not carry credit for graduate students.

600 through 799:
1. Designed for juniors, seniors, and graduate students.
2. Prerequisites which amount to 20 quarter hours in the same or allied subjects. A minimum of at least 10 quarter hours must be in the same subject.
   - or
   - 30 quarter hours in not more than two allied subjects.
3. Consent of Dean of the Graduate School needed for freshmen and sophomores.

800 and above:
1. Open only for graduate students.
2. Consent of Dean of the Graduate School needed for undergraduate students.
3. Prerequisite which amounts to 30 quarter hours in the same and allied subjects, of which 15 quarter hours must be in the same subject.

Special prerequisites as stated in the descriptive courses must be included with these prerequisites.

### EXPLANATION OF COURSE LISTINGS

#### A

The material in bold type includes:

- The course number: 631
- A dagger—denoting that the course will not be offered this year:
- An asterisk—indicating that the course is offered every other year:
- The course title: Structural Design V
- The instructional level: U G
  - U = Undergraduate
  - G = Advanced Undergraduate and Graduate
- C = Graduate
- P = Professional (for professional students enrolled in that particular school only)

Credit hours: 5

#### B

The material in italics includes:

- quarters of offering:
  - Su = Summer
  - W = Winter
  - A = Autumn
  - Sp = Spring

Summer Quarter is further divided into 1st Term and 2nd Term. See the University Calendar on the inside back cover 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-hr. labs. In the illustration above, the 5 hours of credit are earned through satisfactory completion of courses work which involves attending class 3 days a week and attending 2 2-hr laboratory periods.
Architecture

Introductory Architectural Design U 4
A. 15 lab. hrs.
Introduction to architectural design, through exercises in scale, delineation, techniques, and space organization. Library and individual criticism. Bower and Staff.

Introductory Architectural Design U 4
W. 12 lab. hrs.
Prereq.: 411.

Introduction to Architectural Design U 4
Sp. 12 lab. hrs.
Prereq.: 412.

Elementary Architectural Design U 5
A. 15 lab. hrs.
Prereq.: 413.
Elementary problems in architectural design dealing with organization of space for human occupancy. Library research, individual criticism, and lectures. Tilley, Biddle, and Staff.

Elementary Architectural Design U 5
W. 15 lab. hrs.
Prereq.: 511.

Elementary Architectural Design U 5
Sp. 15 lab. hrs.
Prereq.: 512.

Elementary Architectural Construction U 3
A. 1 cl., 6 lab. hrs.
Upgradation, manufacture, physical properties, standards, and uses of building materials. Theory, methods, codes, and specifications of architectural construction, preparation of contract drawings. Diper and Staff.

Elementary Architectural Construction U 3
W. 1 cl., 6 lab. hrs.
Prereq.: 521.

Elementary Architectural Construction U 3
Sp. 1 cl., 6 lab. hrs.
Prereq.: 522.

Special Studies in Architecture U 1-5
A.
Prereq.: Permission of the School.
For students not majoring in Architecture who desire to pursue special studies in the field of Architecture.

572 Special Studies in Architecture U 1-5
W.
Prereq.: Permission of the School.
For students not majoring in Architecture who desire to pursue special studies in the field of Architecture.

573 Special Studies in Architecture U 1-5
Sp.
Prereq.: Permission of the School.
For students not majoring in Architecture who desire to pursue special studies in the field of Architecture.

604 History of Ancient Architecture U 3
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.

605 History of Medieval and Renaissance Architecture U 3
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.

606 History of Contemporary Architecture U 3
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.

611 Intermediate Architectural Design U 5
A. 15 lab. hrs.
Prereq.: 513.
Intermediate problems in architectural design dealing with space analysis and site planning, presented in an integrated and related series of building types. Clark and Staff.

612 Intermediate Architectural Design U 5
W. 15 lab. hrs.
Prereq.: 611.
Continuation of 611.

613 Intermediate Architectural Design U 5
Sp. 15 lab. hrs.
Prereq.: 612.
Continuation of 612.

621 Intermediate Architectural Construction U 4
A. 1 cl., 8 lab. hrs.
Prereq.: 613, 533 and 661, 662, 663 concurs.
Continuation of composition, manufacture, physical properties, standards, and uses of basic building materials. Theory, methods, codes and specifications of architectural construction, preparation of contract drawings. Clark and Staff.

622 Intermediate Architectural Construction U 4
W. 1 cl., 8 lab. hrs.
Prereq.: 621.
Continuation of 621.

623 Intermediate Architectural Construction U 4
Sp. 1 cl., 8 lab. hrs.
Prereq.: 622.
Continuation of 622.

631 Inspection Trip U 2
Sp.
Prereq.: Arch. or Land Arch., 4th or 5th yr. standing.
Taken between Winter and Spring Quarters. Trip to inspect architect’s office and buildings in Ohio and neighboring states. Written report required.

A-21
Architecture

11 Introductory Architectural Design U 4
A. 12 lab. hrs.
12 Introductory Architectural Design U 4
W. 12 lab. hrs.
Prereq.: 411.
Continuation of 411.

13 Introductory Architectural Design U 4
Sp. 12 lab. hrs.
Prereq.: 412.
Continuation of 413.

511 Elementary Architectural Design U 5
A. 15 lab. hrs.
Prereq.: 413.
Elementary problems in architectural design dealing with organization of space for human occupancy. Library research, individual criticism, and lectures. Tilley, Biddle, and Staff.

512 Elementary Architectural Design U 5
W. 15 lab. hrs.
Prereq.: 511.
Continuation of 511.

513 Elementary Architectural Design U 5
Sp. 15 lab. hrs.
Prereq.: 512.
Continuation of 512.

521 Elementary Architectural Construction U 3
A. 1 cl., 6 lab. hrs.
Composition, manufacture, physical properties, standards, and uses of basic building materials. Theory, methods, codes, and specifications of architectural construction, preparation of contract drawings. Dipner and Staff.

522 Elementary Architectural Construction U 3
W. 1 cl., 6 lab. hrs.
Prereq.: 521.
Continuation of 521.

523 Elementary Architectural Construction U 3
Sp. 1 cl., 6 lab. hrs.
Prereq.: 522.
Continuation of 522.

571 Special Studies in Architecture U 1-5
A.
Prereq.: Permission of the School.
For students not majoring in Architecture who desire to pursue special studies in the field of Architecture.

572 Special Studies in Architecture U 1-5
W.
Prereq.: Permission of the School.
For students not majoring in Architecture who desire to pursue special studies in the field of Architecture.

573 Special Studies in Architecture U 1-5
Sp.
Prereq.: Permission of the School.
For students not majoring in Architecture who desire to pursue special studies in the field of Architecture.

604 History of Ancient Architecture U 3
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.

605 History of Medieval and Renaissance Architecture U 3
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.

606 History of Contemporary Architecture U 3
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.

611 Intermediate Architectural Design U 5
A. 15 lab. hrs.
Prereq.: 513.
Intermediate problems in architectural design dealing with space analysis and site planning; presented in an integrated and related series of building types. Clark and Staff.

612 Intermediate Architectural Design U 5
W. 15 lab. hrs.
Prereq.: 611.
Continuation of 611.

613 Intermediate Architectural Design U 5
Sp. 15 lab. hrs.
Prereq.: 612.
Continuation of 612.

621 Intermediate Architectural Construction U 4
A. 1 cl., 8 lab. hrs.
Prereq.: 613, 523 and 661, 662, 663 concurs.
Continuation of composition, manufacture, physical properties, standards, and uses of basic building materials. Theory, methods, codes and specifications of architectural construction, preparation of contract drawings. Clark and Staff.

622 Intermediate Architectural Construction U 4
W. 1 cl., 8 lab. hrs.
Prereq.: 621.
Continuation of 621.

623 Intermediate Architectural Construction U 4
Sp. 1 cl., 8 lab. hrs.
Prereq.: 622.
Continuation of 622.

631 Inspection Trip U 2
Sp.
Prereq.: Arch. or Land Arch., 4th or 5th yr. standing.
Taken between Winter and Spring Quarters. Trip to inspect architect's office and buildings in Ohio and neighboring states. Written report required.
830 Advanced Chemical Engineering Kinetics
W. 3 cl.
Prereq.: 720, 755, or permission of instructor.
Chemical engineering kinetics from the viewpoint of industrial chemical processes. Corrigan.

831 Advanced Chemical Engineering Kinetics
Sp. 3 cl.
Prereq.: 830.
Continuation of 830.

861 Advanced Chemical Engineering Processes
A. 2 cl., 2 comp. lab. hrs.
Prereq.: 720, 755, 880; and/or 760 concur. or equiv.
Study of selected chemical engineering processes which involve the application of chemistry, thermodynamics, reaction kinetics, and heat and mass transfer, oxidation, hydrogenation, polymerization, esterification, halogenation. Corrigan, Brodkey, Dryden, Synesson, Sweeney.

870 Advanced Chemical Engineering Process Development
W. 1 cl., 14 lab. hrs.
Prereq.: 755, 780, 880.
Original work on development of a new process. Basic data for process design and preliminary cost estimate required. Corrigan, Dryden, Synesson, Sweeney.

880 Advanced Chemical Engineering Operations Laboratory
Su, A, W, Sp. 1 conf., 5-17 lab. hrs.
Prereq.: 720, 754, and/or concur. 741, or permission of instructor.
Repeatable to a maximum of 15 hrs.
Chemical engineering fundamentals and operations. Koffolt.

905 Seminar in Chemical Engineering
G 2
Prereq.: Graduate standing in Chem. E.
Repeatable.
Formal reports, lectures, and discussions of fundamentals and new developments in science and technology as related to chemical engineering. Koffolt, Kay, Geankoplis, Dryden, Brodkey, Corrigan, Synesson, Sweeney.

950 Research in Chemical Engineering
G Arr.
Research for thesis or dissertation purposes only.

Chemistry

Offices: Evans Chemistry Laboratory, 88 West 18th Avenue.
General Chemistry Office: 115 McPherson Chemical Laboratory, 140 West 18th Avenue.


404 General Chemistry
A, W. 3 cl., 3 lab. hrs.
Prereq.: Engr.: 1st yr. standing. One unit of high school Chem. and/or concur. Math. 401.
Not open to students with credit for 407 or 411.
A general course in the principles of chemistry intended for students in engineering; metallic elements; applications to qualitative analysis. Shone, General Chem. Staff and Assistants.

405 General Chemistry
W, Sp. 3 cl., 3 lab. hrs.
Prereq.: 404.
Not open to students with credit for 408 or 412.
Continuation of 404.

406 General Chemistry
A, Sp. 2 cl., 8 lab. hrs.
Prereq.: 405.
Not open to students with credit for 408, 409, or 413.
Continuation of Chemistry 405; elementary organic chemistry; non-metallic elements. Busch, General Chem. Staff and Assistants.

407 Elementary Chemistry
A, W, Sp. 4 cl., 3 lab. hrs.
Prereq.: Math 400 or equiv.
Not open to students with credit for Chem. 404 or 411.
A course in the principles of chemistry, the chemistry of the more important elements and compounds, including the compounds of carbon (408). For students who require only two quarters of chemistry whether they have had high school chemistry or not and for students who do not present one unit of high school chemistry for entrance to the University. May be followed by 409 to satisfy all first year requirements in chemistry.

408 Elementary Chemistry
W, Sp. 4 cl., 3 lab hrs.
Prereq.: 407.
Not open to students with credit for 408 or 412.
Continuation of 407.

409 General Chemistry and Qualitative Analysis
A, Sp. 3 cl., 6 lab. hrs.
Prereq.: 408.
Not open to students with credit for 408 or 413.
Designed as a transition course to follow 408 and to prepare students, from that sequence of courses, for second year chemistry.
Advanced Chemical Engineering
Kinetics
W. 3 cr.
Prereq.: 720, 755, or permission of instructor.
Chemical engineering kinetics from the viewpoint of industrial chemical processes. Corrigan.

Advanced Chemical Engineering
Kinetics
Sp. 3 cr.
Prereq.: 830.
Continuation of 830.

Advanced Chemical Engineering
Processes
A. 2 cr., 2 comp. lab. hrs.
Prereq.: 720, 755, 880; and/or 760 concur. or equiv.
Study of selected chemical engineering processes which involve the application of chemistry, thermodynamics, reaction kinetics, and heat and mass transfer, oxidation, hydrolysis, polymerization, esterification, halogenation. Corrigan, Brodkey, Dryden, Syverson, Sweney.

Advanced Chemical Engineering
Process Development
W. 1 cr., 14 lab. hrs.
Prereq.: 755, 760, 850.
Original work on development of a new process. Basic data for process design and preliminary cost estimate required. Corrigan, Dryden, Syverson, Sweney.

Advanced Chemical Engineering
Operations Laboratory
Sa, A, W, Sp. 1 conf., 5-17 lab. hrs.
Prereq.: 720, 754, and/or concur. 741, or permission of instructor.
Repeatable to a maximum of 15 hrs.
Chemical engineering fundamentals and operations. Koffolt.

Seminar in Chemical Engineering
Sa, A, W, Sp. 2 conf. hrs.
Prereq.: Graduate standing in Chem. E.
Repeatable.
Formal reports, lectures, and discussions of fundamentals and new developments in science and technology as related to chemical engineering. Koffolt, Kep, Geankoplis, Dryden, Brodkey, Corrigan, Syverson, Sweney.

Research in Chemical Engineering
Research for thesis or dissertation purposes only.

Chemistry

Office: Evans Chemistry Laboratory, 68 West 18th Avenue.
General Chemistry Office: 115 McPherson Chemical Laboratory, 140 West 18th Avenue.


General Chemistry
A, W, 2 cr., 2 lab. hrs.
Prereq.: Engr. I 1st yr., standing. One unit of high school Chem. and/or concur. Math. 401. Not open to students with credit for 407 or 411.
A general course in the principles of chemistry intended for students in engineering, metal-working: applications to qualitative analysis. Shaw, General Chem. Staff and Assistants.

General Chemistry
W, Sp. 3 cr., 3 lab. hrs.
Prereq.: 404.
Not open to students with credit for 408 or 412.
Continuation of 404.

General Chemistry
A, Sp. 2 cr., 6 lab. hrs.
Prereq.: 405.
Not open to students with credit for 408, 409, or 413.
Continuation of Chemistry 405, elementary organic chemistry; non-metallic elements. Brown, General Chem. Staff and Assistants.

Elementary Chemistry
A, W, Sp. 4 cr., 3 lab. hrs.
Prereq.: Math 400 or equiv.
Not open to students with credit for 404 or 411.
A course in the principles of chemistry, the chemistry of the more important elements and compounds, including the compounds of carbon (408). For students who require only two quarters of chemistry whether they have had high school chemistry or not and for students who do not present one unit of high school chemistry for entrance to the University. May be followed by 408 to satisfy all first year requirements in chemistry.

Elementary Chemistry
W, Sp. 4 cr., 3 lab hrs.
Prereq.: 407.
Not open to students with credit for 405 or 412.
Continuation of 407.

General Chemistry and Qualitative Analysis
A, Sp. 3 cr., 6 lab. hrs.
Prereq.: 408.
Not open to students with credit for 406 or 413.
Designed as a transition course to follow 408 and to prepare students, from that sequence of courses, for second year chemistry.
732  Administration of Nursing Services U G 5
Su. 4 cl. and 3 hr. planned observations.
Prereq. or concurs.: Grad. standing in nursing service administration curriculum, 731.
Exploration of major problems of nursing administration at the top administrative levels. Includes observations of administrative situations, conferences, field trips, and written reports. Dorsch.

736  Clinical Obstetrics and Gynecology  P 16
Prereq.: Med. 4th yr. standing.

738  Obstetrics and Gynecology P 12
2 months, offered in July, Sept., Nov., Jan., Mar., or May.
Prereq.: Med. 3rd yr. standing.
Normal and abnormal obstetrics and diseases of the female generative tract; management and philosophy of current therapy. Supervised in-patient and out-patient experience.

740  Fetus and Newborn
1 month, offered Aug., Dec., May.
Prereq.: 735, 715.
Reproduction biology and human development; the fetal-maternal axis and the product of conception; supervised clinical training and service.

745  Reproduction Endocrinology and Infertility
1 month, offered Sept. and Mar.
Prereq.: 736.
Selective endocrinologic aspects of the specialty; correlation of biochemical, histochemical and cytologic aspects with clinical problems.

749  Obstetric and Gynecologic Specialties P 4
Prereq.: Med. 4th yr. standing.

751  Obstetric and Gynecologic Specialties P 6
1 month, offered all months.
Prereq.: 736.
Repeatable by permission of instructor.
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.
A. Obstetric emphasis
B. Gynecologic emphasis

753  Individual Studies in Obstetrics and Gynecology
1 month, offered all months.
Prereq.: Permission of Chairman.
Clinical, laboratory, conference, and library work in Obstetrics and/or Gynecology.
A. Obstetric emphasis.
B. Gynecologic emphasis.

782  Residence in Obstetrics and Gynecology
12 months, full time, beginning July 1.
Prereq.: Appointment as Resident, University Hospital. Rotation through obstetric and gynecologic sub-specialties, in-patient and out-patient services; supervisory and teaching responsibility in the patient-care team; rounds and conferences.

900  Obstetric and Gynecologic Pathology G 2-5
Prereq.: Permission of instructor.
Laboratory, conference, and library work. Study of current pathological specimens with emphasis upon special investigation. Ullery, Meiling, Hollenbeck, Holzaepfel, Williams, Boutsela, Becht.

950  Research in Obstetrics and Gynecology
Research for thesis purposes only.

A-176
850 Advanced Preventive Medicine: Public Health  G 3
A. 2 3-hr. conf.
Prereq.: 750 or equiv. and 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.

851 Advanced Preventive Medicine: Industrial Hygiene  G 3
W. 3 conf. and lab.
Prereq.: 850, resident standing in Aviation and Occupational Medicine.
Engineering appraisal of environmental health hazards, sampling techniques, instrumentation and analytical methods; the industrial hygiene survey. Diemer, Roberts and Staff.

852 Advanced Preventive Medicine: Environmental Control  G 3
Sp. conf. and field exercises.
Prereq.: 850 and 851; resident standing in Aviation and Occupational Medicine.
Principles of substitution, enclosure, isolation of hazardous operations; local exhaust ventilation; general ventilation-air conditioning; Noise control, radiant energy; ionizing radiation. Personal protective equipment, medical supervision of persons exposed to conditions of special hazards. Roberts and Staff.

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

999 Interdepartmental Seminar in Industrial Engineering  G 1-5
Prereq.: Resident standing in Aviation and Occupational Medicine.
The Department of Industrial Engineering and Preventive Medicine conduct a Seminar annually with industrial psychologists in an area of common interest. Topic to be announced.

950 Research in Preventive Medicine  G Arr.
Research for thesis purposes only.

Psychiatry
Office: 071 Upham Hall, 473 West 10th Avenue.
PROFESSORS: PATTERSON (Chairman), HARDING, MUELLER, and PASMANICK; ASSOCIATE PROFESSORS: CORSON, FISCHER, GREEN, HARRINGTON, PETER, PINE, REUTTIG, RISTINE, ASSISTANT PROFESSORS: ADDISON, BEIER, BESCH, BUTCHER, FRANK, GARDNER, GODFREY, HARDING, HASS, KAESBLING, KAPP, KING, KNOBLOCH, KNOOP, LUBIN, McGILLEN, MCGOUGH, NEW, RETZLAF, RIND, R. STEVENSON, VEZOZIS, WAHLER, WEISS, and WHIELDON.

704 Electroencephalography  G 2
A, W.
Repeatable to a maximum of 4 cr. hrs.
Interpretation and techniques of obtaining recordings. Parker.

737 Clinical Psychiatry  P 12
Prereq.: Med. 3rd or 4th yr. standing.
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.

782 Residency in Psychiatry  P 18
12 months, full time, beginning July 1.
Prereq.: Appointment as Resident, University Hospital Repeateable to a maximum of 216 hrs.
Rotation through in-patient and out-patient services in the diagnosis and treatment of psychiatric disorders of adults and children; rounds, conferences and individual supervision.

800 Seminars in Psychiatry  G 1-2
Prereq.: M.M. residency in Psychiatry, and permission of chairman.
a. Clinical Psychiatry, Patterson and Staff.
b. Experimental Psychology, Patterson and Staff.
c. Learning and Motivation.
d. Neuroendocrine and Other Correlates of Conditioned Reflexes and Hypnosis.
e. Neurochemistry and Neuropsychopharmacology, McClure, Fischer.
f. Neuroendocrinology, Goldman.
g. Neuropathology, Liss.
h. Neuropsychiatry, Retzlaff.
i. Psychological Psychiatry, Pasmanick.
j. Biological Psychiatry, Patterson.

830 Individual Studies in Biological Psychiatry  P 6, 12, 18
1, 2, or 3 months, offered all months.
Repeatable to a maximum of 6 cr. hrs.
Current diagnostic and treatment methods of dealing with major psychiatric disorders. Patterson and Staff.
COURSES OF INSTRUCTION
PREVENTIVE MEDICINE

850  Advanced Preventive Medicine:  G 3
     Public Health
     A. 2 2-hr. conf.
     Prereq.: 750 or equiv. and 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.

851  Advanced Preventive Medicine:  G 3
     Industrial Hygiene
     W. 3 conf. and lab.
     Prereq.: 850, resident standing in Aviation and Occupational Medicine.
     Engineering appraisal of environmental health hazards, sampling techniques, instrumentation and analytical methods; the industrial hygiene survey. Dimman, Roberts and Staff.

852  Advanced Preventive Medicine:  G 3
     Environmental Control
     Sp. conf. and field exercises.
     Prereq.: 850 and 851; resident standing in Aviation and Occupational Medicine.
     Principles of substitution, enclosure, isolation of hazardous operations; local exhaust ventilation; general ventilation-air conditioning. Noise control, radiant energy; ionizing radiation. Personal protective equipment, medical supervision of persons exposed to conditions of special hazards. Roberts and Staff.

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

899  Interdepartmental Seminar in Industrial Engineering:  G 1-5
     Prereq.: Resident standing in Aviation and Occupational Medicine.
     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.

950  Research in Preventive Medicine:  G Arr.
     Research for thesis purposes only.

Psychiatry

Office: 207 Upshur Hall, 472 West 12th Avenue.

PROFESSORS: PATTERSON (Chairman), HARDING, LISS, PALMER, and THASAMANICK; ASSOCIATE PROFESSORS: CORSON, FISCHER, GREEN, MCKOWN, MISSILIDINES, PARKER, PINE, ROTH, RISTINE, ASSISTANT PROFESSORS: ADDISON, BENDER, BERGE, BUTCHER, FRANK, GARDNER, GOULD, GORE, R. HARDING, HASS, KAJALING, KARRAS, KING, KNOEBEL, KOOP, KORHAN, MCLAUGHER, MCGOUGH, NEW, BREZLAFF, RORLD, STEVENSON, VECOZS, WAHLER, WEEF, and WHIELDON.

704  Electroencephalography:  G 2
     A, W.
     Repeatable to a maximum of 4 cr. hrs.
     Interpretation and technique of obtaining recordings. Parker.

736  Dispensary Clinics in Psychiatry:  P 2
     Prereq.: Med., 4th yr. standing.
     Clinical Psychiatry:  P 12
     Su, W, Sp.
     Prereq.: Med., 3rd or 4th yr. standing.
     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.

782  Residency in Psychiatry:  P 18
     12 months, full time, beginning July 1.
     Prereq.: Appointment as Resident, University Hospital.
     Repeatable to a maximum of 316 hrs.
     Rotation through in-patient and out-patient services in the diagnosis and treatment of psychiatric disorders of adults and children; rounds, conferences and individual supervision.

800  Seminars in Psychiatry:  G 1-2
     1 cr.
     Prereq.: M.M., residency in Psychiatry, and permission of chairman.
     a. Clinical Psychiatry, Patterson and Staff.
     b. Research Methodology, Pademack and Staff.
     c. Psychotherapy, Patterson and Staff.
     d. Psychiatric Literature, Patterson and Staff.

830  Individual Studies in Biological Psychiatry:  G 1-2
     1, 2, or 3 months, offered all months.
     Prereq.: Med., 3rd or 4th yr. standing and permission of chairman.
     a. Electroencephalography in Psychiatry.
     b. Experimental Psychology.
     c. Learning and Motivation.
     d. Neuroendocrine and Other Correlates of Conditioned Reflexes and Hypnosis.
     e. Neurochemistry and Neuropharmacology, McClure, Fitcher.
     f. Neuroendocrinology, Goldman.
     g. Neuropathology, Liss.
     h. Neurophysiology, Brelaaff.
     i. Physiological Psychiatry, Pademack.
     j. Biological Psychiatry, Patterson.
courses of instruction

This section provides descriptions of courses of instruction offered by the University at the undergraduate, graduate, and professional levels. The departments and schools, which offer the courses, are arranged in alphabetical order. The courses in each are preceded by the names of faculty members with the rank of assistant professor, associate professor, and professor in that department or school. The preceding names signify members of the graduate faculty who function in an advisory capacity.

EXPLANATION OF COURSE LISTINGS

A

The material in bold type includes

The course number: 631
A dagger—denoting that the course will not be offered this year:
An asterisk—indicating that the course is offered every other year:

The course title: Structural Design V
The instructional level: U G
U = Undergraduate
G = Advanced Undergraduate and Graduate

Credit hours: 5

B

The material in italics includes

Su = Summer W = Winter
A = Autumn Sp = Spring

Summer Quarter is further divided into 1st Term and 2nd Term. See the University Calendar on the inside back cover 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.

Classroom and laboratory hours: 3-cl.: 2-hr.

labs. In the illustration above, the 5 hours of credit are earned through satisfactory completion of courses work which involves attending class 3 days a week and attending 2 2-hr laboratory periods.

3

Prerequisites: 673, Engr. Mech. 605 or 3rd yr. standing.
The course number(s) or other information indicate the preparation or classification prerequisite to enrollment in the course. If no department name is listed, the course number refers to the course within the same department. The prerequisite may be satisfied by the course or courses indicated or equivalent background. 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 or department office should be consulted in cases of question as to eligibility for taking the course.

4

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

C

A brief description of the course: Basic theory and design of reinforced concrete structures. Instructor's name: Tilton

GENERAL PREREQUISITES

The abbreviated description of courses offered by the University follow in alphabetical order. The prerequisites of each course are a part of the descriptive material.

The system of numbering courses at The Ohio State University is limited to a 300 through 999 series in each course area, which breaks down in the following manner:

Below 500:
1. Primarily designed for freshmen and sophomores.
2. Do not carry credit for graduate students.

500 to 599:
1. Not open to freshmen.
2. Do not carry credit for graduate students.

600 through 799:
1. Designed for juniors, seniors, and graduate students.
2. Prerequisites which amount to 20 quarter hours in the same or allied subjects. A minimum of at least 10 quarter hours must be in the same subject or 30 quarter hours in not more than two allied subjects.
3. Consent of Dean of the Graduate School needed for freshmen and sophomores.

800 and above:
1. Open only for graduate students.
2. Consent of Dean of the Graduate School needed for undergraduate students.
3. Prerequisite which amounts to 30 quarter hours in the same and allied subjects, of which 15 quarter hours must be in the same subject.

Special prerequisites as stated in the description of courses must be included with these requirements.
Accounting

Office: 452 Majors Hall, 1775 South College Road.

PROFESSORS: McCOLLUGH (Chairman), FERTIG, and
ISHONITOO: ASSOCIATE PROFESSORS: BRUSH, BURNS,
HAMILTON, IGRAY, NORTHRUP, ASSISTANT PROFESSOR GORDON.

501 Introduction to Accounting  U G 3
Su, A, W, Sp. 5 cl.
Prereq. or concis.: Econ. 401 or 412 or 509 or 505 or 506 or 507.
Not open to students with credit for 401-402, 411-
412, 470, or 510.
The uses of accounting reports in management decisions and in
cost control of business enterprises.

502 Introduction to Accounting  U G 3
Su, A, W, Sp. 5 cl.
Prereq.: 501 and Econ. 501.
Not open to students with credit for 401-402, 411-
412, 470, or 510.
The accrual interpretation of transactions and fundamentals of
income determination, uses of financial statements by persons
outside the firm.

503 Accounting Methods  U G 3
Su, A, W, Sp. 3 cl., 2 2-9 hr. labs.
Prereq.: 402, 412, or 502.
Not open to students with credit for 401-402, 411-
412, 470, or 510.
The application of accounting techniques to recording and reporting
financial information. Special emphasis is given to accounting
systems and the use of working papers.

510 Outline of Accounting  U G 3
Su, A, Sp. 5 cl.
Not open to students with credit for 401, 405, 410, 411, or 501.
Survey of accounting in modern business. This course is intended
for students whose major interest is in fields other than business.

603 Cost Accounting  U G 4
Su, A, W, Sp. 4 cl.
Prereq.: 403, 413, or 503.
Not open to students with credit for 624. 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.

605 Financial Accounting  U G 4
Su, A, W. 4 cl.
Prereq.: 401, 413, or 503.
Not for graduate credit for majors in Acc.
Analysis and interpretation of financial statements, advanced study of
concepts of asset valuation and income determination.

606 Financial Accounting  U G 4
A, W, Sp. 4 cl.
Prereq.: 403, 413 or 503, and 405.
A continuation of 605 with special emphasis on the accounting
entity and business combinations.

623 Principles of Automatic Data Processing  U G 3
A, W. 2 cl., 1 2-hr. lab.
Prereq.: 402 or 412 or 509, Econ. 542, and 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.

624 Factory Costs  U G 5
A, Sp. 5 cl.
Prereq.: 402 or 412 or 502.
Not open to majors in Acc.
Survey of industrial cost accounting for the student whose major
interest is in fields other than accounting.

641 Tax Accounting I  U G 4
Su, A, W, Sp. 4 cl.
Prereq.: 403 or 412 or 413 or 502 or 510.
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.

642 Tax Accounting II  U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 641 and 403 or 412 or 503.
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.

643 Introduction to Management Accounting  U G 3
A. 3 cl. and conf.
A survey of accounting principles from the viewpoint of management; income measurement; analysis and interpretation of ac-
counting data, internal reports.

644 Introduction to Management Accounting  U G 3
W. 3 cl. and conf.
Prereq.: 643.
Continuation of 643.

713 Accounting Practice  U G 4
Su, A, W, Sp. 4 cl.
Prereq.: 603 and 610 or 603 and 606.
A study of the accounting concepts and standards underlying corporate and non-corporate financial statements, including con-
sideration of typical accounting problems.

719 Advanced Cost Accounting  U G 4
A. 4 cl.
Prereq.: 603.
Advanced study of selected applications of cost accounting concepts
to management problems involving performance measures with emphasis on budgetary control and standard costing.

724 Accounting Systems  U G 3
Sp. 3 cl.
Prereq.: 403 and permission of instructor.
Not open to students with credit for 821, 822, 823, or 824.
The principles underlying the design and installation of accounting
systems.
AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

828f Accounting Problems of Financial Institutions and Fiduciaries G 3
A. 3 cr.
Prereq.: 50 hrs. in Acc. or equiv.
Accounting principles and problems peculiar to banks, insurance companies, brokerage and investment houses, receivers, executors, and trustees.

830 Governmental Accounting G 3
A. 3 cr.
Prereq.: 50 hrs. in Acc. or equiv.
The application of accounting principles to government. Problems relating to funds, appropriations, and allotments.

856 Accounting Policies of Regulatory Agencies G 3
W. 3 cr.
Prereq.: 50 hrs. in Acc. or equiv.
Not open to students with credit for 650 or 855.

860 Accounting Aspects of Business Policy Determination G 3
Policy Sp. 3 cr.
Prereq.: 50 hrs. in Acc. or equiv.
Case studies with particular attention to accounting analysis and application thereof to business problems.

950 Research in Accounting Arr.
Research for thesis or dissertation purposes only.

Aeronautilcal and Astronautical Engineering

Office: 325 Civil and Aeronautical Engineering Bldg., 2026 Neil Avenue.
PROFESSORS: VON ESCHEN (Chairman), EDSE, GATEWOOD, RIPER, and MLR; ASSOCIATE PROFESSORS: BURG-GRAF and MALLET; ASSISTANT PROFESSORS BOLLING and FISHER; and INSTRUCTORS.

681 Elements of Aeronautics and Astronautics U 4
A. 4 cr.
Prereq.: Physics 533, Math. 544 or concour.
An integrated study at an intermediate level of dynamics, fluid mechanics, propulsion, and light weight structures as related to Aeronautical and Astronautical Engineering.

682 Elements of Aeronautics and Astronautics U 4
W. 4 cr.
Prereq.: 681.
Continuation of 681.
683 Elements of Aeronautics and Aeronautics  U 4
Sp. 4 cl.
Prereq: 682.
Continuation of 683.

688 Aeromechanics  U 4
Sp. 4 cl.
Prereq: 682.
Introduction to the nature and properties of aerodynamic fluids from microscopic and macroscopic points of view.

698 Special Studies in Aeronautical and Astronautical Engineering  U 3-5
A, W, Sp. 3-5 cl.
Prereq.: Permission of department.
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.

700 Aerokineties  U G 4
A. 4 cl.
Prereq.: 688.
Derivation of fundamental equations governing internal and external aerodynamic flows.

705 Aerothermochemistry I  U G 4
W. 4 cl.
Prereq.: 700.
The aerodynamics of one-dimensional compressible flow from the molecular-kinetic point of view including chemical reactions in the fluid.

707 Compressible Aerodynamics  U G 4
Sp. 4 cl.
Prereq.: 705, 708.
The fundamentals of the aerodynamics of compressible fluids.

708 Classical Aerodynamics  U G 4
W. 4 cl.
Prereq.: 700.
Fundamentals of steady and unsteady incompressible, nonviscous aerodynamic flows with applications to oscillating airfoils and finite wings.

713 Aeronautical Laboratory  U 4
A. 2 cl., 2 3-hr. labs.
Prereq.: Aero. Astro. E. 5th yr. standing.
Laboratory demonstrations and experiments in aerodynamics, aeroelasticity, propulsion, and structures of flight vehicles.

714 Advanced Aeronautical Laboratory  U G 2-4
W. 4-8 lab. hrs.
Prereq.: Permission of department, 713 or equiv.
The solution of problems in aero-space engineering by experimental methods.

715 Advanced Aeronautical Laboratory  U G 2-4
S. 4-8 lab. hrs.
Prereq.: Permission of department, 713 or equiv.
Continuation of 714.

724 Stability and Control of Flight Vehicles  U G 4
Sp. 4 cl.
Prereq.: 729.

725 Stability and Control of Flight Vehicles  U G 4
W. 4 cl.
Prereq.: 724.
Continuation of 724.

729 Motion and Deformation of Flight Vehicles  U G 4
A. 4 cl.
Derivation of the basic equations and methods of analysis governing the motions, deformations, and resisting stresses encountered by flight vehicles.

730 Flight Vehicle Structures  U G 4
W. 4 cl.
Prereq.: 739.
Stress and deformation analysis of light weight structures for flight vehicles under static and dynamic loadings.

731 Structural Design of Flight Vehicle Components  U 4
Sp. 2 cl., 2 3-hr. labs.
Prereq.: 730.

740 Preliminary Design of Flight Vehicles  U 4
Sp. 2 cl., 2 3-hr. labs.
Prereq.: Aero-Astro. E. 5th yr. standing.

746 Thermal Stresses in Aircraft and Missiles  U G 4
Sp. 4 cl.
Prereq.: 730.
Theory of thermal stresses, aerodynamic heating and structural effects due to heating.

754 Aeroelasticity  U G 4
A. 4 cl.
Prereq.: 708, 750.
Dynamic loads analysis of elastic flight vehicles subjected to unsteady airloads.

755 Aeroelasticity  U G 4
W. 4 cl.
Prereq.: 754.
Continuation of 754.

763 Principles of Flight Vehicle Propulsion  U G 4
A. 4 cl.
Prereq.: 707.
Functional characteristics and performance of rocket, ramjet, turbojet, turbo-propeller, pulse jet, and hybrid engines.

764 Advanced Propulsion  U G 4
W. 4 cl.
Prereq.: 763.
Problems of chemical energy sources for space propulsion, nuclear and electric propulsion systems.

772 Advanced Compressible Flow I  U G 4
W. 4 cl.
Prereq.: 707.
Characteristic methods, conical flow phenomena, supersonic wing theory, and slender body theory.
773 Advanced Compressible Flow II  U G 4
Sp.  4 cl.
Prereq.: 772 and 775.
Wing-body interference, shock wave-boundary layer interaction, and control surfaces in supersonic flow.

775 Aerodynamics of Viscous Fluids I  U G 4
A.  4 cl.
Prereq.: 707.
The elements of laminar and turbulent boundary layers in incompressible flows.

776* Aerodynamics of Viscous Fluids II  U G 4
Sp.  4 cl.
Prereq.: 775.
Advanced problems in boundary layer flows.

777* Superaerodynamics  U G 4
Sp.  4 cl.
Prereq.: 707.
Molecular theory of flow, rarefied gas phenomena, aerodynamic forces and heat transfer in rarefied gas flow.

778 Aerodynamic Heating  U G 4
Sp.  4 cl.
Prereq.: 775.
The analysis of laminar and turbulent boundary layer heat transfer in high speed flow.

779 Hypersonic Flows  U G 4
W.  4 cl.
Prereq.: 772 and 775.

787 Analytical Dynamics of Astronautics I  U G 4
W.  4 cl.
Prereq.: 720 or equivo.
The dynamical analysis of spacecraft trajectories and orbits including atmospheric re-entry.

788 Analytical Dynamics of Astronautics II  U G 4
Sp.  4 cl.
Prereq.: 787 or equivo.
Drag estimation, transfer orbits, perturbations, and three-body problems.

789 Hypersonic Flows  U G 4
Sp.  4 cl.
Prereq.: 779.
Continuation of 779.

790 Senior Seminar  U 1
A.  1 cl.
Prereq.: Aero-Astro. E. 5th yr. standing.

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

799 Special Problems in Advanced Aeronautical and Astronautical Engineering  U G 2-10
Su, A, Sp.
Prereq.: Written permission of department.
Repeatable to a maximum of .5 cr. hrs.
Special studies in aeronautical and astronautical engineering under one or more topics, including aircraft structures, aerodynamics, propulsion, flutter and vibration, and stability and control.

821 Advanced Dynamics of Flight Vehicles  G 3
A.  3 cl.
Prereq.: 725 or 755 or equivo.

822 Advanced Dynamics of Flight Vehicles  G 3
W.  3 cl.
Prereq.: 725 or 755 or equivo.

823 Advanced Dynamics of Flight Vehicles  G 3
Sp.  3 cl.
Prereq.: 725 or 755 or equivo.

831 Aerodynamics of Plasmas  G 3
A.  3 cl.
Prereq.: 707, 775, and Elec. E. 832 or equivo.

832 Aerodynamics of Plasmas  G 3
W.  3 cl.
Prereq.: 707, 775, and Elec. E. 832 or equivo.

833 Aerodynamics of Plasmas  G 3
Sp.  3 cl.
Prereq.: 707, 775, and Elec. E. 832 or equivo.

841 Advanced Structures for Flight Vehicles  G 3
A.  3 cl.
Prereq.: 730 or equivo.

842 Advanced Structures for Flight Vehicles  G 3
W.  3 cl.
Prereq.: 730 or equivo.

843 Advanced Structures for Flight Vehicles  G 3
Sp.  3 cl.
Prereq.: 730 or equivo.

861 Advanced Propulsion for Flight Vehicles  G 3
A.  3 cl.
Prereq.: 764 or equivo.

862 Advanced Propulsion for Flight Vehicles  G 3
W.  3 cl.
Prereq.: 764 or equivo.

863 Advanced Propulsion for Flight Vehicles  G 3
Sp.  3 cl.
Prereq.: 764 or equivo.

A-5
620 Biochemistry of Animal Function U G 3
A, Sp. 3 cl.
Prereq.: Chem. 551 or equiv.
Biochemical bases of animal function and nutrition.

621 Biochemistry of Animal Function U G 3
Laboratory
A, W, Sp., 3-3 hr. labs.
Prereq. or concurs.: 520.
Laboratory course to accompany 620. Assay techniques for chemical constituents and metabolic reactions in animals. Biochemistry of nutritional deficiency.

Topics in Biological Sciences
(See Biology 660.)

701 Special Problems U G 2-5
Prereq.: 6 qtr. hrs. of biochemistry.

705 General Biological Chemistry U G 3
A. 3 cl.
Prereq.: Chem. 647, 648, 649, 650, or 655, 656, 657, 659 or equiv., and Math. 138 or equiv. Chem. 681 recommended. 705, 706, 708 should be taken in sequence.
An intensive treatment of modern biochemistry. Protein structure, thermodynamics of enzyme catalyzed reactions and oxidation-reduction reactions in living systems.

706 General Biological Chemistry Laboratory U G 3
A. 2 4-4 hr. labs.
Prereq. or concurs.: 705, 706, 708, 710 should be taken in sequence.
Laboratory to accompany 705.

707 General Biological Chemistry U G 3
W. 3 cl.
Prereq.: 705.
An intensive treatment of modern biochemistry. Chemistry and intermediary metabolism of lipids and carbohydrates.

708 General Biological Chemistry Laboratory U G 3
W. 2 4-4 hr. labs.
Prereq.: 706.
Laboratory to accompany 707.

709 General Biological Chemistry U G 3
Sp. 3 cl.
Prereq.: 707.
An intensive treatment of modern biochemistry. Intermediary metabolism of proteins and nucleic acids; function of vitamins and hormones.

710 General Biological Chemistry Laboratory U G 3
Sp. 2 4-4 hr. labs.
Prereq.: 708.
Laboratory to accompany 709.

804 Seminar G 1 or 2
A, W, S. 1 or 2 cl.
804A Topic to be announced. G 1
804B Journal Seminar. G 1

Agricultural Biochemistry

Office: 101 Victor Hall, 2121 Fyffe Road.
PROFESSORS: DEATHERAGE (Chairman), ALMY (Emeritus), BROWN, BURRELL (Emeritus), BARBER, MOORE, INOXON, and SNELL; ASSOCIATE PROFESSORS: BULEN and GANDER; ASSISTANT PROFESSORS: CLEMENTS, DIAMONDSTONE, DOUGALL, IVES, MENDEZ and SERIF.

For related courses see Biology.

610 Introduction to Biological Chemistry U G 3
Su, A, W, Sp. 3 cl.
Prereq.: Chem. 405 or 408 or 551 and 2 qtrs. of biological science.
An introductory course in biochemistry dealing with the molecular basis of structure and metabolism of plants, animals, and microorganisms.

611 Introduction to Biological Chemistry: Laboratory U G 3
Su, A, W, Sp. 2 cl., 2 2-3 hr. labs.
Prereq. or concurs.: 610.
Laboratory work to accompany 610. Assay techniques for chemical constituents and metabolic reactions of living cells.

613† Chemistry of Foods and Food Processing U G 5
W. 3 cl., 2 3-3 hr. labs.
Prereq.: Chem. 531 and 551 or equiv.
The chemical, physical, and biological nature of foods in relation to handling, processing, packaging, quality, and consumer acceptance. Deatherage.
Agricultural Economics

Office: 103 Agricultural Administration Bldg., 2130 Fiske Road.


420 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, Hines.

502 Farm Management

A. W., Sp. 4 cl; 1 2-hr. lab, 1 field trip during qtr.
Prereq.: 420 and Econ. 401, 402 or 406 or 501, 502, or 506.


510 Farm Records and Analysis

W. 1 2-hr. cl; 1 2-hr. lab.
Prereq.: 420.

Nature and need for farm business records and analysis and interpretation of essential records from farm management viewpoint. Their use in income tax reporting. Baker, Shaundys.

602 Advanced Farm Organization

Su. 4 cl; 1 2-hr. lab, one day field trip during qtr.
Prereq.: 502.

Detailed application of production economics, management principles and decision making techniques to the organization, operation, and administration of farms. Farm plans are developed. Shaundys.

603 Cooperation in Agriculture

W. 5 cl.
Prereq.: 420 and Econ. 401, 402 or 406 or 501, 502, or 506.

Basic principles of cooperatives including types of organizations, legal aspects, membership relations, financing, organizational and intercooperative problems, and distribution of savings. Ingham.

605 Agricultural Policy

Su. W. Sp. 3 cl.
Prereq.: 420 and Econ. 401, 402, or 406 or 501, 502 or 506.

Characteristics and problems of agriculture. Description and analysis of programs and policies designed to assist agriculture and alternative proposals for the future. McCormick, Smith.

608 Livestock Marketing

W. 3 cl.
Prereq.: 613 or Bus. Org. 700.

Selling methods, basis of sale, agencies involved, organization of markets, transportation, financing, marketing costs, prices, when to market, grade differentials, government regulation will be studied. (Offered in cooperation with the Department of Animal Science.) Stout.

610 Agricultural Finance

Su. A. Sp. 3 cl. One Saturday and one overnight field trip.
Prereq.: 420 and Econ. 401, 402 or 406 or 501, 502 or 506.

Agricultural credit, facilities, procurement, extension, and management. Bridey, Jones.

612 Prices of Farm Products

W. Sp. 3 cl.
Prereq.: 420 and Econ. 401, 402 or 406 or 501, 502 or 506.

Characteristics of agricultural price, movement, measurement, seasonality, cycles, and forecasting, including analysis of price formation elasticity, parity, and other price statistics. Fadberg.

613 Marketing Farm Products

A. W. Sp. 5 cl. Two-day field trip.
Prereq.: 420 and Econ. 401, 402 or 406 or 501, 502 or 506.

Study of local, wholesale, and retail marketing agencies and principles involved in the marketing of farm products. Baumer, Sharp, Fadberg, Craven, and Stout.
614 Business Management in Agricultural Marketing
Su, A, Sp, 3 cl., 1 lab.
Prereq.: 420 and Econ. 401, 402 or 406, or 501, 502 or 506.
A detailed study of representative agricultural marketing agencies including their problems of administration, employees, financial statements, selling, purchasing, and warehousing. Henning.

615 Land Economics
Sp, 3 cl.
Prereq.: 420 and Econ. 401, 402 or 406, or 501, 502 or 506, 3rd yr. standing and permission of instructor.

616 Food Economics
Sp, 3 cl.
Prereq.: Econ. 401, 402 or 404 or 406 or 501, 502 or 504 or 506.
Economic aspects of the production, distribution, and consumption of food. Sherman.

618 Farm Appraisal
Sp, 3 cl., 3 3-hr. field trips during qtr.
Prereq.: 402.

621 Poultry Marketing
Sp, 3 cl.
Prereq.: Poul. Sc. 401 or ZooL 401 or equiv. and Agr. Econ. 613 or Bus. Org. 700.
Factors affecting supply and demand for poultry products. Organization to achieve technical and economic efficiency within and among industry segments. (Offered in cooperation with the Department of Poultry Science.) Baker.

626 Marketing Dairy Products
W, 3 cl.
Prereq.: 613 or permission of instructor.
A study of the principles of assembling, transporting, selling, pricing, distribution, marketing costs, and margin for dairy products. (Offered in cooperation with the Department of Dairy Science.) Baummer.

628 Marketing Fruits and Vegetables
Sp, 3 cl. One 2-day field trip.
Prereq.: 613 or Bus. Org. 700.
Principles involved in the marketing of fruits and vegetables and the agencies concerned. Croonen.

633 Grain Marketing
A, 3 cl.
Prereq.: 613 and Econ. 401, 402 or 406, or 501, 502 or 506.
Principles and practices involved in grain and feed marketing and the theory of grain pricing. Economics of storage, current development, and trends affecting grain marketing. Sharp.

650 Foreign Agricultural Development
A, 3 cl.
Prereq.: 420 and Econ. 401, 402 or 406, or 501, 502 or 506, or permission of instructor.
Analysis of agricultural organization, production and marketing in foreign countries. Foreign agricultural policies and international competition. Appraisal of foreign technical assistance programs in agriculture. Smith.

697 Natural Resources Problems, Programs, and Policies
W, 3 1-hr. cl.
Prereq.: Concurs. 401 and 514, or equiv. with permission of instructor.
An analytical study of contemporary and future problems of natural resources conservation and the programs and policies related to their solution. Dombach.

701 Special Problems
Prereq.: 8 cl. hrs. of Agr. Ec. and permission of instructor.
Repeatable.
Planning, conducting, and reporting a special problem in agricultural economics fitting the needs of the student, under the guidance of an instructor.

711 Food Merchandising
Sp, 4 cl.
Prereq.: Bus. Org. 705 or equiv. with permission of instructor.
Management problems in the food distribution channel including consideration of the wholesale and retail markets. Marion.

713 Market Organization in Agricultural Industries
Sp, 4 cl.
Prereq.: 613 or Bus. Org. 700 or equiv. with permission of instructor.
Analysis of agricultural market structure, behavior, and performance. Interpretation of recent changes in agricultural market structure. Faddego.

811 Research Methods in Agricultural Economics
A, W, 3 cl.
Prereq.: Econ. 707, 5 hrs. of college mathematics, 4 hrs. of statistics, or equiv. with permission of instructor.
Principles of scientific method in agricultural economic investigations. Sherman, Williams, Walker.

820 Economics of Agricultural Production
A, Sp, 3 cl.
Prereq.: 15 hrs. of Ag. Econ., 5 hrs. of mathematics, 4 hrs. of statistics, Econ. 707-708 or equiv. with permission of instructor.
A critical consideration of economic principles as they apply to production problems in agriculture. Williams, Walker.

821 Advanced Economics of Agricultural Production
Sp, 3 cl.
Prereq.: 820, Econ. 804 A-B, Math. 440 or equiv. with permission of instructor.
A further consideration of economic principles as they apply to production problems in agriculture. Williams, Walker.

830 Advanced Farm Organization and Resource Management
W, 3 cl.
Prereq.: Agr. Econ. 602.
This course is designed to integrate resource use and the human factor under dynamic conditions of risk and uncertainty with a goal of economic progress. Tompkins.
Agricultural Education

Office: 206 Agricultural Administration Bldg., 2120 Fyffe Road. PROFESSORS: BENDER (Chairman), Kirby, McCormick, Hinch, Robinson, Stewart (Emeritus), Wolfs, Wood, and Woodin; ASSOCIATE PROFESSORS: Bolender (Emeritus), Culler, E. Johnson, Taylor, and Wilson; ASSISTANT PROFESSORS: Fidler (Emeritus), Ruble, and Worrall.

456 Introduction to Agricultural Education
A, W, Sp. 3 cl.
The importance and purpose of education in agriculture with emphasis upon nature of programs, opportunities available, and qualifications of personnel. Cunningham.

501 Methods in Teaching Vocational Agriculture
A, Sp. 4 cl., 4 lab. hrs.
Prereq.: 456.
The learning process and its application to teaching vocational agriculture. Field trips to schools with special attention to vocational departments. Wcl.

504 Student Teaching in Vocational Agriculture
A, W.
Prereq.: 501 and acceptance by Guidance Committee. Teaching experience in a selected school community with full time devoted to these courses. Concur 505 and 506.
Guided participation in the professional responsibilities of a teacher of vocational agriculture, including an intensive study of the problems encountered and the competencies developed. Gulicker, Wilson and F. McCormick.

505 Student Teaching in Vocational Agriculture
A, W.
Prereq.: Concur 504 and 506. See 504 for description and requirements.
F. McCormick.

506 Student Teaching in Vocational Agriculture
A, W.
Prereq.: Concur 504 and 505. See 504 for description and requirements.
F. McCormick.

526 Principles in Extension Program Development
Sp. 3 cl.
Objectives and procedures in developing extension programs in agriculture and home economics with emphasis on program determination, teaching methods, and relationships to other groups. Cunningham.

550 Experience in Agricultural Education
Su (either term or quarter), A, W, Sp.
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
A period of practical experience in an area of agricultural education approved by the adviser. Written reports of the experience are required. Wilson, Cunningham.
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<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
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<tbody>
<tr>
<td>611</td>
<td>Teaching Aids for Agricultural Education</td>
<td>U G 3</td>
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<td>Theory and practices in the development and utilization of teaching materials in agricultural education. Woodin, Gutier.</td>
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<td>624</td>
<td>Apprenticeship in Agricultural Education</td>
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<td>625</td>
<td>Apprenticeship in Agricultural Education</td>
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<td>701</td>
<td>Special Problems</td>
<td>U G 2-5</td>
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<td>Planning, conducting, and reporting a special problem in agricultural education appropriate to the needs of the student.</td>
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<td>703</td>
<td>Methods in Teaching Agriculture</td>
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<td>705</td>
<td>Supervised Occupational Experiences in Agriculture</td>
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<td>707</td>
<td>Curriculum in Vocational Agriculture</td>
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<td>708</td>
<td>Methods in Teaching Agriculturalal Mechanics</td>
<td>U G 3</td>
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<tr>
<td>709</td>
<td>Methods in Teaching Farm Business Planning</td>
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<td>712</td>
<td>Youth Organizations in Agriculture</td>
<td>U G 3</td>
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<tr>
<td>715</td>
<td>Adult Education in Agriculture</td>
<td>U G 3</td>
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<tr>
<td>797</td>
<td>Evaluation in Agricultural Education</td>
<td>U G 3</td>
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<tr>
<td>799</td>
<td>Workshop in Agricultural Education</td>
<td>U G 4</td>
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<td>Full time of student required for three weeks; no other courses concur.</td>
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</table>

**Notes:**
- Prereq.: Teaching experience in vocational agriculture.
- Emphasis upon teaching procedures for vocational agriculture concerning farm business planning. F. McCormick.
- Prereq.: Experience in Agri. Ed. or permission of instructor.
- An analysis of youth organizations in agriculture in relation to the education of youth, with emphasis upon planning and conducting FFA and 4-H Club programs. Bender, Taylor.
- Prereq.: Experience in Agri. Ed. or permission of instructor.
- Principles and practices appropriate to the solution of problems encountered in developing and conducting instructional programs for young and adult farmers. Bender, Wolf.
- See 624 for description and requirements.
- See 624 for description and requirements.
- Prereq.: Supervised occupational experiences in agriculture as related to teaching-learning situations. Woodin, Wolf.
- Prereq.: Permission of instructor.
- Methods and procedures in communication involving the use of appropriate individual group, and mass media in the development of a program of agricultural education. Woodin, McCormick.
- Educational objectives for student teaching, the development of programs, the provision of experiences, the guidance and evaluation of professional growth of trainees.
Agricultural Engineering

Office: 105 Ives Hall, 2075 Neil Avenue.

PROFESSORS: STEWART (Chairman), BARDEN (Emeritus), IBARRE, HARROLD, KENNEDY (Emeritus), McCUEN (Emeritus), MCLedd, MILLER (Emeritus), OVERBOLT (Emeritus), and SCHRADER, ASSOCIATE PROFESSORS: IBRAHIM, SCURRY, HUBER, IC. E. JOHNSON, EW. H. JOHNSON, and TROLLE, INSTRUCTOR HALL.

504 Farm Shop Teaching Methods
A, W, Sp. 2 cl., 6 lab. hrs.
Prereq.: Agr. 501.
Principles and methods of teaching selection, use, and care of hand and power tools, materials for wood and metal construction based upon farm needs. G. Johnson.

508 Practical Experience in Agricultural Engineering
A.
Prereq.: Permission of adviser.
Ten weeks of agricultural engineering work prior to fifth year. The occupation, work completed, and a written report shall be subject to approval by adviser.

510 Food Products Engineering
A. 3 cl., 2 3-hr. labs.
Prereq.: Math. 417 or equiv., and Physics 412 or equiv. Engineering elements of production, distribution, and control of steam and electricity for heat, power, and light applications in food products processing. Harkness.

513 Power for Agricultural Operations I
W, Sp. 2 cl., 2 lab. hrs.
Prereq.: Math. 416 or 439.
Not open to students with credit for 513 or 518.
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.

522 Buildings and Equipment for Farmstead Operations
A. 2 cl., 2 lab. hrs.
Prereq.: Math. 419 or 469.
Not open to students with credit for 522.

525 Machines for Agricultural Operations
A, S. 2 cl., 2 lab. hrs.
Prereq.: 513 or permission of instructor.
Not open to students with credit for 401. Analyst of field machine operations with emphasis on recognition and quantitative solution of problems in selection and use of machines for optimum economic performance. Harkness, Huber.

527 Agricultural Drainage and Erosion Control
A, S. 2 cl., 3 lab. hrs.
Not open to students with credit for 507.
Use and application of surveying instruments, serial and topographic maps, rainfall and runoff, and engineering problems of soil and water management on farms. Schubab.
528  Agricultural Materials Handling Systems  U  3 W.  2 cl., 2 lab. hrs. Prereq.: 513 or permission of instructor. Principles, functional analysis and design of agricultural materials handling systems from harvest to utilization. Barre.

536  Power for Agricultural Operations II  U  3 W.  2 cl., 2 lab. hrs. Prereq.: 513 Not open to students with credit for 509. An analysis of the functional requirements of energy needs of the farmstead, characteristics of available power sources, and selection of economic power units. Harkness.


600  Farm and Home Safety  U G  1 Sp. Causes of accidents. Methods for conducting farm and home safety programs. For students interested in vocational agriculture, extension, and farm organization work. Stenwart.


701  Special Problems  U G  2-5 Su, A, W, Sp. Prereq.: Permission of instructor. Advanced study of problems not included in regular courses of this department.


779 Engineering of Agricultural Systems
Sp. 3 cr., 2 2-hr. labs.
Not open for graduate credit to Agr. Engr. students.
Integration of engineering and biological principles in agriculture to optimize complete operational production systems. Application of relevant theory to present and future systems.

791 Senior Seminar
A. 1 cr.
Prereq.: Engr. senior standing.
Study of professional ethics, examinations, societies, and employment opportunities.

788 Advanced Studies in Agricultural Engineering
A, Sp. 3 cr.
Prereq.: 15 cr. hrs. of 600 level Agr. Engr. courses and permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
Advanced subjects to agricultural engineering. Course content to be announced in previous quarter. A.—Farm Structures, Stewart; Sp.—Power and Machinery.

799 Workshop
Su (first term), first three weeks—full time.
Not open to students majoring in agricultural engineering.
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.
   a. Workshop—Farm Mechanics, Johnson.

801 Seminar
A, W, Sp. 1 cr.
Repeatable to a maximum of 3 cr. hrs.

880* Measurement in Agricultural Engineering
Su. 3 cr.
Theory and principles involved in measurement and control of biophysical processes in agricultural engineering. Stewart.

883* Soil Machine Dynamics in Plant Environment
Sp. 3 cr.
Mass and heat transfer in soil and dynamics of mechanical actions on soil in relation to plant environment and agricultural machine design and use. MeLeod and Staff.

885* Aerosol Mechanics in Agricultural Engineering
A. 4 cr.

887 Advanced Agricultural Drainage
W. 3 cr.
Prereq.: 677 and Math. 609.

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

950 Research in Agricultural Engineering
G Arr.
Research for thesis and dissertation purposes only.

Agronomy

Offices: 108 Townsend Hall, 1885 Neil Avenue.
101 Horticulture and Forestry Bldg., 1857 Neil Avenue.
PROFESSORS: VOLK, (Chairman); ANDERSON, DAVIS, HOLOWAYCHUK, LAMBE, N.I.A., MEDELSKI, MUSSGRAVE, SPARKS, TEAY, SIMMONS, TAYLOR, WILLARD (Emeritus), YAMAZAKI, and YODER; ASSOCIATE PROFESSORS: DOLLINGER, HOFF, JONES, TRIPLETT, VAN DOREN, and VAN KEUREN; ASSISTANT PROFESSORS: BADER, BENDIXEN, CLARK, FEINDLEY, FRANKLIN, GRAF, HAIKNI, HEIZE, HINES, R.H. MILLER, B.W. MILLER, SCHMIDT, STRUB, STRUTHERS VIMMERSTED, and WILDING.

403 Field Crop Production
Su. A, W, Sp. 3 cr., 1 2-hr. lab.
A study of the fundamental principles essential to crop production and a survey of adaptation, utilization, and problems in production of leading agronomic crops. Miller.

501 Soils
Su. A, W, Sp. 4 cr., 1 2-hr. lab.
Prereqs.: Chem. 411, 412, or Chem. 407, 408 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. Himes.

515 Grain Crops
A. W. 3 cr., 1 2-hr. lab.
Prereq.: Bot. 401 or permission of instructor.
A study of the grain crops, their classification, geographic distribution, culture, varieties, improvement, seed selection, seed production, harvesting, handling, recognition, grading, and utilization. Roy.

520 Forage Crops
Su. A, W, Sp. 3 cr., 1 2-hr. lab.
Characteristics, tolerances, requirements, uses, and production of principal forage plants. Management of pastures and meadows, based on a study of literature and experimental data. Anderson.

525 Weed Control
A. 3 cr., 1 2-hr. lab.
Prereq.: Bot. 401.
A study of weeds, losses due to them, and their control. Bendixen.
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<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>599</td>
<td>Undergraduate Seminar</td>
<td>U</td>
<td>2</td>
<td>W. 2 cl.</td>
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<td>Prereq.: 15 cr. hrs. in Agron. and 3rd or 4th yr. standing in Agron.</td>
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<td>Research publication review and interpretation; the function of agronomic</td>
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<td>industries is studied.</td>
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<tr>
<td>600</td>
<td>Crop Production in Developing Countries</td>
<td>U</td>
<td>4</td>
<td>W. 4 cl.</td>
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<td>Prereq.: 403, 501, or equiv.</td>
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<td>Fundamental studies of field and plantation crops in tropical and</td>
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<td>subtropical countries with emphasis on means and techniques for</td>
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<td>obtaining production increases. Volk, Alber, Hartman.</td>
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<td>Prereq.: 501, 520, or equiv.</td>
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<td>Recognizing, correlating, and solving crop problems relating to the</td>
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<td>efficient production and use of field crops.</td>
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<tr>
<td>603</td>
<td>Origin and Classification of Soils</td>
<td>U</td>
<td>5</td>
<td>Sp. 4 cl., 1 2-hr. lab.</td>
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<td>Prereq.: 501 and Geol. 416 or equiv.</td>
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<td>Factors and processes in soil formation and the classification of soils</td>
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<td>with specific reference to Ohio conditions. Holosoukach.</td>
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<tr>
<td>604</td>
<td>Soil Erosion and Its Control</td>
<td>U</td>
<td>5</td>
<td>A. 4 cl., 1 3-hr. lab.</td>
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<td>Prereq.: 501 and Geol. 416 or equiv.</td>
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<td>A study of the mechanics of soil erosion and its control. Field trips to</td>
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<td>observe erosion and conservation practices are included. Hof.</td>
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<tr>
<td>605</td>
<td>Soil Microbiology</td>
<td>U</td>
<td>5</td>
<td>Sp. 3 cl., 2 2-hr. lab.</td>
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<td>Prereq.: 501, Microbiol. 607 or permission of instructor.</td>
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<td>A study of the morphology and physiology of soil microorganisms and</td>
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<td>their biochemical transformations of inorganic and organic materials in</td>
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<td>relation to soil fertility. Miller.</td>
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<tr>
<td>608</td>
<td>Soil Physics</td>
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<td>A. 3 cl., 2 2-hr. lab.</td>
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<td>Prereq.: 501, 1 yr. college Physics and Math. 440 or 556.</td>
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<td>A study of the physical makeup and properties of soil, including structure,</td>
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<td>thermal relationships, consistency, plasticity, water, and their</td>
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<td>relationships. Taylor.</td>
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<td>611</td>
<td>Soil Fertility</td>
<td>U</td>
<td>3</td>
<td>A. 3 cl.</td>
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<td>Prereq.: 501.</td>
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<td>A study of the factors affecting soil productivity and the practices</td>
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<td>needed in good soil management. Fertilizer properties and practices are</td>
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<td>included. Hof.</td>
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<td>613</td>
<td>Soil Management</td>
<td>U</td>
<td>3</td>
<td>A. 3 cl.</td>
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<td>Prereq.: 501 or equiv.</td>
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<td>An integrated study of fertility, tillage, erosion control, and water</td>
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<td>management in maintaining soil productivity. Misagrace.</td>
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<td>614</td>
<td>Field Crop Breeding</td>
<td>U</td>
<td>4</td>
<td>W. 3 cl., 2 2-hr. lab.</td>
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<td>Prereq.: 403 and Zool. 604 or Biol. 604 or equiv.</td>
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<td>Principles of genetics and methods of plant breeding applied to the</td>
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<td>improvement of field crops and the ultimate development of superior</td>
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<td>varieties. Smith.</td>
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<td>620</td>
<td>Principles of Grassland Management</td>
<td>U</td>
<td>4</td>
<td>Sp. 4 cl., 4 day field trip.</td>
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<td>Prereq.: 501 and 520 or permission of instructor.</td>
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<td>An advanced course primarily dealing with establishment, management,</td>
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<td>maintenance, and utilization of important forage species as pasture, hay,</td>
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<td>slage, soilage and sod crops and ranges. Anderson.</td>
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<td>630</td>
<td>Principles of Turfgrass Selection and</td>
<td>U</td>
<td>4</td>
<td>Sp. 4 cl.</td>
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<td></td>
<td>Management</td>
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<td>Prereq.: 501 and Bot. 401 or permission of instructor.</td>
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<td>Adaptation, identification, uses, growth characteristics, growth rates,</td>
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<td>and fundamental principles essential to the production of quality turf.</td>
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<td>Miller.</td>
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<td>640</td>
<td>Field Crop Ecology</td>
<td>U</td>
<td>3</td>
<td>Sp. 3 cl.</td>
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<td>Prereq.: 501, 515, 520, and permission of instructor.</td>
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<td>A study of the relationship of crop plants to climate, soils, and other</td>
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<td>limiting factors of distribution, production, and quality. Berdikov.</td>
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<tr>
<td>701</td>
<td>Special Problems</td>
<td>U</td>
<td>2-5</td>
<td>Su, A. W., Sp.</td>
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<td>Prereq.: Permission of instructor.</td>
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<td>Students may select special agronomic problems, not included in regular</td>
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<td>courses and involving library, laboratory, or field studies.</td>
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<tr>
<td>712</td>
<td>Chemistry of Soils and Fertilizers</td>
<td>U</td>
<td>5</td>
<td>W. 3 cl., 2 2-hr. lab.</td>
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<td>Prereq.: 611, Chem. 521 or equiv. and permission of instructor.</td>
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<td>A study of the chemical properties of soils and fertilizers affecting</td>
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<td>plant growth and composition including modern laboratory analysis of soil,</td>
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<td>fertilizer, and plant tissue. McLean.</td>
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<tr>
<td>801</td>
<td>Agronomy Seminar</td>
<td>G</td>
<td>1</td>
<td>A, W. Sp. 1 cl.</td>
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<td>Prereq.: Repeatable to a maximum of 6 cr. hrs.</td>
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<td>Discussion of current problems in agronomy.</td>
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<td>Prereq.: Permission of instructor.</td>
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<td>a. A. Techniques with Field Plot Data. Ray.</td>
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<td>c. W. Radioactive Tracers in Plant and Soil Research. Franklin.</td>
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<td>e. W. Soil Physics, Taylor.</td>
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<tr>
<td>805</td>
<td>Physical Chemistry of Soils</td>
<td>G</td>
<td>5</td>
<td>W. 3 cl., 2 2-hr. lab.</td>
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<td>Prereq.: 699, Chem. 670 or 681, 682 and permission of instructor.</td>
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<td>A study of the physico-chemical properties of soils including methods of</td>
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<td>characterizing clay minerals, soil acidity, ionic absorption and release,</td>
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<td>and plant nutrient uptake. McLean.</td>
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<td>807</td>
<td>Techniques of Experimental Design</td>
<td>G</td>
<td>5</td>
<td>W. 5 cl.</td>
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<td>Prereq.: Zool. 630 or Biol. 650 or equiv.</td>
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<td>A study of experimental designs and their application to agricultural</td>
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<td>research. Smith.</td>
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AIR SCIENCE

502 World Military Systems
W. 2 cl., 1 lab. hr.
Prereq.: 401, 402, and 403 or permission of the Professor of Aerospace Studies.
A study of the factors contributing to the military power of the free world (excluding the United States).

503 World Military Systems
Sp. 2 cl., 1 lab. hr.
Prereq.: 401, 403, and 404 or permission of the Professor of Aerospace Studies.
A study of the factors contributing to the military power of the Communist World.

601 Growth and Development of Aerospace Power
A. 3 cl. 1 lab.
Prereq.: 501, 502, and 503; or completion of the field training course; or permission of the Professor of Aerospace Studies.
A survey course covering the nature of war and the development of Air Power in the United States.

602 Growth and Development of Aerospace Power
W. 3 cl. 1 lab.
Prereq.: 501, 502, and 503; or completion of the field training course; or permission of the Professor of Aerospace Studies.
A survey course covering the nature of war and the development of Air Power in the United States.

603 Growth and Development of Aerospace Power
Sp. 3 cl. 1 lab.
Prereq.: 501, 502, and 503; or completion of the field training course; or permission of the Professor of Aerospace Studies.
A survey course covering the nature of war and the development of Air Power in the United States.

701 Weather and Navigation
A. W. 4 cl., 1 lab. hr.
Prereq.: 601-602-603 or permission of the Professor of Aerospace Studies.
Basic principles of weather and air navigation. Prepares student for entry into Air Force flight training.

705 The Professional Officer I
A. 3 cl. 1 lab.
Prereq.: 601, 602, and 603 or permission of the Professor of Aerospace Studies.
A study of military professionalism, the military justice system, and leadership theory.

706 The Professional Officer II
W. 3 cl. 1 lab.
Prereq.: 601, 602, and 603 or permission of the Professor of Aerospace Studies.
A study of human relations, personnel policies, and problem solving.

707 The Professional Officer III
Sp. 3 cl. 1 lab.
Prereq.: 601, 602, and 603 or permission of the Professor of Aerospace Studies.
A study of the principles and functions of management and the professional officer as administrator and member of the Command-Staff Team.

Air Science

Office: 300 Military Science Bldg., 2121 Tuttle Park Place.
COLONEL ROBERTSON and STAFF.
Anatomy

Office: 414 Hamilton Hall, 1645 Neil Avenue.
PROFESSORS IGRAVES (Chairman), TACKERMAN, TH, AP- LINGTON, EDWARDS, FJ, EGLITIS and PALMER, ASSOCIATE PROFESSORS II, EGLITIS, GAUGHAN, HALL, RUSSELL, and IWESTON; ASSISTANT PROFESSORS BOSTON, DDELPHIA, HUMBERTSON, JULIAN, KAELEBING, VERN- ALL, WISMAR and WOOTEN.

For related courses see Biology.

504 Introductory Anatomy U 6
Su, A, W, Sp. 3 cl., 2 3-hr. labs.
Prereq.: Biol. 402 or equiv.
Not open to pre-dental or pre-medical students.
Fundamental principles of anatomy as illustrated by the dissection of the cat, supplemented by demonstrations of human material.
Aplington, Mrs. Aplington.

505 Neuro-Muscular Anatomy U 5
A. 2 cl., 2 3-hr. labs.
Prereq.: 504 or equiv. and permission of instructor.
Not open to pre-dental or pre-medical students.
Neuro-muscular anatomy of the human body. Wooten.

513 Comparative Vertebrate Anatomy U 6
Su, A, W, Sp. 3 cl., 3 3-hr. labs.
Prereq.: Biol. 402 and Zool. 404.
The basic plan of vertebrates with emphasis on the dogfish shark and on phylogeny leading to the mammals. Julian.

604 Anatomical Methods UG 5
A. 2 cl., 6 lab. hrs.
Prereq.: 15 cr. hrs. of Anat. and permission of instructor.
A study of the various techniques employed in anatomical research; designed for students to begin such research. Weston and Stoff.

607 General Histology UG 6
W. 3 cl., 3 3-hr. labs.
Prereq.: 504 or 513 or equiv.
Not open to pre-dental or pre-medical students.
A detailed study of the tissues, and a general survey of the microscopic structure of the various organs. Wissmar.

608 The Eye UG 5
Sp. 2 cl., 2 3-hr. labs.
Prereq.: 607 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 Comparative Morphology of the Lower Vertebrates UG 6
A. 3 cl. 2 3-hr. labs.
Prereq.: Biol. 402 or Zool. 404.
Not open to optometry, pre-medical, pre-dental or pre- veterinary students.
Comparative morphology of representative lower vertebrates. Julian.

615 Human Developmental Anatomy and Genetics PG 4
A. 64 cl. and lab. hrs.
Prereq.: Med. 1st yr. standing.
Emphasis is on human gametogenesis, fertilization, and the formation of germ layers, fetal membranes and organs. Weston, Russell.

616 Vertebrate Embryology UG 6
Su, Sp. 3 cl., 2 3-hr. labs.
Prereq.: 513 or equiv. or Zool. 620.
Embryology of representative amphibians, birds and lower mammals from fertilization through gametogenesis.

618 Introductory Neurology UG 6
A. 3 cl., 3 3-hr. labs.
Prereq.: 513 or equiv.
An elementary presentation of the structure and function of the human nervous system; a basic consideration of the neurological systems and servomechanisms. Humberton.

619 Comparative Morphology of Mammals UG 5
W. 2 cl., 2 3-hr. labs.
Prereq.: 513 or 620.
Morphology of mammals, including man, from the point of view of their structural evolution. Jellinek.

621 Human Anatomy PG 8
A. 149 cl. and lab. hrs.
Prereq.: Med. 1st yr. standing.

622 Human Anatomy PG 4
W. 56 cl. and lab. hrs.
Prereq.: Med. 1st yr. standing.

624 Histology of the Human PG 3
W. 56 cl. and lab. hrs.
Prereq.: Med. 1st yr. standing.
General histology, cytology, epithelial, connective, bone, muscular, and nervous tissues, blood, hematopoietic tissue and vascular system. Eglitis, Ackerman, Caso, Vernall, Weston, Wissmar.

625 Histology of the Human PG 7
Sp. 120 cl. and lab. hrs.
Prereq.: Med. 1st yr. standing.
Special histology of the integumentary, digestive, respiratory, urogenital, and endocrine systems. Eglitis, Ackerman, Caso, Vernall, Wissmar.

626 Human Neurology PG 2
W. 48 cl. and lab. hrs.
Prereq.: Med. 1st yr. standing.
The gross and microscopic anatomy of the human brain and spinal cord with special emphasis on the reaction systems. Hall, Humberton, Kaelbling.

626A Human Neurology PG 3
Sp. 72 cl. and lab. hrs.
Prereq.: Med. 1st yr. standing.
Continuation of 626.

627 Clinical Anatomy PG 2
Sp. 2 cl.
Prereq.: Med. 2nd yr. standing.
A study of selected anatomical regions correlated with clinical diagnostic methods. Groves and Staff.

637 Essentials of Embryonic Development PG 3
A. 2 cl., 1 3-hr. lab.
Dent. 1st yr. standing.
The early embryology and organogenesis of man. The laboratory study emphasizes the pig embryo and is supplemented by human material.
638 Human Anatomy  P G 5  
W. Sp. 3 cl., 2 3-hr. lab.  
Prereq.: Dent. 1st yr. standing.  

639 Human Anatomy  P G 7  
W. Sp. 4 cl., 3 3-hr. lab.  
Prereq.: Dent. 1st yr. standing.  

640 Histology  P G 6  
A. 3 cl., 3 3-hr. lab.  
Prereq.: Dent. 1st yr. standing.  
General histology of the tissues and special histology of the organ systems. Vernall, Caso, Egglitis.

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

701 Minor Problems in Anatomy  U G 2-5  
Su, A, W, Sp. 1 cl., 2-8 lab. and/or library hrs.  
Prereq.: 15 cr. hrs. in Anat. or allied fields and permission of instructor.  
Designed to enable the student to pursue a minor investigation in some anatomical field of his choice. Graduate Staff.

705 Anatomical Methods in Electron Microscopy  P 12  
Sp.  
Prereq.: Med. 2nd, 3rd or 4th yr. standing.  
The preparation of biological materials for electron microscopy and training in the operation of the instrument. A research project may be chosen. Weston.

711 Comparative Histology  G 5  
Sp. 2 cl., 3 2-hr. labs.  
Prereq.: 607 or 634 or equiv.  
A general consideration of cells, tissues and organs of animals with emphasis on the comparative and evolutionary aspects. Wiener.

727 Anatomy of the Newborn  P 6  
1 month, offered Apr., Nov.  
Sp.  
Prereq.: Med. 2nd, 3rd or 4th yr. standing.  
Gross anatomy of the newborn correlated with prenatal and postnatal development; dissection and section study. Edwards, Gaughan, Graves, Egglitis.

728 Topographical Anatomy  G 2 or 4  
1 month, offered July, Apr.  
Sp.  
Prereq.: Med. 2nd, 3rd, or 4th yr. standing.  
A study of human body sections with emphasis on structural relations. Edwards, Gaughan, Graves, and Egglitis.

807 Special Studies in Anatomy  P 6  
Prereq.: Permission of instructor.  
Repeatable.  
a. Advanced Regional. Dissections. 1 month, offered any month  
b. Blood and hemopoiesis  
c. Blood and Connective tissues  
d. Embryology  
e. Advanced comparative morphology  
f. Microscopic anatomy  
g. Neurology  
h. Normal X-ray anatomy. 1 month, offered Nov., May  
i. Epithelial tissue, including glands  
j. Gross human anatomy  
k. Electronmicroscopy  
l. Tissue culture

815 Human Morphogenesis and Genetics  G 4  
A. 2 cl., 2 3-hr. lab.  
Prereq.: Permission of instructor.  
Emphasis is placed on human gametogenesis, fertilization, germ layer formation, organogenesis, fetal membranes, and principles of human genetics.

817 Comparative Neurology  G 5  
W. 3 cl., 3 3-hr. lab.  
Prereq.: 618 or 626 or 628 and permission of instructor.  
A phylogenetic approach toward an appreciation of neurology. The development and refinement of specific tracts will be considered from invertebrates to man. Hall.

818 The Autonomic Nervous System  G 4  
W. 2 2-hr. cl.  
Prereq.: 618 or 626 or 628 and/or permission of instructor.  
A detailed presentation of the involuntary Nervous System. Hall.

821 Human Morphology  G 6  
A, W, Sp. 3 cl., 9 lab. hrs.  
Prereq.: Permission of instructor.  
Gross anatomy of the human body for advanced students in comparative morphology. Special attention is given to the phylogenetic and ontogenetic history of the organ systems. Gross Anatomy Staff.

822 Human Morphology  G 6  
W, Sp. 3 cl., 9 lab. hrs.  
Prereq.: 821  
Continuation of 821.

824 Advanced Mammalian Histology  G 5  
W. 3 cl., 6 lab. hrs.  
Prereq.: Permission of instructor.  
General histology of mammalian tissues and special histology of the vascular system. Egglitis, Ackerman, Weston.

825 Advanced Mammalian Histology  G 5  
Sp. 3 cl., 6 lab. hrs.  
Prereq.: Permission of instructor.  
Special histology of mammalian organ systems except the vascular. Ackerman, Egglitis.
COURSES OF INSTRUCTION
ANATOMY

826 The Nervous System of Man G 5
Sp. 3 cl., 0 lab. hrs.
Preq.: Permission of instructor.
A detailed consideration of the gross and histological structure of the nervous system and sense organs of man. Hall, Humbertson, Kaelbling.

830 Seminar in Anatomy G 1
Discussions of research in progress and reports from the literature of current anatomical problems.

950 Research in Anatomy G Arr.
Research for thesis or dissertation purposes only. Graduate Staff.

Animal Science


401 Introductory Animal Science U 5
A, W, Sp. 3 cl., 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. Parker, R. F. Wilson, G. R. Wilson, Juday.

407 Meat Selection and Identification U 3
A, W, Sp. 3 2-hr. lab.
The structure and composition of beef, pork, veal, and lamb are used to distinguish grades and usefulness of meat products for domestic and institutional purposes. Kunkle, Cahn, Althouse.

501 Horse Production and Management U 5
W. 3 cl., 2 2-hr. lab.
Preq.: 401, 402 or 530, and 10 cr. hrs. in Biol. Sc.
Information in breeding, feeding, and miscellaneous management of horses. Inspection trips to horse farms. Emphasis on light-leg horses and equitation skills. Reed.

502 Beef Cattle Production and Management U 5
A, Sp. 3 cl., 2 2-hr. lab.
Preq.: 401, 402 or 530, and 10 cr. hrs. in Biol. Sc.
Economic importance of beef cattle, covering the phases of selection, breeding, feeding, and management under diversified types of farming. Commercial and pure bred operations considered. G. R. Wilson.

503 Swine-Production and Management U 5
A, Sp. 3 cl., 2 2-hr. lab.
Preq.: 401, 402 or 530, and 10 cr. hrs. in Biol. Sc.
Selection of breeding stock, reproduction, feeding, management, and sale of commercial and breeding swine. Swine herds, markets, and research stations are visited. R. F. Wilson.

505 Sheep Production and Management U 5
W. Sp. 3 cl., 2 2-hr. lab.
Preq.: 401, 402 or 530, and 10 cr. hrs. of Biol. Sc.
The place of sheep on the farm—selection, breeding, management, and marketing. Inspection trips: breeding flocks, feed yards, wool warehouse, and Experiment Station. Judy.

506 Livestock Selection U 5
Sp. 5 2-hr. lab.
Preq.: 401 and 15 cr. hrs. Biol. Sc. or permission of instructor.
Laboratory exercises employing current standards of animal excellence including carcass value for the selection and improvement of farm livestock. Reed.

509 Meat and Meat Products U 5
A, W, Sp. 3 cl., 2 2-hr. lab.
Preq.: 401, 402 or 530.
Selection of slaughter animals to illustrate the relationship of breeding, feeding, and management to carcass yield, cost, and cut-out value. Meat processing is emphasized. Cahn, Kunkle.

510 Meat Grading U 3
Sp. 1 cl., 2 2-hr. lab.
Preq.: 401, 402 or 530; 407 for Home Econ. students.
The factors that influence the value of meat animals, carcasses, and wholesale cuts in accordance with recognized grading standards. Laboratory practice. Althouse.

515 Livestock Management U 5
W, Sp. 3 cl., 2 2-hr. lab.
Preq.: 401 and 402 or 530.
Feeding, breeding, and management of beef, sheep, and swine. Laboratory exercises are concerned with major management problems. Reed.

Principles of Animal Improvement
(See Dairy Science 520)
(Offered in cooperation with the Departments of Animal Sc. and Poul. Sc.)

530 Principles of Animal Nutrition U 5
A, W, Sp. 4 cl., 1 2-hr. lab.
Preq.: Chemistry 408 or 412 and Math. 439 or equiv.
Not open to students with credit for Animal Sc. 402 or Poul. Sc. 569.
A study of the fundamental principles of nutrition in mammals and birds. (Offered in cooperation with the Departments of Dairy Sc. and Poul. Sc.) Cline, Nabor, Tynick.

Livestock Marketing
(See Agricultural Economics 608)
(Offered in cooperation with the Department of Animal Sc.)

619‡ Advanced Meat Technology U C 3
W. 2 cl., 2 2-hr. lab.
Preq.: 309 or 407 and 25 cr. hrs. in Biol. Sc.
Evaluation of scientific contribution to meat products and processing. Cahn, Kunkle, Okerman.
630 Nutrition and Feeding of Monogastric Animals
W. 4 cr., I 2-hr. lab.
Prereq.: 530 or equiv.
Not open to students with credit for Foul. Sc. 601.
The nutrition of swine, poultry, and laboratory animals: principles and practice.(Offered in cooperation with the Department of Foul. Sc.) Culler, Nebel.

631 Nutrition and Feeding of Ruminant Animals
A, Sp. 4 cr., I 2-hr. lab.
Prereq.: 530 or equiv.
Not open to students with credit for 618.
The nutrition of dairy cattle, beef cattle, and sheep: principles and practice. (Offered in cooperation with the Department of Dairy Sc.)

701 Special Problems
Prereq.: 4th yr. standing.
Special assignments in the advanced phases of animal production and meat. Students will elect work in desired subjects after conferences with the instructor in charge.

Genetics of Animal Populations
(See Dairy Science 730)
(Offered in cooperation with the Departments of Animal Sc. and Foul. Sc.)

810 Animal Science, Seminar
Prereq.: Animal Sc. graduate standing.
Discussions of current animal science research.

Current Topics in Animal Breeding
(See Dairy Science 820)
(Offered in cooperation with the Departments of Animal Sc. and Foul. Sc.)

830 Advanced Studies in Nutrition
A, W, Sp. 3 cr.
Prereq.: Bio. 709 and 710 or Physiol. Chem. 611 and 612 or permission of instructor.
Repeatable to a maximum of 12 credit hours.
(Offered in cooperation with the Departments of Dairy Sc. and Foul. Sc.)
Topics for 1964-65
A. Autumn quarter. Vitamins. Tymus.
C. Spring quarter. Lipids.

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

950 Research in Animal Science
Research for thesis or dissertation purposes only.

ANTHROPOLOGY

Anthropology
Office: 112 Hagner Hall, 1775 South College Road.
PROFESSOR ISLETT (Chairman); ASSOCIATE PROFESSORS BOURGUIGNON and TESTEL; ASSISTANT PROFESSOR PETTAY.

501 Introduction to Anthropology
Su, A, W, Sp. 5 cr.
Prereq.: 2nd yr. standing.
An introductory survey of the field of Anthropology, with emphasis upon the prehistoric development of culture. Behavior of man illustrated by the simpler societies.

502 Introduction to Physical Anthropology
A, W, Sp. 5 cr.
Prereq.: 2nd yr. standing.
The organic development of man; human evolution; the modern groupings of man.

503 Introduction to Ethnology
Su, A, W, Sp. 5 cr.
Prereq.: 2nd yr. standing.
A comparative survey of tribal peoples in basic world areas—Asia, Africa, Oceania, North and South America.

607 Culture Contact and Technological Change
Sp. 4 cr.
Prereq.: 401 and Soc. 401 or 407, or permission of instructor.
Consequences for folk societies of the diffusion of Euro-American culture. Introduction of advanced technology to underdeveloped areas. Cultural aspects of colonialism and military government.

612 Social Relations in Folk Societies
A. 4 cr.
Prereq.: 8 hrs. of Anthrop., or equiv. and permission of instructor.
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. Bourguignon.

613 Religion in Folk Societies
W. 4 cr.
Prereq.: 8 hrs. of Anthrop., or equiv. and permission of instructor.
World views in folk societies, emphasizing religion and sacred beliefs. Integration of these beliefs with social organization and the arts. Slides, motion pictures, recordings. Bourguignon.

Culture Patterns and Personality
(See Sociology 624.)

630 Indians of the Americas
Sp. 4 cr.
Prereq.: 8 hrs. of Anthrop., or equiv. and permission of instructor.
American Indian cultures of the time of European conquest. Estel.

632 American Indian Prehistory
A. 4 cr.
Prereq.: 8 hrs. of Anthrop., or equiv. and permission of instructor.
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. Estel.
COURSES OF INSTRUCTION

ANTHROPOLOGY

633 Dynamics of American Culture U G 3
Su, A, 3 cl.
Prereq.: 5 hrs. of Anthrop., or equiv., or permission of instructor.
A review of American customs, institutions, social systems, and ideas, with emphasis on recent cultural anthropological studies. Petray.

634 Ethnology of Asia U G 4
Su, W, 4 cl.
Prereq.: 5 hrs. of Anthrop., or equiv., or permission of instructor.
A survey of the people of Asia. High civilizations and tribal cultures. Prehistoric origins of Asian cultures; the distribution of physical types, languages, social customs. Denton.

635 Ethnology of Africa U G 4
A, 4 cl.
Prereq.: 5 hrs. of Anthrop., or equiv., or permission of instructor.
The people of Africa south of the Sahara. Distribution of physical types, languages, cultural areas. West Coast Kingdoms as source of the American Negro.

636 Fossil Man U G 4
W, 4 cl.
Prereq.: 502 or 15 cr. hrs. of Biol. Sc. or Geol.

637 Physical Variability of Modern Man U G 4
Sp, 4 cl.
Prereq.: 502 or 15 cr. hrs. of Biol. Sc. including genetics.

639 Theory and Problems of Cultural Anthropology U G 4
W, 4 cl.
Prereq.: 20 cr. hrs. in allied subjects.
Major theoretical viewpoints in cultural anthropology. Significance of the cultural approach. Applied anthropology and the relations of cultural anthropology to psychology and other social sciences. Bourguignon.

659 Peoples and Cultures of Latin America U G 3
Sp, 3 cl.
Prereq.: 5 cr. hrs. of Anthrop. or equiv., or permission of instructor.
The pre-Columbian background. Contemporary races, cultures, and social organizations. The emergence of Latin America as a distinct culture area in the modern world. Bourguignon.

660 Introduction to Anthropological Linguistics U G 4
W, 4 cl.
Prereq.: 10 cr. hrs. of Anthrop. or Linguistics.
Relations of language to social organization, world view, socialization, and cultural analysis. Bourguignon.

670 Principles of Research in Archaeology U G 4
Sp.
Prereq.: 10 cr. hrs. of Anthrop., including 501 or 10 hrs. of work closely related to archaeological field research, and permission of instructor.
Instruction in basic methods of archaeological analysis, including artifact typology and cultural classification. Methods of excavation and recording. One-day or week-end field sessions. Baby.

674 Archaeological Training U G 8–16
Expedition
Su, 8 cr. hrs. per other term.
(Full time in expedition camps.)
Prereq.: 670 or 10 cr. hrs. of work closely related to archaeological field research, and permission of instructor.
Joint expedition of The Ohio State University and the Ohio State Museum, engaged in excavating prehistoric sites in Ohio. Experience in archaeological field work. Baby.

700 Special Problems U G 1–4
Prereq.: 10 cr. hrs. of Anthrop. and permission of instructor.
a. Theory
b. History
c. Anthropological Linguistics
d. Research Methodology
e. Prehistory
f. Ethnography
g. Physical Anthropology
h. Unclassified

710 Research Methods in Physical Anthropology U G 3
A, 3 cl.
Prereq.: 15 cr. hrs. of Anthrop. or 10 cr. hrs. of Anthrop. and 10 cr. hrs. of closely related work, and permission of instructor.
Methods used in the analysis and classification of man in both comparative and evolutionary approaches. Estel, Pettay.

730 Osteometry U G 2
W, 1 hr. lec., 3-hr. lab.
Prereq. or concurrent: 636.
Laboratory measurements of human skeletons. Estel, Pettay.

731 Anthropometry U G 2
Sp, 2 hr. lec., 3-hr. lab.
Prereq. or concurrent: 637.
Laboratory measurement of living human beings. Estel, Pettay.

820 Seminars in Anthropology G 3
Fields of specialization are listed under the description of 700, and registration in 820 should be followed by an alphabetical letter indicating the field of the seminar.

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

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

950 Research in Anthropology G Arr
Research for thesis or dissertation purposes only.
Architecture

Office: 106 Brown Hall, 190 West 17th Avenue.
PROFESSORS WHITAKER (Director), BAUMER (Emeritus), BORCHERS, CLARK, PHILLIAN, RONAN (Emeritus), SULLIVAN, and WILSON; ASSOCIATE PROFESSORS CODDINGTON, KERCKENS, TILLEY, and TOBEY; ASSISTANT PROFESSORS BOWSER, DIPNER, and MILLS; INSTRUCTORS and LECTURERS.

411 Introductory Architectural Design U 4
A. 12 lab. hrs.
An introduction to architectural design, through exercises in graphic, delineation, techniques, and space organization. Library research and individual criticism. Bowser and Staff.

412 Introductory Architectural Design U 4
W. 12 lab. hrs.
Prereq.: 411.
Continuation of 411.

413 Introductory Architectural Design U 4
Sp. 12 lab. hrs.
Prereq.: 412.
Continuation of 412.

511 Elementary Architectural Design U 5
A. 15 lab. hrs.
Prereq.: 413.
Elementary problems in architectural design dealing with organization of space for human occupancy. Library research, individual criticism, and lectures. Tilley, Biddle, and Staff.

512 Elementary Architectural Design U 5
W. 15 lab. hrs.
Prereq.: 511.
Continuation of 511.

513 Elementary Architectural Design U 5
Sp. 15 lab. hrs.
Prereq.: 512.
Continuation of 512.

521 Elementary Architectural Construction U 3
A. 1 cl., 6 lab. hrs.
Composition, manufacture, physical properties, standards, and uses of basic building materials. Theory, methods, codes, and specifications of architectural construction, preparation of contract drawings. Dipner and Staff.

522 Elementary Architectural Construction U 3
W. 1 cl., 6 lab. hrs.
Prereq.: 521.
Continuation of 521.

523 Elementary Architectural Construction U 3
Sp. 1 cl., 6 lab. hrs.
Prereq.: 522.
Continuation of 522.

571 Special Studies in Architecture U 1-5
A.
Prereq.: Permission of the School.
For students not majoring in Architecture who desire to pursue special studies in the field of Architecture.

ARCHITECTURE

572 Special Studies in Architecture U 1-5
W.
Prereq.: Permission of the School.
For students not majoring in Architecture who desire to pursue special studies in the field of Architecture.

573 Special Studies in Architecture U 1-5
Sp.
Prereq.: Permission of the School.
For students not majoring in Architecture who desire to pursue special studies in the field of Architecture.

604 History of Ancient Architecture U 3
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.

605 History of Medieval and Renaissance Architecture U 3
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.

606 History of Contemporary Architecture U 3
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.

611 Intermediate Architectural Design U 5
A. 15 lab. hrs.
Prereq.: 513.
Intermediate problems in architectural design dealing with space analysis and site planning; presented in an integrated and related series of building types. Clark and Staff.

612 Intermediate Architectural Design U 5
W. 15 lab. hrs.
Prereq.: 611.
Continuation of 611.

613 Intermediate Architectural Design U 5
Sp. 15 lab. hrs.
Prereq.: 612.
Continuation of 612.

621 Intermediate Architectural Construction U 4
A. 1 cl., 8 lab. hrs.
Prereq.: 613, 553 and 661, 662, 663 concer.
Continuation of composition, manufacture, physical properties, standards, and uses of basic building materials. Theory, methods, codes and specifications of architectural construction, preparation of contract drawings. Clark and Staff.

622 Intermediate Architectural Construction U 4
W. 1 cl., 8 lab. hrs.
Prereq.: 621.
Continuation of 621.

623 Intermediate Architectural Construction U 4
Sp. 1 cl., 8 lab. hrs.
Prereq.: 622.
Continuation of 622.

631 Inspection Trip U 2
Sp.
Prereq.: Arch. or Land Arch., 4th or 5th yr., standing.
Taken between Winter and Spring Quarters. Trip to inspect architect's office and buildings in Ohio and neighboring states. Written report required.
### Courses of Instruction

#### Architecture

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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td>661</td>
<td>Architectural Building Equipment</td>
<td>U 4</td>
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<td>A.</td>
<td>3 cl., 3 lab. hrs.</td>
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<tr>
<td>Prereq.:</td>
<td>711, 712, 713 and 661, 692, 693, concurrent.</td>
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<tr>
<td>Fundamentals of building services; installation of approved equipment; application of building fire prevention and safety codes; specifications and preparation of working drawings.</td>
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<tr>
<td>671</td>
<td>Special Studies in Architecture</td>
<td>U 1-5</td>
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<td>A.</td>
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<tr>
<td>Prereq.:</td>
<td>Permission of the School for students not majoring in Architecture who desire to pursue special studies in the field of Architecture.</td>
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<td>Special Studies in Architecture</td>
<td>U 1-5</td>
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<tr>
<td>Prereq.:</td>
<td>Permission of the School for students not majoring in Architecture who desire to pursue special studies in the field of Architecture.</td>
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<tr>
<th>Course Code</th>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>673</td>
<td>Special Studies in Architecture</td>
<td>U 1-5</td>
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<tr>
<td>Sp.</td>
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<tr>
<td>Prereq.:</td>
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<th>Course Code</th>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>707</td>
<td>Allied Arts</td>
<td>U 3</td>
</tr>
<tr>
<td>A.</td>
<td>3 cl.</td>
<td></td>
</tr>
<tr>
<td>Prereq.:</td>
<td>Arch. 5th yr. standing.</td>
<td></td>
</tr>
<tr>
<td>Analysis of arts related to architecture and the expression of the nature of materials in architectural ornament, furniture and furnishings, and the garden.</td>
<td>Borchers.</td>
<td></td>
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<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>708</td>
<td>Community Patterns</td>
<td>U 3</td>
</tr>
<tr>
<td>W.</td>
<td>3 cl.</td>
<td></td>
</tr>
<tr>
<td>Prereq.:</td>
<td>Arch. and Land. Arch. 5th yr. standing.</td>
<td></td>
</tr>
<tr>
<td>Analysis of architecture and the urban landscape from ancient to modern times.</td>
<td>Tobey.</td>
<td></td>
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<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>709</td>
<td>Urbanism and City Planning</td>
<td>U 3</td>
</tr>
<tr>
<td>Sp.</td>
<td>3 cl.</td>
<td></td>
</tr>
<tr>
<td>Prereq.:</td>
<td>Arch. and Land. Arch. 5th yr. standing.</td>
<td></td>
</tr>
<tr>
<td>Not open to graduate Planning students.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning for the modern city environment; the impact of urbanization; problems of urban land-use, transportation, and rebuilding worn-out cities; analysis of representative city plans.</td>
<td>Stollman.</td>
<td></td>
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>711</td>
<td>Advanced Architectural Design</td>
<td>U 6</td>
</tr>
<tr>
<td>A.</td>
<td>18 lab. hrs.</td>
<td></td>
</tr>
<tr>
<td>Prereq.:</td>
<td>612.</td>
<td></td>
</tr>
<tr>
<td>Advanced problems in architectural design dealing with space organization in relation to group composition and community patterns. Library research and individual criticism.</td>
<td>Philian and Steff.</td>
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<tr>
<th>Course Code</th>
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<th>Credit Hours</th>
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<tr>
<td>712</td>
<td>Advanced Architectural Design</td>
<td>U 6</td>
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<tr>
<td>W.</td>
<td>18 lab. hrs.</td>
<td></td>
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<tr>
<td>Prereq.:</td>
<td>711.</td>
<td></td>
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<tr>
<td>Continuation of 711.</td>
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<td>Sp.</td>
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<td>Prereq.:</td>
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<tr>
<td>Continuation of 711.</td>
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<th>Course Code</th>
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<tbody>
<tr>
<td>714</td>
<td>Advanced Architectural Design and Thesis</td>
<td>U 8</td>
</tr>
<tr>
<td>A.</td>
<td>24 lab. hrs.</td>
<td></td>
</tr>
<tr>
<td>Prereq.:</td>
<td>713. Arch. 5th yr. standing.</td>
<td></td>
</tr>
<tr>
<td>The thesis problem summarizes all the student's architectural experiences as an undergraduate, and includes a complete analysis of building types, library research, design presentation, and working drawings. Coddington and Steff.</td>
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<tr>
<th>Course Code</th>
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<tr>
<td>715</td>
<td>Advanced Architectural Design and Thesis</td>
<td>U 8</td>
</tr>
<tr>
<td>W.</td>
<td>24 lab. hrs.</td>
<td></td>
</tr>
<tr>
<td>Prereq.:</td>
<td>714.</td>
<td></td>
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<tr>
<td>Continuation of 714.</td>
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<tr>
<th>Course Code</th>
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<tr>
<td>716</td>
<td>Advanced Architectural Design and Thesis</td>
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<tr>
<td>Sp.</td>
<td>24 lab. hrs.</td>
<td></td>
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<tr>
<td>Prereq.:</td>
<td>715.</td>
<td></td>
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<tr>
<td>Continuation of 715.</td>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>754</td>
<td>Professional Practice: Theory of Working Drawings and Specifications</td>
<td>U 2</td>
</tr>
<tr>
<td>A.</td>
<td>2 cl.</td>
<td></td>
</tr>
<tr>
<td>Prereq.:</td>
<td>Arch. 5th yr. standing.</td>
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<th>Course Code</th>
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<tr>
<td>755</td>
<td>Professional Practice: Building Costs, Contracts, Supervision</td>
<td>U 2</td>
</tr>
<tr>
<td>W.</td>
<td>2 cl.</td>
<td></td>
</tr>
<tr>
<td>Prereq.:</td>
<td>Arch. 5th yr. standing.</td>
<td></td>
</tr>
<tr>
<td>Building costs, bidding procedures, forms of construction contracts and bonds, and supervision of building construction, including study of current construction projects.</td>
<td>Wilson.</td>
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<th>Course Code</th>
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<tbody>
<tr>
<td>756</td>
<td>Professional Practice: Public, Professional Relations, and Office Management</td>
<td>U 2</td>
</tr>
<tr>
<td>Sp.</td>
<td>2 cl.</td>
<td></td>
</tr>
<tr>
<td>Prereq.:</td>
<td>Arch. 5th yr. standing.</td>
<td></td>
</tr>
<tr>
<td>Planning of offices and development of organization charts for management and operation of architect's practice, including inspection of existing offices and interviews with practicing architects.</td>
<td>Borchers.</td>
<td></td>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>771</td>
<td>Special Studies in Architecture</td>
<td>U G 1-5</td>
</tr>
<tr>
<td>A.</td>
<td></td>
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</tr>
<tr>
<td>Prereq.:</td>
<td>Permission of the School. For students majoring in Architecture desiring to pursue special studies not offered in the fixed curriculum.</td>
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<tr>
<td>772</td>
<td>Special Studies in Architecture</td>
<td>U G 1-5</td>
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<td>W.</td>
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<td>773</td>
<td>Special Studies in Architecture</td>
<td>U G 1-5</td>
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<tr>
<td>Sp.</td>
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<td></td>
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<tr>
<td>Prereq.:</td>
<td>Permission of the School. For students majoring in Architecture desiring to pursue special studies not offered in the fixed curriculum.</td>
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</table>

A-22
ASTRONOMY

Astronomy

Offices: 106 Orton Hall, 355 South Oval Drive. Perkins Observatory, Delaware, Ohio.

PROFESSORS ISLETTEBAK (Chairman), 1. BOBROVNIKOFF, 1. KEENAN, 1. KO, and 1. KRAUS; ASSOCIATE PROFESSORS 1. BONSACK and 1. MITCHELL; ASSISTANT PROFESSORS 1. CAPRIOTTI and 1. COLLINS.

401 General Astronomy I U 5
A. 4 cl., 1 2-hr. lab.
Prereq.: Passing of O.S.U. Math Entrance Test, or Math 400 or 401 concur.
Not open to students with credit for 500.
Astronomy 401 and 402 form a comprehensive introduction to modern astronomy. 401 deals with the solar system and the earth as an astronomical body. Bobrovnikoff.

402 General Astronomy II U 5
W. . . 4 cl., 1 2-hr. lab.
Prereq.: Astron. 401.
Not open to students with credit for 500.
A continuation of Astron. 401 with emphasis on the stellar universe and physical astronomy. Bobrovnikoff.

500 Descriptive Astronomy U 5
Su, A. Sp. 5 cl.
Not open to students with credit for 401 and 402.
A course emphasizing the place of astronomy in man's cultural and scientific development. Bonsack, Collins, Slettebak.

601 History of Astronomy U G 3
W. . . 3 cl.
Prereq.: 401-402, or 500, or permission of instructor.

605* Introduction to Celestial Mechanics U G 3
W. . . 3 cl.
Prereq.: Math. 544 or 611 and Physics 413 or 532 and 533 or permission of instructor.
Application of the laws of motion to planets, satellites, and stars. The two- and three-body problems. Introduction to orbit and perturbation theory. Collins.

611 Spherical Astronomy U G 3
W. . . 3 cl.
Prereq.: 401 or 500 or equiv; Mathematics 441 or 549 or 550, and Physics 412 or 532.
The application of spherical trigonometry to stellar positions and motions; stellar co-ordinate systems; time; fundamental measurements of star positions. Bonsack.

650 Stellar Astronomy U G 3
A. . . 3 cl.
Prereq.: 402 or 500; Math. 441, 538, or 543; Physics 532 and 533; or permission of instructor.
Distances, motions, luminosities, and masses of stars. The motions and distribution of stars and interstellar matter. Star clusters and galaxies. Capriotti.

651 Introduction to Astrophysics U G 3
W. . . 5 cl.
Prereq.: Physics 614 or equiv. and Math. 544 or 611 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. Slettebak.
### COURSES OF INSTRUCTION

#### ASTRONOMY

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisites</th>
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</thead>
</table>
| 652        | Solar System                                     | U G 3 | 0 cl.  
Prereq.: 401 or 500; Math. 441, 538, or 543; Physics 532 or 533; or permission of instructor.  
The physical nature of the solar surface, planets, satellites, comets, asteroids, meteorites, and diffuse matter in the solar system. Cosmogony of the solar system. Capriotti. |
Prereq.: 10 cr. hrs. of Astron., Math. 538 or 543 and Physics 413-413 or 522-533.  
Repeatable.  
Independent library or laboratory work on a special problem in observational or theoretical astronomy at the Perkins or McMillin Observatory. Perkins Observatory Staff. |
| 751        | Observational Techniques                         | U G 3 | A.  
Prereq.: 651 and Physics 606 and 718.  
| 752        | Observational Techniques                         | U G 3 | W.  
Prereq.: 751.  
Continuation of 751. |
| 753        | Observational Techniques                         | U G 3 | Sp.  
Prereq.: 752.  
Continuation of 752.  
Radio Astronomy Instrumentation  
(See Electrical Engineering 784.) |
| 801        | Seminar in Astronomy                              | G 1   | A.  
1 cl.  
Prereq.: 10 cr. hours each in 600 courses or higher in Astron., Physics, and Math., or permission of instructor.  
Repeatable.  
Seminars conducted on astronomical topics of current interest. Students will participate actively in the presentation and discussion of materials. Perkins Observatory Staff. |
| 802        | Seminar in Astronomy                              | G 1   | W.  
1 cl.  
Prereq.: 801.  
Continuation of 801. |
| 803        | Seminar in Astronomy                              | G 1   | Sp.  
1 cl.  
Prereq.: 802.  
Continuation of 802. |
| 821        | Stellar Atmospheres and Diffuse Matter            | G 3   | A.  
3 cl.  
Prereq.: 651, Physics 703, 718, Math. 601, 611.  
| 823        | Stellar Atmospheres and Diffuse Matter            | G 3   | in Space  
W.  
3 cl.  
Prereq.: 831.  
Continuation of 821. |
| 841        | Dynamical Astronomy                               | G 3   | A.  
3 cl.  
Prereq.: 651, Math. 601, 611.  
| 842        | Dynamical Astronomy                               | G 3   | W.  
3 cl.  
Prereq.: 841.  
Continuation of 841. |
| 843        | Dynamical Astronomy                               | G 3   | Sp.  
3 cl.  
Prereq.: 842.  
Continuation of 842. |
| 850        | Current Topics in Astronomy                       | G 3   | A., W., Sp.  
Prereq.: 651.  
Repeatable with permission of staff.  
Staff members and visiting lecturers will present material on their current research problems. Perkins Observatory Staff. |
| 851        | Stellar Interiors and Stellar Evolution           | G 3   | A.  
3 cl.  
Prereq.: 651, Physics 614, 708, Math. 601, 611.  
| 852        | Stellar Interiors and Stellar Evolution           | G 3   | W.  
3 cl.  
Prereq.: 851.  
Continuation of 851. |
| 853        | Stellar Interiors and Stellar Evolution           | G 3   | Sp.  
3 cl.  
Prereq.: 852.  
Continuation of 852. |
(See under Interdepartmental Seminars.) |
| 896        | Radio Astronomy Theory I                          | G 3   | W.  
3 cl.  
Prereq.: 651 and Physics 713 or Elec. E. 832 or permission of instructor.  
Fundamental theory of radio astronomy and interpretation of basic radio observations. Given in collaboration with the Department of Electrical Engineering. Kraus, Ko. |
| 897        | Radio Astronomy Theory II                         | G 3   | Sp.  
3 cl.  
Advanced theory of generation, propagation and absorption of cosmic radio waves. Given in collaboration with the Department of Electrical Engineering. Kraus, Ko. |
Research for thesis or dissertation purposes only. |
Aviation

Office: Ohio State University Airport, 2160 Case Road.
ASSOCIATE PROFESSOR EGGSFUEHLER (Chairman); ASSISTANT PROFESSORS BILLINGS and CHAPMAN; INSTRUCTORS and LECTURER.

505 Elements of Aviation U 4
Su, A, W, Sp. 3 cl., 2 lab.
Prereq.: Math. 416 or 439, Physics 411.
Problems in fundamentals of flight and aircraft operation. Objective studies of aviation laws and regulations.

506 Primary Flight U 1
Su, A, W, Sp. 5 lab.
Prereq.: 505 or concur. and secure permission slip at University Airport prior to scheduling.
A laboratory course provided for students to achieve greater understanding of 505.

507 Introduction to Aviation U 3
W. 3 cl., 1 field trip.
A comprehensive study of our air transportation system.

600 Advanced Flight U 1-4
Su, A, W, Sp. 5 lab.
Prereq.: 505 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.
Repeatably to a maximum of 4 cr. hrs.
a. Precision Flight Maneuvers
b. Flight Navigational Procedures
c. Performance Evaluation
d. Flight Safety

601 Aircraft Performance U 3
A. 3 cl.
Prereq.: 505.
Studies of airframe components, performance and design characteristics, power plants, and federal certification of aircraft equipment.

603 Air Traffic Control and Flight Meteorology U 3
W. 3 cl.
Prereq.: 505, Physics 420.
Precision navigational techniques for position control, flight planning and cruise control, aids to navigation, fundamentals of meteorological analysis, and effects of weather on flight.

605 Analysis of Problems in Aviation Safety U 3
Sp. 3 cl.
Prereq.: 601, 603, Psych. 627.
Detailed analysis of standard and proposed procedures relating to safety, studies in pilot behavior, accident investigation and safety programs.

Biology

For related courses see Anatomy, Agricultural Biochemistry, Botany and Plant Pathology, Entomology, Microbiology, Physiological Chemistry. Physiology, and Zoology.

402 Principles of Biology U 5
Su, A, W, Sp. 3 cl. 2-full hr. labs.
Not open to students with credit for Zool. 400.
A study of biological principles common to all living things: protoplasm, cells, development, organization, coordination, genetics, homeostasis, ecology, evolution and systematics. Wharton and Staff.

403 Principles of Heredity U 5
A, W. 5 cl.
Prereq.: Biol. 402.
Open only to students in Animal Sc., Dairy Sc., and Poultry Sc.

505 Introduction to Ecology U 5
W. 5 cl., two Saturday field trips.
Not open to students with credit for Bot. 505.
An introduction to biotic communities, inter-relations of a community with its physical environment, and the application of ecological principles to human affairs. Colman, Kiftsh.

509 Evolution U 5
A, Sp. 5 cl.
Prereq.: Zool. 404 or Bot. 404, 402, or equi.
Not open to students with credit for Zool. 509.
The principles of organic evolution. Demonstrations and discussions of the facts and theories underlying the evolution of man and other living things. Tidd.

604 Genetics U G 5
Su, A, W 5 cl.
Prereq.: Biol. 402 and Math. 416, 439 or equi. Zool. 404 and Bot. 403 or equi.
Not open to students with credit for Zool. 604.
A consideration of the principles, concepts, and applications of classical and modern genetics. Rouse, Plaine.

617 General Cytology U G 5
W. 3 cl., 1-3 hr. lab.
Prereq.: 3 qtrs. Chem. and 26 cr. hrs. of Biol. Sci.
A study of the nature of protoplasm, the inner organization of living cells and the fundamental phenomena of life. Byers, Giese, Farrar.

618 The Cytological Basis of Genetics U G 5
W. 2 cl., 3 2-hr. labs.
Prereq.: 603 or 604 or equi.
Not open to students with credit for Zool. 618.
Documentation of the correlation between genetic principles and chromosome behavior by studying the mitotic and meiotic cells of several organisms with oil immersion microscopy. Faddock.

630 The Interpretation of Biological Data U G 5
Su, A. 4 cl. 1 2-hr. lab.
Prereq.: Math. 418 or 440 or equi. and 15 cr. hrs. in Biol. Sci.
Not open to students with credit for Zool. 630.
Application of statistical methods to biological problems. Emphasis on understanding principles and concepts, including estimation, testing, hypotheses, regression, chi-square, and analysis of variance. Skravena.
COURSES OF INSTRUCTION

BIOLOGY

690 Topics in Biological Science
W. 5 cr.
Prereq.: Math. 415, Chem. 405 or equiv.
Not open to students with credit for Bot. 690.
Lectures and demonstrations intended for students of junior
level, including development, cell and molecular biolog,
physiology of reproduction, population genetics, speci
ication, and evolution. Staff.

699 Radiation Biology
Su.
Prereq.: High school teacher status and Zool. 404 or
equiv., Physics 634 or concur., and 10 cr. hrs. in gen.
Chem. and Physics.
(N.S.F. Summer Institute students only.)
Not open to students with credit for Zool. 699.
A study of the principles of radiation biology and their
application to high school and college teaching. Burley.

740+ Cytogenetics
Sp. 3 cr., 1 2-hr. lab.
Prereq.: 601-602 or 403 or 672, Biol. 604 and Biol.
618 or Bot. 737.
Not open to students with credit for Bot. 740.
Origin, transmissibility, and effects of chromosomal aberrations;
their usefulness in practical breeding and in attacks on fundamen
tal cytogenetic problems. Paddock.

804 Ecological Investigations of Biotic
Areas of North America
Su. (First term).
Prereq.: Bot. 601 or Zool. 636 or 640, 20 additional
grad. hrs in Bot. Sci. and permission of instructor. Fee
of $15 for travel and subsistence.
Not open to students with credit for Zool. 804.
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.

816 Mathematical Genetics
Sp.
Prereq.: 604, Math. 537 or 628 or equiv. and permis
sion of instructor.
Not open to students with credit for any two of Zool.
706, 707, or 708, or to students with credit for Zool.
816.
Effects of mating system, mutation, selection, migration, and
drift on gene frequencies in populations. Elements of biometrical
and human genetics. McIntosh.

817 Principles of Systematics
A. 2 cr., 2 hr. lab.
Prereq.: 15 cr. hrs. of Zool. or Extrem. zo at or above
the 600 level.
Not open to students with credit for Zool. 817.
A study of the principles and techniques of Zoological identifi
cation, classification, and nomenclature. Borrer.

830* Physiological Genetics
Sp. 5 cr.
628 or equiv.
Not open to students with credit for Zool. 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. Plaine.

831* The Nature of Gene Action
Sp. 5 cr.
Prereq.: Zool. 603, 632, Agr. Bio. 601, Physiol. 628, or
equiv.
A study of the action of genes at all levels of expression with
special emphasis on the role of genes in developmental processes.
House.

Biophysics

Office: 211 Graduate School Bldg., 164 West 13th Avenue.
PROFESSORS: RICHARD C. NELSON (Chairman), and IVAN
WINKLE; ASSOCIATE PROFESSORS: COULTER, SLIPETZ,
and JST. PIERRE (ex-officio).

645* Principles of Biophysics
Sp.
(See under Physiology 645.)

646 Radiation Biophysics
W.
(See under Physiology 646.)

648* Physical Instrumentation for
Biologists
Sp.
(See under Physiology 648.)

700 Seminar in Biophysics
Prereq.: Permission of instructor.
Repeatable.

701 Mirror Problems in Biophysics
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.

702 Advanced Experimental Methods in
Biophysics
Prereq.: Permission of instructor.
Repeatable to a maximum of 9 cr. hrs.

800 Advanced Topics in Biophysics
Prereq.: Permission of instructor.
Repeatable to a maximum of 18 cr. hrs.

950 Research in Biophysics
G Arr.
Research for thesis and dissertation purposes only.

A-26
Botany and Plant Pathology


PROFESSORS IMEYER (Chairman), TALEXANDER, TALISSON, TBLAYDES, TBOHNING, DILLER, TGRAY, TKRIEBEL, TLEBEN, TSWANSON, TSTAFT, TVERNON, TWALLER (Emeritus), and TWILSON; ASSOCIATE PROFESSORS SELLETT, TSPISHER, TGILBERG, THACKSKAYLO, THERR, TFADDOCK, TFOPHAM, TSCHMITT, TSCHMITZHENNER, TWESHAUFT, TWILMANS, and TIZABKA; ASSISTANT PROFESSORS BAR, TBURLEY, TGESY, TJONES, TKOOP, TLMF, TPLATT, TRUDOLPH, TSFITH, and TROXEL.

For related courses see Biology.

401 General Botany U 5
Su, A, W, Sp. 5 cl.
Not open to students with credit for 403.
An observation and discussion course in basic processes and structures of plants, their relation to the environment, and their importance to other organisms, especially man. Staff.

402 General Botany U 5
Su, A, W, Sp. 5 cl.
Prereq.: 401.
Continuation of 401. Reproduction, heredity, variation and evolution in plants; the plant groups; importance of non-green plants; plant distribution, plants in relation to conservation. Staff.

403 General Botany U 5
Prereq.: Biol. 402.
Not open to students with credit for 401.
A basic course in botany with emphasis on the structure and process of the seed plants. Staff.

406 Local Flora U 5
Su, Sp, 4 2-hr. cl.; several Saturday field trips.
Prereq.: 401-402 or 403 or 672.
A laboratory, field, and discussion course in identifying plants common in Ohio. Use of keys and manuals and recognition of plants in the field are emphasized. Weithaupt, Fishier.

519 General Plant Pathology U 5
A, Sp. 3 cl., 2 2-hr. lab.
Prereq.: 401-402 or 403 or 672.
An introduction to diseases of plants. Ellett, Troxel, Smith.

601 Basic Principles of Plant Ecology U 5
Su, A. 3 cl., 1 3-hr. lab., several Saturday field trips, 1 3-day field trip.
Prereq.: 401-402 or 403 or 672, 26 additional cr. hrs. Biol. Sc.
The establishment, development, succession, and dynamics of plant communities and their inter-relationships with historic, climatic, soil, and biotic factors. Gilbert, Kilgoof.

602 Ecological Relations of World Vegetation U 5
Vegetation
Sp. 3 cl., 1 3-hr. lab., 1 4-day field trip.
Prereq.: 401.
A consideration of present and past distribution of plants throughout the world and the pattern and structure of modern vegetation with emphasis on North America. Gilbert.

605 Plant Physiology U G 3 or 5
Su, A, W. 3 cl., 2 2-hr. lab.
Prereq.: 401-402 or 403 or 672, 10 cr. hrs. Chem.
A fundamental course in plant physiology; solutions, colloidal systems, diffusion, osmotic quantities, transpiration, sorption and translocation of water, enzymes, photosynthesis. Swanson, Zabka, Platt, Burley.

606 Plant Physiology U G 3 or 5
W, Sp. 3 cl., 2 2-hr. lab.
Prereq.: 401-402 or 403 or 672, 10 cr. hrs. Chem.
A continuation of 605; photosynthesis, respiration and metabolic synthesis, absorption and utilization of mineral salts, digestion, translocation of solutes, growth, reproduction, dormancy. Swanson, Zabka, Platt, Burley.

613+ Bryophytes, Pteridophytes, and Gymnosperms U G 5
W, 4 2-hr. lab. cl.
Prereq.: 401-402 or 403 or 672, 10 additional cr. hrs. Biol. Sc.
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. Lampe.

614 Morphology of the Angiosperms U G 5
Su, A. 4 2-hr. cl.
Prereq.: 401-402 or 403 or 672, 10 additional cr. hrs. Biol. Sc.
The basic principles involved in the reproducing mechanisms of angiosperms and their application to problems in genetics, plant breeding, and crop production. Blaydes.

615 Plant Microtechnic U G 5
W. 2 cl., 2 2-hr. lab.
Prereq.: 401-402 or 403 or 672, 10 additional cr. hrs. Biol. Sc.
Principles and methods of preparing permanent plant tissue microscopic preparations. Student has opportunity to prepare a personal slide collection suitable for teaching or research. Blaydes.

635 Plant Genetics U G 5
A. 3 cl., 2 2-hr. lab.
Prereq.: 401-402 or 403 or 672, Zool. 604 or Biol. 604.
Effects of lethals, linkage, heterozygosity, introgression, polyplody, self-incompatibility, and cytoplasm. Laboratory experience with ascot-carnitnine smears, colchicine, progeny tests, random number tables, and herbarium specimens. Faddock.

640 Developmental Plant Anatomy U G 5
Sp. 4 2-hr. cl.
Prereq.: 401-402 or 403 or 672, 10 additional cr. hrs. Biol. Sc.
The initiation, differentiation, and development of tissue, tissue systems and organs of vascular plants, and a comparative study of the various structures. Popeh.

649 Diseases of Ornamentals U G 3
W. 1 1-hr. cl., 2 2-hr. lab.
Prereq.: 519 or 671.
A detailed study of important diseases of floral and woody ornamental plants; their cause, distribution, severity, importance, and specific control measures. Ellett.

650 Diseases of Fruit Crops U G 3
A. 3 2-hr. cl.
Prereq.: 519 or 671.
A detailed study of important tree and small fruit crop diseases; their cause, distribution, severity, and specific control measures. Allison.

A-27
651 * Diseases of Cereal and Forage Crops  U G 3
W. 3 2-hr. cl.
Prereq.: 519 or 671.
A detailed study of important cereal and forage crop diseases; their cause, distribution, severity, importance, and specific control measures. Ellett.

652 * Diseases of Vegetable Crops  U G 3
Sp. 3 2-hr. cl.
Prereq.: 519 or 671.
A detailed study of important vegetable crop diseases; their cause, distribution, severity, importance, and specific control measures. Allison.

653 Mycology  U G 5
A. 3 cl., 2 2-hr. lab.
Prereq.: 401-402 or 403 or 672, 10 additional cr. hrs. Biol. Sc.
A study of structures, life histories, and classification of the fungi. Gray, Schmitt.

655 Industrial Mycology  U G 3
Sp. 2 cl., 1 2-hr. lab.
Prereq.: 508-506, or Chem. 551 and 552 or equiv.
The relation of fungi, especially saprophytic fungi, to human affairs, with emphasis upon their actual and potential applications in industry. Gray.

658 Medical Mycology  U G 5
A. 3 cl., 2 2-hr. lab.
The fungi pathogenic to man, their structure and distribution, and the importance of human mycotic diseases. Schmitt.

660 * Bacterial Plant Pathogens  U G 3
Sp. 2 cl., 1 2-hr. lab.
Prereq.: 519 or 671 and Microbiol. 607.
Representative types of bacterial plant diseases and factors affecting their control, severity, distribution, and economic importance. Methods used in studying plant pathogenic bacteria. Troxel.

664 Field Botany  U G 4
Su (first term.)
Prereq.: 20 cr. hrs. Biol. Sc. including 401-402 or 403 or 672.
Not open to students with credit for Hydrobiol. 664.
Given only at Frans Theodore Stone Laboratory.
Collection, preservation, field and laboratory identification, and local distribution of plants of the major groups. Fisher.

665 Algae  U G 4 or 5
Sp. 4 3-hr. cl.
Prereq.: 401-402 or 403 or 672, 10 additional cr. hrs. Biol. Sc.
In summer Qtr. given only at Frans Theodore Stone Laboratory.
A general course covering identification, growth, reproduction, evolution, distribution and economic importance of the algae. Taft.

666 * Plant Virus Diseases  U G 3
Sp. 2 cl., 1 2-hr. lab.
Prereq.: 519 or 671.
A study of representative types of plant virus diseases; factors affecting their control, severity, distribution, and economic importance. Methods used in studying plant viruses. Troxel.

667 Physiology of Aquatic Plants  U G 4
Su (second term.)
Prereq.: 401-402 or 403 or 672 or equiv. and 20 cr. hrs. of Chem.
Not open to students with credit for Hydrobiol. 667.
Given only at Frans Theodore Stone Laboratory.
Lectures, discussions, laboratory and field work on basic topics in the physiology of aquatic plants. Butley.

669 * Higher Aquatic Plants  U G 4
Su (second term.)
Prereq.: 401-402 or 403 or 672 or equiv. and 10 additional cr. hrs. Biol. Sc.
Not open to students with credit for Hydrobiol. 669.
Given only at Frans Theodore Stone Laboratory.
The aquatic plants of the Lake Erie region other than the algae. Field and laboratory work on their identification and ecological relation. Fisher.

670 * Aquatic Mycology  U G 4
Su (second term.)
Prereq.: 401-402 or 403 or 672 or equiv. and 10 additional cr. hrs. Biol. Sc.
Given only at Frans Theodore Stone Laboratory.
A lecture, laboratory, and field course designed to acquaint the student with the fungi found in aquatic habitats including soil water. Schmitt.

671 Plant Pathology  U G 5
Sc. W. 3 cl., 2 2-hr. lab.
Prereq.: 401-402 or 403 or 672, 15 additional cr. hrs. Biol. Sc.
Not open to students with credit for Bot. 515 or 530.
Not open to students majoring in plant pathology.
Representative plant diseases are studied with emphasis on general principles of disease development and control. Troxel, Ellett.

672 Basic Concepts in Botany  U G 5
Su, A. W., Sp.
Prereq.: 10 hrs. Chem.
Not open to students with credit for 401 or 403.
Graduate credit only to participants in the Academic Year Institute.
An advanced course in the basic concepts of botany for students with a fundamental knowledge of chemistry. Taft.

673 * Taxonomy of Vascular Plants  U G 5
A. 4 2-hr. lab. several Saturday field trips.
Prereq.: 406 or 664.
A laboratory, field, and discussion course in the classification and identification of vascular plants. Fisher.

674 Field Plant Ecology  U G 4
Su (first term.)
Prereq.: 401-402 or 403 or 672 and 10 hrs. additional cr. Biol. Sc.
Given only at Frans Theodore Stone Laboratory.
Principles of plant ecology as exemplified by the study of aquatic terrestrial habitats. Emphasis on field work with supplementary lectures and laboratory work.

701 Special Problems  U G 1-5
Su, A. W., Sp.
Prereq.: 401-402 or 403 or 672 and 10 hrs. additional cr. Biol. Sc.
Problems may be selected in the fields of taxonomy, morphology, anatomy, physiology, pathology, genetics, cytology, plant pathology, mycology, or ichnology.

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BOTANY AND PLANT PATHOLOGY

718 Physiology of Fungi
W. 8 cl., 2 2-hr. lab.
Prereq.: 605-606, 653.
The physiology of nutrition, growth, and reproduction of fungi. Gray.

725 Physiological Methods
A. 8 lab. hrs.
Prereq. or concurs.: 605-606.
Not open to students with credit for 633.
Selected research techniques dealing primarily with respiration, photosynthesis, and associated metabolic phenomena. Burley, Platt, Swanson, Zabka.

730 Physiological Methods
W. 6 lab. hrs.
Prereq. or concurs.: 605-606.
Not open to students with credit for 632.
Selected research techniques dealing primarily with solution culture, sterile tissue culture, hormone assay, ion uptake, osmotic relations, and physiological reactions. Burley, Platt, Swanson, Zabka.

734 Advanced Plant Physiology: Metabolism
A. 3 cl.
Advanced study of selected topics, mainly respiration, metabolic synthesis, absorption, and utilization of mineral salts, metabolism of growth substances, photosynthesis, and translocation. Platt.

735 Advanced Plant Physiology: Growth
W. 3 cl.
Prereq.: 605-606.
Not open to students with credit for 634.
The physiology of growth and reproduction. Special attention given to the interrelated effects of internal and external factors on these processes. Meyer, Swanson.

737 Plant Cytology
Sp. 3 2-hr. lab.
Prereq.: 605-606.
Colloidal chemistry and structure of cell organelles living and fixed. Ontogeny, structure, division, and fusion of plant cells. Chromosome behavior, structure, and mutation; the gene. Lampe.

751 Nematode Diseases of Plants
A. 2 cl., 2 2-hr. lab., several Saturday field trips.
Prereq.: 519 or 671.
Bionomics and control methods of representative plant diseases caused by nematodes. Methods used in studying plant parasitic nematodes. Smith.

754 Advanced Mycology
Sp. 3 2-hr. lab.
Prereq.: 653.
Advanced detailed study of specific groups of fungi, with emphasis on their morphology, cytology, and genetics. Gray.

757 Experimental Taxonomy
A. 3 cl., 2 3-hr. lab., several Saturday field trips.
Prereq.: 406 or 664 and Zool. 604 or Biol. 604.
Biometric categories, population analysis of mass collections, individual variations, hybridization, and introgression are studied in relation to the methods and materials of experimental taxonomic research. Fisher.

810 Botanical Colloquium
A, W, Sp, Su.
Repeateable.

815 Seminar in Plant Pathology
Repeateable.
Allison, Ellett, Troxel, Smith.

820 Seminar in Plant Physiology
Repeateable.
Meyer, Swanson, Platt, Burley, Zabka.

825 Seminar in Plant Ecology
Prereq.: 601.
Repeateable.
Gilbert, Kilgoff.

830 Seminar in Lichenology
Sp. 2 cl.
Repeateable.
Current problems in lichen symbiosis, morphology, taxonomy, ecology, and physiology. Rudolph.

835 Seminar in Plant Taxonomy
Repeateable.
Fisher, Weikhardt.

850 Principles of Plant Pathology
W. 3 3-hr. cl.
Prereq.: 650 or 651, or 652.
The basic factors governing the development of plant diseases, including host-parasite relationships, effect of environment on disease development, and the nature of disease resistance. Allison.

560 History of Botany
Sp. 3 cl.
Prereq.: 401-402 or 403 or 672, 10 additional cr. hrs. Biol. 5c.
A brief survey of the fundamental discoveries that have led to modern concepts in plant science. Rudolph.

896 Interdepartmental Seminar in Polar and Alpine Studies
Sp.
(See under Interdepartmental Seminars)

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

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

950 Research in Botany
Research for thesis and dissertation purposes only.

G 1

A-29
Business Organization

Office: 352, 354 Hagerty Hall, 1775 South College Road.

PROFESSORS: TMINER (Chairman), TBAETELS, TCRAGS, IICULLMAN, TDAVIDSON, IJ, H. DAVIS, IDONALDSON, IHICKS, IJDOUG, ILEAND, ILEF, IPAHL, ISQUANTUS, TSCHLEDNER, TSTODD, and ISTONE; ASSOCIATE PROFESSORS TABRAMOWITZ, ITALLEN, IBICEHLAUP, IBLACK, TBDONNER, IDOODY, IFENEL, IFPLETCHERS, IHESKETT, TGODDELL, THOWELL, TMEOCKEL, TMORGENROTH, IN, G. RIDDLE, ITUTURE, IVELMAN, and IWKINS; ASSOCIATE PROFESSORS: BIELING, CAMERON, IPPOSTER, ILESHER, MIJUS, IMSITH, and ISTERN.

401 Introduction to Business
Su, A, W, Sp. 5 cl.
Prereq.: 1st or 2nd yr. standing.
Introduction to principles of marketing, finance, management, and other business subjects. Designed to provide a broad background for advanced courses. Goodell and Staff.

500 Personal Adjustment to Business
A, W. 1 cl.
Prereq.: 4th yr. standing.
Basic principles and procedures relating to preparation of job campaigns and career blueprints; factors facilitating the adjustment from school to business. Frances.

504 Business Communications
A, W, Sp. 3 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 506 or 507, and 3rd yr. standing.
Principles of writing in business letters and reports and internal communications. Selling, buying, collecting, adjusting, credit granting, etc., by mail. Hicks and Staff.

510 Secretarial Work
A. 5 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 506 or 507, Ed. 403 and 406.
Theory and practice of secretarial fundamentals; duties, responsibilities, procedures, and techniques of secretarial work. Hicks.

551 Personal Finance
A, W, Sp. 3 cl.
Prereq.: Sophomore standing.
Not open to students in the College of Commerce and Administration majoring in either Accounting or Finance.
Credit, borrowing money, saving money, bank relationships, buying government bonds, insurance, annuities, real estate, corporate bonds and stocks, and problems of taxation and wills. Donaldson, Pfahl, Goodell, Foster.

614 Business Statistics
W. 3 cl., 1 2-hr. lab.
Prereq.: Econ. 532 or 542 or Soc. Work 511.

615 Industrial Statistics
A, Sp. 3 cl.
Prereq.: Econ. 532 or 542.
The application of statistical methods to the design and analysis of experiments, with a view to planning, organizing, and controlling the output of industry. Abramowitz, Black, Kindig.

618 Risk and Insurance
Su, A, W, Sp. 3 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 506 or 507.
Economic theory of risk, its significance and treatment; theory and practice of property, liability, life and health insurance. Bickelhart, Roeser.

621 Business Law; Contractual Relationships
Su, A, W, Sp. 3 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not for graduate credit for majors in Bus. Org. or Acc.

622 Business Law for Engineers and Architects
W, Sp. 3 cl.
Not open to students in the College of Commerce and Administration.
Study of legal problems affecting professional engineers and architects, with special reference to the fundamental principles governing contractual agreements. Wilkins.

623 Business Law: Agency and Partnerships
A, W, Sp. 3 cl.
Prereq.: 621.
Not for graduate credit for majors in Bus. Org. or Acc.
Legal principles and cases analyzed relating to representation of principals by agents, and to the formation, operation, and dissolution of partnerships. Craig, Wilkins.

625 Business Law: Commercial Paper and Sales
Su, A, W, Sp. 3 cl.
Prereq.: 621.
Analysis of cases and provisions of the Uniform Commercial Code relating to commercial paper, including checks and notes; sales of personal property and related transactions. Ley, Howell, Velman.

627 Business Law: Corporations
A, W, Sp. 3 cl.
Prereq.: 621.
Analysis of legal principles and cases governing the formation, operation, and dissolution of corporations. Craig, Ley.

633] Governmental Agencies and Business
W. 3 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 506 or 507 and 3rd yr. standing.
A study of the policies and procedures of the various agencies created by federal, state, and local governments to promote and regulate business enterprise.

642 Real Estate and Urban Land Economics
A, W, Sp. 3 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 506 or 507.
A survey of the field, including valuation, markets, public influence, city analysis, financing and administration. The decision-making process regarding land resource utilization is emphasized. Velman, Smith.
BUSINESS ORGANIZATION

643 Real Estate Finance U G 3
A. 3 cl.
Prereq.: 942.
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. Stone, Smith.

645† Trade Associations U G 3
Sp. 3 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 508 or 507.
The nature and functions of trade associations and their relationship to business and to government.

646 Real Property Valuation U G 3
Sp. 3 cl.
Prereq.: 642.
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.

647 Real Estate Administration U G 3
Sp. 3 cl.
Prereq.: 642.
Administration of real estate businesses in the performance of economic functions. Operations of brokerage, development, construction, management, and financing firms are considered. Smith.

649 Real Property Law U G 3
W. 3 cl.
Prereq.: 642.
Legal principles affecting land utilization and value; interests, instruments, transactions, participants, relationships, and licensing regulations. Veilman.

650 Corporation Finance U G 5
Su, A, W, Sp. 5 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 508 or 507 and Acc. 402 or 405 or 412 or 502 or 510.
Not open to students with credit for 640 except by permission of instructor.
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. Donaldson, Riddle, and Staff.

651 Financial Management U G 3
Su, A, W. 3 cl.
Prereq.: 650.
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. Fhahl, Stone, Foster.

652 Problems in Business Finance U G 3
A, Sp. 3 cl.
Prereq.: 650.
Specific problems which involve the financial policies and operations of industrial companies. Donaldson, Fhahl.

655 Principles of Investment U G 3
A, W, Sp. 3 cl.
Prereq.: 650.
Nature and types of investments; objectives and programs; prices and yields; timing; taxes; supervision. Donaldson, Riddle, Stone.

657 Security Analysis U G 4
Su, W, Sp. 4 cl.
Prereq.: 650.
Objectives of security analysis; analysis of financial statements; principles and standards for selecting bonds and preferred stocks; appraisals and valuation of common stocks. Fhahl, Stone, Lester.

659 Investment Banking and the Capital Market U G 3
Sp. 3 cl.
Prereq.: 650.
The capital market; security offerings; the investment banking business—functions, organization, operation; regulation of security issues; institutional investment policies and practices. Riddle.

660 The Stock Market U G 3
Su, A, Sp. 3 cl.
Prereq.: 650 and Econ. 520.
Practices, procedures, and regulations relating to listing and to buying and selling securities in the organized security markets. Donaldson, Lester.

670 Bank Organization and Management U G 3
A. 3 cl.
Prereq.: 650 and Econ. 520.
Functions of banking, loan and investment policy, bank organization, operation, regulation, and supervision. Goodell.

674 Savings and Trust Institutions U G 3
W. 3 cl.
Prereq.: 650 and Econ. 520.
Operations, regulation, and economic significance of savings and loan associations, saving banks, trust companies, and other financial institutions. Goodell, Foster.

676 Principles of Management U G 3
Su, A, W, Sp. 3 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 506 or 507 and Acc. 402 or 412 or 502.
Not open to students with credit for 680.
An intensive examination of the basic fundamentals of organization and management underlying the solution of management problems. Jucius, Hicks, and Staff.

677 Industrial Organization and Management U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 676, Econ. 542.
Not open to students with credit for 680.
Plant location, product and process planning, materials handling, physical facilities, production control, quality control, inventory control, utilization of materials and personnel in industrial organization. Abramowicz, Black, and Staff.

682 Supervisory Management U G 3
A, W. 3 cl.
Prereq.: 677.
Managerial, technical, and human relations functions and responsibilities of the first level of management as exemplified by the foreman and supervisor. Jucius, Schröder, Milua.

685 Purchasing, Stores, and Inventory Control U G 3
A, W. 3 cl.
Prereq.: 615, 677.
Objectives, principles, and methods of managing the function of procurement and of supply. Planning of materials requirements, purchasing, receiving, storing, and disbursing. Hicks, Black.
<table>
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
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Prereq.: 678.  
Not open to students with credit for 689.  
Principles and practices of line and staff executives in managing the procurement, development, maintenance, and utilization of an effective and satisfied working force.  
Jucius, Behling, Mithas. |
| 687         | Production Organization and Management                                | UG 4    | A, W, Sp. 4 cl.  
Prereq. or concur: 685.  
Examines the problem of coordinating sales, finance, and various technical staff services with the line function of production and its requirements.  
Abramowitz, Black. |
| 691         | Office Organization and Management                                    | UG 3    | A, W, Sp. 3 cl.  
Prereq.: 678.  
The planning, organizing, and controlling of office work; office standards, business forms, selection of business machines, analysis of office methods.  
Hicks. |
Prereq.: 686 or 689.  
Problems and case histories are utilized to develop proficiency in applying principles and developing decision-making powers in regard to personnel and human relation areas.  
Jucius, Schleider. |
| 693         | Wage and Salary Administration                                        | UG 3    | Su, W. 3 cl.  
Prereq.: 686.  
Examination of problems of equitable compensation plans, alternative methods of compensation, wage and salary differentials, staff relationships, and administrative methods of compensation.  
Jucius, Behling, Mithas, Kinding. |
| 695         | Industrial Relations Management                                       | UG 3    | W, Sp. 3 cl.  
Prereq.: 686.  
Examination of managerial and organizational aspects of employee relations arising out of relations with unions, negotiation of contracts, living with contracts, and pertinent legislative matters.  
Jucius, Behling, Mithas. |
| 698         | Problems in Industrial Organization and Management                   | UG 3    | Sp. 3 cl.  
Prereq. or concur: 685, 687.  
Case approach to problem-solving thought in the area of industrial organization and management.  
Black, Abramowitz. |
| 700         | Marketing                                                             | UG 5    | Su, A, W, Sp. 5 cl.  
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 506 or 507.  
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 and Staff. |
| 702         | Managerial Marketing                                                  | UG 3    | A, Sp. 3 cl.  
Prereq.: 700.  
Marketing policies and strategy. Product planning, pricing, distribution, promotion, and service from the marketing manager's viewpoint.  
J. H. Davis, Stern. |
| 704         | Marketing Research                                                    | UG 4    | Su, A, W, Sp. 4 cl.  
Prereq.: 700 and Econ. 522 or 542.  
The role of research in the solution of marketing problems. Emphasis is on available data analysis and methods of the field investigation.  
Miner, Morgenroth, Engel, Stern. |
| 705         | Retailing                                                             | UG 4    | A, W, Sp. 4 cl.  
Prereq.: 700 and Acc. 402 or 405 or 412 or 502 or 510.  
Principles and methods of management as applied to retailing, including location, organization, personnel, buying, inventory control, selling and advertising, services, expenses, and profits.  
Davidson, Dooday. |
| 706         | Wholesaling                                                           | UG 4    | A, W, Sp. 4 cl.  
Prereq.: 700 and Acc. 402 or 405 or 412 or 502 or 510.  
Nature, history, institutional compositions, competitive factors, economic and governmental aspects; scientific management of wholesale establishments, including functions of sales, internal operations, and operating expense control.  
Davidson, J. H. Davis. |
| 707         | Retail Merchandising and Control                                      | UG 3    | Sp. 3 cl.  
Prereq.: 705, and Econ. 522 or 542.  
Planning and analysis with reference to merchandise and expense budgets, pricing, purchase planning, buying techniques, stock control, and related phases of operation in retailing institutions.  
Davidson, Dooday. |
| 708         | Problems in Marketing Research                                        | UG 3    | Sp. 3 cl., 1 2-hr. lab.  
Prereq.: 704.  
Intensive problem-oriented study of selected areas of marketing research to meet the needs of students having a professional interest in such research.  
Miner, Morgenroth. |
| 709         | Credits and Collections                                               | UG 4    | A, W, Sp. 4 cl.  
Prereq.: 700 and Acc. 402 or 405 or 412 or 502 or 510.  
Credit: control.  
Barretts, Miner, Morgenroth. |
| 712         | Sales Management                                                      | UG 4    | A, W, Sp. 4 cl.  
Prereq.: 675, 700, Acc. 402 or 405 or 412 or 502 or 510.  
Management of sales function of a firm. Organization, forecasting, sales planning, setting territories and quotas, management of sales force, sales, and cost analysis.  
J. H. Davis, Cullman. |
| 716         | Principles of Advertising                                            | UG 4    | Su, A, W, Sp. 4 cl.  
Prereq.: 700.  
Management of advertising by clients and agencies. Budgeting, research, media selection, preparation of advertisements, economic and social effects of advertising.  
Cullman, Engel. |
720  International Marketing  U G 3  
A.  3 cl.  
Prereq.: 700.  

721  International Marketing  U G 3  
W.  3 cl.  
Prereq.: 720.  
Application of marketing management principles to international business problems. Comparative marketing analysis of selected countries. Barret.

722  Advertising Management and Policies  U G 3  
W, Sp.  3 cl.  
Prereq.: 718.  
Critical analysis of perennial problems such as advertising budgets, client-agency relationships, advertising account management, administration and control, media planning. Cullman.

725  Field Work in Business Organization  U 1-3  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 6 cr. hrs.  
Internships may be approved in the following fields of business enterprises:  
a. Finance. Donaldson and Staff.  
b. Real Estate. Smith and Staff.  
c. Insurance. Leg, Bickelhaupt.  
d. Marketing. Miner and Staff.  
e. Banking. Goodell.  
f. Industrial Management. Abramowitz and Staff.  
g. Personnel Management. Jecius and Staff.  
h. Transportation. Heskett.  
i. Advertising. Cullman and Staff.  
j. Retailing. Davidson, Doody, and Staff.

729  Marketing  G 3  
A, Sp.  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. J. H. Daets, Doody.

730  Corporation Finance  G 3  
W, Sp.  3 cl.  
Prereq.: Permission of instructor.  
Open only to students preparing for graduate work in business.  
A critical study of the field of Corporation Finance from an economic point of view. Foster, Goodell.

749  Seminar in Real Estate  G 3  
W.  3 cl.  
Prereq.: 642 plus one of the following: 643, 646, 647 or 649.  
Issues and problems in the economics and administration of real estate resources critically examined through an intensive investigation of the literature. Smith, Stone.

750  Transportation Management  U G 3  
Sp.  3 cl.  
Prereq.: Econ. 676 and 678.  
The management of public and private transportation, considering problems of operations, sales, traffic, finance, personnel relations, and advertising in a service enterprise. Heskett.

752  Industrial and Commercial Traffic Management  U G 3  
W.  3 cl.  
Prereq.: 677, or Econ. 618 or 648 or 672 or 678.  
Organization of traffic management by shippers and carriers. Current problems of rates and services in the transportation of goods by various types of carriers. Heskett.

760  Life and Health Insurance  U G 3  
A.  3 cl.  
Prereq.: Econ. 624.  
Examination of the principles of life and health insurance; its contracts, rates, legal concepts, and agency management. Bickelhaupt.

761  Multiple-line Insurance  U G 3  
A.  3 cl.  
Prereq.: Econ. 624.  
Study of property and liability insurance, including emphasis on the multiple-line concept, its development, organization, basic functions and problems. Bickelhaupt.

764  Business Risk Management  U G 3  
W.  3 cl.  
Prereq.: Econ. 624.  
The development of sound risk and insurance programs for business, including proper case study analysis and treatment of property, liability, life and health risks. Bickelhaupt.

765  Life Underwriting, Group Insurance  U G 3  
and Pensions  
Sp.  3 cl.  
Prereq.: 760.  
Critical analysis of the problems of professional life underwriting and estate planning, and employee benefit programs through group insurance and pensions. Bickelhaupt.

799  Special Problems in Business Organization  U G 1-3  
Prereq.: Graduate or senior standing, or with a 2.5 point average in the field of specialization, and permission of instructor.  
Repeatable.  
a. Finance. Donaldson and Staff.  
b. Real Estate. Smith and Staff.  
d. Marketing. Miner and Staff.  
e. Banking. Goodell.  
f. Industrial Management. Abramowitz and Staff.  
g. Personnel Management. Jecius and Staff.  
h. Transportation. Heskett.  
i. Advertising. Cullman and Staff.  
j. Retailing. Davidson, Doody, and Staff.  
k. Analysis of Theories. Stogdill and Staff.  
l. Quantitative methods. Black and Staff.

800  Principles and Techniques of Research  G 3  
Su, A, Sp.  
Prereq.: 650, 676, 700, Econ. 522 or 542.  
Not open to students with credit for 703.  
Principles of research methods in business and the use of research by management. The scientific method in business, sampling theory, variable analysis, research cases. Miner, Heskett, Morganroth, Engel.
802 Applications of Quantitative Methods in Business
Sp. 3 cr.
Prereq.: 800 and an introductory course in calculus.
Applications of quantitative tools to the solution of recurring business management problems such as break-even points, forecasting, capital budgeting, inventory control, and product mix. Abramowitz, Black, Monganworth.

803 Advanced Finance
Su, W.
Prereq.: 650.
A critical study of internal financial management of business enterprises, based primarily on comprehensive case analyses. Frohli, Stone, Goodell, Foster.

804 Seminar in Finance
Sp.
Prereq.: 650.
Repeatable by permission of instructor.
A critical study of current practices, trends and problems in the field of finance. Donaldson, Stone, Frohli.

812 Physical Distribution Management
A.
Prereq.: 677, 700, Econ. 522 or 542.
Management of movement services and coordination of demand and supply patterns for optimization of physical systems in terms of cost and customer service. Heskett.

813 Advanced Marketing
Su, W.
Prereq.: 700.
A critical study of management of marketing activities in business enterprises, based primarily on comprehensive case analyses. Davidson, J. H. Davis, Dody.

815 Seminar in General Marketing
A.
Prereq.: 700.
A critical study of fundamental principles of marketing. Special emphasis on the historical, macro, social, and theoretical aspects of the subject.

816 Seminar in General Marketing
W.
Prereq.: 815.
Continuation of 815.

817 Seminar in Contemporary Marketing Problems
Sp.
Prereq.: 700.
Repeatable.
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. Bartels, J. H. Davis, Davidson, Miner.

818 Seminar in Specialized Areas of Marketing
W, Sp.
Prereq.: 700.
Repeatable.
Regular class meetings and group discussions of the subject matter embodied by one of the following areas in the field of marketing:

Include letter with number on schedule card.

818A Advertising. Culman.
818B Credits and Collections. Bartels.
818C Marketing Research. Miner.
818D Retailing. Dovidon.
818E Sales Management. J. H. Davis.
818F Wholesaleing.

819 History of Marketing Thought
A.
Prereq.: 700 and permission of instructor.

825 Industrial Consolidations and Mergers
W.
Prereq.: 640 or 650.
Historical and analytical study of industrial consolidation and mergers. Stone.

827 The Security Market
A.
A critical study of the markets for listed and unlisted securities and of the factors influencing security prices. Stone.

829 Seminar in Life and Health Insurance
W.
Critical consideration of current topics of significance in the field of life and health insurance through class discussions and individual research reports. Bickelhaupt.

830 Seminar in Property and Liability Insurance
Sp.
Investigation through class discussion and reports of the current literature on significant topics in property and liability insurance. Bickelhaupt.

833 General Administrative Management
A.
Prereq.: 676, 677.
A seminar dealing with certain management problems of top executives in business organization, such as business objectives, ethics, policy, functions, and executive leadership. Jeutras, Hicks, Schlegner.

834 General Administrative Management
W.
Prereq.: 676, 677.
Deals with such top management problems as organization, structure, staff organization, decentralization, morale, and others. Hicks, Schlegner.

835 Advanced Industrial Management
Su, W.
Prereq.: 677.
A critical survey and examination of the current trends and advanced problems in the organization and management of industrial enterprises. Abramowitz, Black, Kinding.

836 Advanced Office Organization and Management
Sp.
Prereq.: 691.
A critical survey and examination of current trends and advanced problems in the field of office organization and management. Hicks.
CERAMIC ENGINEERING

838 Personnel Relations
A, Sp.
Prereq.: 676.
Analysis of interpersonal relations, personnel programs and policies, communication practices, and morale factors relative to the effect upon productivity, organizational effectiveness, and personal objectives. Jucius, Schleender.

839 History of Management Thought
A.
Prereq.: 676, 677.
Seminar in the historical development of fundamental concepts underlying the theory and practice of modern management. Pioneers in the management fields are discussed. Jucius.

840 Administrative Principles
A, Sp.
Prereq.: 650, 676, 700.
An examination of management fundamentals underlying decision-making with respect to the utilization of basic performance factors in the accomplishment of business objectives. Schleender, Hicks.

841 Business Policy
Su, A, Sp. 3 cl.
Prereq.: Admission to M. B. A. program or 650, 678, 700, Acc. 403 or 412 or 503, 503 or 644, Econ. 522 or 542 and permission of Graduate Committee.
Examination of fundamental factors in organization and management. Major policy decisions are analyzed. Effects of policy decisions on sales, production, personnel, and finances are investigated. Senior Staff.

845 " Theory of Business Logistics
Sp.
Prereq.: Permission of instructor.
History of the development of logistics systems; an examination of commonly held hypotheses and other related evidence; discussion of contemporary problems. Reckert.

899 Interdepartmental Seminar
(See under Interdepartmental Seminars.)

950 Research in Business Organization
Research for thesis or dissertation purposes only.

Ceramic Engineering
Office: 196 Lord Hall, 124 West 17th Avenue.
PROFESSORS: EVERHART (Chairman), BLAU, CARRUTHERS (Emeritus), R. KING (Emeritus), and IRUSSELL; ASSISTANT PROFESSORS ALEXANDER, T.B. KING, and HOOK, INSTRUCTOR and LECTURER.

430 Industrial Experience
A.
Ten weeks practical experience or its equiv., including written report, in approved factory manufacturing ceramic wares.

521 Fundamentals of Ceramic Engineering
A. 4 cl., 3 3-5 hr. lab.

630 Junior Inspection Trip
Sp. One week between W. and Sp. Qtrs.
A class visit to various types of ceramic manufacturing plants in Ohio and adjacent states. A written report upon the work of the trip is required. Everhart, Russell.

640 Fundamentals of Ceramic Materials
Sp. 3 cl.
Survey of raw materials, their properties, functions, thermal behavior, and application. Introduction to the concept of glassy and crystalline states. Russell.

650 Ceramic Heat Processes
W. 5 cl.
Drying processes including vaporization, moisture transport, hygrometry, and fluid flow. Firing, sintering, melting, cooking, tempering, and annealing processes. Harrell.

715 Ceramic Materials Science I
A. 4 cl.
Prereq.: Chem. 685, Mineral. 605.
Crystalline bonds, atomic structure, coordination, defect and silicate structures. Glass energy relations. Glass structure and composition related to photelastic, optical, elastic, and mechanical properties. Blau.

716 Ceramic Materials Science II
W. 4 cl.
Prereq.: 715.
Combinations of the glassy and crystalline states. Heterogeneous crystal systems. Interfacial conditions, internal stress states, interstate bonds, micro and macro structure. Blau.

719 Ceramic Process and Product Control
Sp. 4 cl.
Prereq.: 650.
The application of control methods for processes and products. Everhart.

726 The Chemistry and Chemical Processes of Glass Technology
W. 3 cl.
Prereq.: 715, 731.
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. Blau.
COURSES OF INSTRUCTION

CERAMIC ENGINEERING

727 The Physics and Physical Processes U G 4
of Glass Technology
Sp. 4 cl.
Prereq.: 715, 731.

731 Ceramic Technology U G 4
Sp. 2 cl., 2 3-hr. lab.
The technology of glass. Blau.

732 Ceramic Technology U G 4
W. 2 cl., 2 3-hr. lab.
The technology of porcelain enamels and surface coatings for metals. King.

733 Ceramic Technology U G 4
A. 2 cl., 2 3-hr. lab.
The technology of refractories, structural clay products, and abrasives. Harrell.

734 Ceramic Technology U G 4
A. 2 cl., 2 3-hr. lab.
The technology of fine textured ceramics in the area of whitewares, electrical, technical and nuclear materials, and glass coatings. Russell.

740 Ceramic Plant Design U G 5
Sp. 4 cl., 1 2-hr. lab.
The basic concepts of ceramic plant layout and process equipment selection. Kin, drier, and structure requirements. Manufacturing economics. Harrell.

750 Special Problems U G 1-7
Prereq.: Permission of department.
Repeatable to a maximum of 15 cr. hrs.

765 Ceramic Research Methods U G 3
A. 1 cl., 2 2-hr. lab.
Prereq.: 716.
Introduction to research experience; organization and planning; initiating specific research, designed in combination with Ceram. E. 766 to give experience in individual and group research. Eberhart, Russell, Blau.

766 Ceramic Research Methods U G 3
W. 2 3-hr. lab.
Prereq.: 765.
Continuation of Ceram. E. 765 with accent on the conduct of specific research problems. Eberhart, Russell, Blau.

775 Ceramic Case Histories U G 3
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. Eberhart, Blau.

776 Ceramic Case Histories U G 3
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. Russell, Blau.

781 Advanced Ceramic Materials U G 4
Science I
A. 4 cl.
Prereq.: 716 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. King.

782 Advanced Ceramic Materials U G 4
Science II
A. 4 cl.
Prereq.: 716 or permission of instructor.

815 Seminar in Ceramic Engineering G 1-5
Prereq.: Permission of instructor.
Conference and reports on problems in ceramic science, technology and engineering. Topics are chosen to cover the development of the ceramic industry. Eberhart, Russell, Blau, Koenig, King, Alexander.

821 Advanced Ceramic Physics and Chemistry G 4
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.

822 Advanced Ceramic Physics and Chemistry G 4
Sp. 4 cl.
Prereq.: Permission of instructor.
Special properties of crystals; organic chemistry, ultrasonics, and thermodynamics applied to ceramics; non-oxide ceramics. Alexander.

831 * Advanced Glass Science G 4
W. 2 cl., 2 3-hr. lab.
Prereq.: 731, Chem. 683.
The coordination of composition and physical treatment for attaining desired properties in glass. Detailed consideration is given to special glasses. Blau

832 * Physical Vitreology G 4
Sp. 4 cl.
Prereq.: 731, Chem. 683.
Advanced study of the concepts of the glassy state. Theories of random space networks, energy relations, thermal effects, phase equilibria, and X-ray diffraction studies. Blau.

841 Advanced Ceramic Science G 4
W. 4 cl. or conf.
Prereq.: 716 or equiv.
Modern engineering materials from viewpoint of ceramic science, and solid state physics. Consideration of electrical and mechanical phenomena related to technical ceramics behavior. Russell.

842 Advanced Ceramic Science G 4
Sp. 4 cl. or conf
Prereq.: 716 or equiv.
Modern engineering materials from viewpoint of ceramic science, Thermal behavior, ceramic-metal systems, sandwich and fiber composites, space material problems, plasma and vapor deposition technology. King.
Chemical Engineering

Office: 121 Chemical Engineering Building, 140 West 19th Ave.
PROFESSORS 1KOFFOLT (Chairman), 1BRODKEY, 1DRYDEN, 1GEANKOPLIS, 1KAY, O'BOURKE (Emeritus), and 1SYVER-SON; ASSOCIATE PROFESSORS 1CORRIGAN, 1SHEETS, 1SLIDER, and 1SMITH; ASSISTANT PROFESSOR 1SWEENEY; INSTRUCTOR and LECTURERS.

501 Chemical Engineering Practice Work U 5
A. 10 weeks approved work experience.
Prereq.: Chem. Eng. 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 yr. in Chem. E. Koffolt.

593 Chemical Engineering and Process U 3
Calculations
A, W. 2 cl., 2 comp. lab. hrs.
Prereq.: Physic 532, Math. 542, and Chem. 522 or permission of instructor.
The application of physico-chemical principles to problems of chemical industry. The emphasis is on graphical methods, stoichiometry, heat, and material balances. Koffolt, Geankoplis, Haering.

594 Chemical Engineering and Process U 3
Calculations
W, Sp. 2 cl., 2 comp. lab. hrs.
Prereq.: 593.
Continuation of 593.

691 Elements of Chemical Engineering— U 3
Transport Phenomena I
A, W. 2 cl., 2 comp. lab. hrs.
Prereq.: 594, concwr. Math. 544, Physics 532 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, Smith, Sweeney.

692 Elements of Chemical Engineering— U 3
Transport Phenomena II
W, Sp. 2 cl., 2 comp. lab. hrs.
Prereq.: 691, Math. 544, Math. 609, or permission of the instructor.
Continuation of transport theory and introduction to radiation as applied to heat transfer. Basic principles will be developed and illustrated with practical problems from chemical engineering practice. Dryden, Brodkey, Smith, Sweeney.

693 Problems in Chemical Engineering U G 2-5
Operations
Su, A, W, Sp. 1 cl., 5-23 lab. hrs.
Prereq.: 692.
Repeatable. Not for graduate credit for students majoring in Chem. E.
Individual or group conferences, library, and laboratory work dealing with fundamental chemical engineering operations. Koffolt, Haering, Sweeney.

704 Inspection Trip U 2
Sp. One week between W. and Sp. Qtrs.
Repeatable.
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 $75. Koffolt, Haering.

719 Elements of Chemical Engineering U G 3
—Transport Phenomena III
A, Sp. 2 cl., 2 comp. lab. hrs.
Prereq.: 692, or equiv., or permission of instructor.
Continuation of the study of transport theory. Emphasis is laid on mass transfer and stageway operations with applied computational problems. Geankoplis, Brodkey, Smith, Sweeney.

720 Chemical Engineering Operations U G 4
W, Sp. 2 cl., 2 comp. lab. hrs.
Prereq. or concur.: 719, Chem. 692 or permission of instructor.
The application of the transport phenomena as fluid, heat and mass transfer to the chemical engineering operations of evaporation, distillation, drying, etc. Koffolt, Smith.

740 Chemical Process Control U G 3
Sp. 2 cl., 4 lab. hrs.
Prereq.: 720 or permission of instructor.
Study of the principles employed in the measurement and control of the physical and chemical variables of chemical processes and applications to control of chemical processes. Geankoplis.

741 Chemical Engineering Operations U G 4-8
Laboratory
Su. 5 cont., 7-10 lab. hrs.
Prereq.: 720-740 or permission of instructor.
The fundamental laboratory course in the chemical engineering operations. Laboratory investigation of the operating characteristics and efficiency of chemical engineering equipment as distillation, drying, filtration, etc. Koffolt, Smith, Haering.

753 Chemical Engineering U G 3
Thermodynamics
A, Sp. 2 cl., 2 comp. lab. hrs.
Prereq.: Chem. 650 or permission of instructor.
Application of the fundamental concepts and laws of thermodynamics to problems of the chemical industry. Stress is laid on computational problem work. Kay, Smith.

754 Chemical Engineering U G 3
Thermodynamics
Su, W. 2 cl., 2 comp. lab. hrs.
Prereq.: 753.
Continuation of 753.

755 Chemical Engineering Kinetics U 3
Sp. 2 cl., 2 comp. lab. hrs.
Prereq.: 720, 754, and Chem. 692.
Chemical and engineering principles for the design and operation of chemical reactors. Kinetic of simple homogeneous systems and introduction to heterogeneous catalysis. Corrigan.
760  Chemical Engineering Economy  U G 3  
A. 2 cl., 3 comp. lab. hrs.
Prereq.: 741 or permission of instructor.
Economic consideration in research, development design, and manufacturing in the chemical process industry. Cost estimation and economic optimization of chemical engineering operations and chemical processes. Corrigan.

761  Chemical Engineering Processes  U G 3  
A. 2 cl., 3 comp. lab. hrs.
Prereq.: 720, 754, concur. 755 and 760 or permission of instructor.
Integration of fundamentals of chemistry, chemical engineering operations, thermodynamics, reaction kinetics, and economics for optimum design and operation of chemical process plants. Dryden, Brokely, Corrigan, Sweeney.

763  Applied Electrochemistry  U G 3  
A. 2 cl., 4 lab. hrs.
Prereq.: Chem. 683 or permission of instructor.
The relationship between electrical and chemical energy as applied to chemical industries will be discussed and illustrated by laboratory work. Syersorn.

765  Introduction to Nuclear Chemical U G 3  
Engineering  
W. 3 cl.
Prereq.: Physics 602 or 615 or permission of instructor.
Introductory survey of reactor engineering, reactor theory and its relation to critical design of reactors and nuclear chemical process equipment, radiation health physics and shielding. Dryden.

766  Nuclear Chemical Engineering  U G 4  
Sp. 3 cl., 3 hr. lab.
Prereq.: 765 or permission of instructor.
Continued from 755 and application of chemical engineering principles to chemical problems in the nuclear field; illustrated by laboratory work with reactors and radioisotopes. Dryden.

770  Chemical Engineering Process  U G 4  
Development  
W. 1 cl., 11 lab. hrs.
Prereq.: 741, 760, 761 or equiv.
Library, laboratory and pilot plant research and development on chemical processes of industrial potential justified by preliminary economic studies; preparation of optimum process flow sheets, plant design studies. Dryden, Corrigan, Syersorn, Sweeney.

772  Chemical Engineering Process  U G 3  
Design  
Sp. 1 cl., 2 4-hr. lab.
Prereq.: 770.
Based on processes developed in 770; equipment design, process control, plant location studies, economic evaluation of project. Work coordinated with Engr. Dr. 785. Syersorn, Wilter.

777  The Profession of Chemical Engineering  U 1  
A. 1 cl.
Prereq.: Chem. E. 5th yr. standing.
The code of ethics of the chemical engineer, professional registration, responsibilities to the society of the profession, to management, to labor, and as an administrator. Kofolt.

790  Analysis and Organization of Special U 2  
Project Problem Investigations  
W. 6 hrs. conf. and lab.
Prereq.: Chem. E. 5th yr. standing.
Analysis of definite problems having the theoretical and practical application to the chemical industry; individual effort guided by a chemical engineering staff member. Syersorn, Haering.

791  Special Project Problem  U G 5 or 6  
Investigations  
Su, A, W, Sp. 15 hrs. conf. and lab.
Prereq.: 790 or permission of instructor. Repeatable.
Solution of study problems, either new or continued from 790. Extensive theoretical and/or experimental work is followed by a comprehensive report.

801  Advanced Special Problems in  G Arr.  
Chemical Engineering  
Su, A, W, Sp. Conf., library and/or lab.
Prereq.: Satisfactory course in the field of the problem undertaken. Repeatable.
A minor problems course covering the chemical engineering operation, instrumentation, thermodynamics, kinetics, the transport fields, and chemical technology.

815  Advanced Chemical Engineering  G 3  
Science and Applications  
A, W, Sp. 3 cl.
Prereq.: Chem. Engr. grad. standing or permission of instructor. Repeatable to a maximum of 21 cr. hrs.
This series of courses presents advanced concepts of science and engineering as applied to the chemical engineering field under various topics. Kofolt, Syersorn, Geankoplie, Dryden, Brokely, Corrigan, Sweeney.

815A  Advanced mass transfer—I.  
815B  Advanced mass transfer—II.  
815C  Advanced binary and multicomponent distillation.  
815D  Extraction, azeotropic and extractive distillation.  
815E  Advanced heat transfer—I, conduction, radiation and convection.  
815F  Advanced heat transfer—II, conduction, boiling, design applications.  
815G  Drying, humidification and dehumidification.  
815H  Advanced momentum transfer—I, basic theory and laminar flow.  
815I  Advanced momentum transfer—II, turbulence.  
815J  Advanced momentum transfer—III, two phase phenomena.  
815K  Advanced combustion principles.  
815L  Advanced instrumentation and process control of chemical plants.  
815M  Design of experiments, data handling and analysis, quality control, linear programming.  
815N  Advanced process and plant design.  
815O  New or unusual chemical engineering operations such as adsorption, atomization, dialysis, ion exclusion, sublimation.

820  Advanced Chemical Engineering  G 3  
Thermodynamics  
W. 3 cl.
Prereq.: 720, 754, 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. Kay.

821  Advanced Chemical Engineering  G 3  
Thermodynamics  
Sp. 3 cl.
Prereq.: 820.
Continuation of 820.
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Chemical Engineering Kinetics W.</td>
<td>3</td>
<td>720, 735, or permission of instructor.</td>
<td>Continuation of 830.</td>
</tr>
<tr>
<td>Advanced Chemical Engineering Kinetics Sp.</td>
<td>3</td>
<td>830.</td>
<td>G 3</td>
</tr>
<tr>
<td>Advanced Chemical Engineering Processes A.</td>
<td>2-6</td>
<td>2 cl., comp. lab. hrs.</td>
<td>Study of selected chemical engineering processes which involve the application of chemistry, thermodynamics, reaction kinetics, and heat and mass transfer, oxidation, hydrogenation, polymerization, esterification, and halogenation. Corrigan, Brodie, Dryden, Syers, Quincy.</td>
</tr>
<tr>
<td>Advanced Chemical Engineering Operations Laboratory Su.</td>
<td>1-2</td>
<td>A, 1 conf., 5-17 lab. hrs.</td>
<td>Repeatability to a maximum of 15 hrs.</td>
</tr>
<tr>
<td>Seminar in Chemical Engineering</td>
<td>2</td>
<td>2 conf. hrs.</td>
<td>G 2</td>
</tr>
<tr>
<td>Research in Chemical Engineering</td>
<td>G Arr.</td>
<td></td>
<td>G 3</td>
</tr>
</tbody>
</table>

**Chemistry**

**Offices:** Evans Chemistry Laboratory, 88 West 18th Avenue.

**General Chemistry Office:** 115 McPherson Chemistry Laboratory, 140 West 18th Avenue.

**Professors:** Calvert (Chairman), Lippincott (Vice-Chairman), Board (Emeritus), Busch, Chalier, Dryden, HARRIS (Emeritus), HENNE, HINE, Newman, SHECHTER, Taylor, Ivan Winkle, VERHOEK, WATTERS, WHITE, WOLFROM (Research Professor), Associate Professors Collam, FIRESTONE, KURATOV (Emeritus), LACOMBE, Rubin, Shire, Sweet, Assistant Professors: Breunel, GASSMAN, GERKIN, HORTON, LEUSING, MEIK, IONELLETTA, PADW, PAQUETTE, SCHRAM, WOJCICKI.

**404 General Chemistry**

A, W. 3 cl., 3 lab. hrs.  
Prereq.: Engr. 1st yr. standing. One unit of high school Chem. and/or concurs. Math. 401.

Not open to students with credit for 407 or 411.

A general course in the principles of chemistry intended for students in engineering; metallic elements; applications to qualitative analysis. Shone, General Chem. Staff and Assistants.

**405 General Chemistry**

W, Sp. 3 cl., 3 lab. hrs.  
Prereq.: 404.

Not open to students with credit for 408 or 412.

Continuation of 404.

**406 General Chemistry**

A, W. 2 cl., 6 lab. hrs.  
Prereq.: 405.

Not open to students with credit for 405, 409, or 413.

Continuation of Chemistry 405; elementary organic chemistry; non-metallic elements. Busch, General Chem. Staff and Assistants.

**407 Elementary Chemistry**

A, W, Sp. 4 cl., 3 lab. hrs.  
Prereq.: Math 400 or equiv.

Not open to students with credit for 404 or 411.

A course in the principles of chemistry, the chemistry of the more important elements and compounds, including the compounds of carbon (408). For students who require only two quarters of chemistry whether they have had high school chemistry or not and for students who do not present one unit of high school chemistry for entrance to the University. May be followed by 408 to satisfy all first year requirements in chemistry.

**408 Elementary Chemistry**

W, Sp. 4 cl., 3 lab. hrs.  
Prereq.: 407.

Not open to students with credit for 405 or 412.

Continuation of 407.

**409 General Chemistry and Qualitative Analysis**

A, Sp. 3 cl., 6 lab. hrs.  
Prereq.: 408.

Not open to students with credit for 406 or 413.

Designed as a transition course to follow 408 and to prepare students, from that sequence of courses, for second year chemistry.
### COURSES OF INSTRUCTION

#### CHEMISTRY

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
</table>
| 411         | General Chemistry                           | U 5     | Su, A, W, Sp. 3 cl., 4 lab. hrs.  
Prereq.: One unit of high school Chem., and Math. 400 or 401 or its equivo.  
Not open to students with credit for 404 or 407.  
A general course in fundamental chemical principles (411), the chemistry of the most important metals and non-metals (412), and qualitative analysis dealing with the separation and identification of the cations and anions (413). Calvetti, Lippincott,  
General Chem. Staff and Assistants. |
| 412         | General Chemistry                           | U 5     | Su, A, W, Sp. 3 cl., 4 lab. hrs.  
Prereq.: 411.  
Not open to students with credit for 405 or 408.  
Continuation of 411. |
| 413         | General Chemistry                           | U 5     | Su, A, W, Sp. 3 cl., 6 lab. hrs.  
Prereq.: 412.  
Not open to students with credit for 406 or 409.  
Continuation of 412. |
| 511         | General Chemistry A                        | U 5     | A. 3 cl., 4 lab. hrs.  
Prereq.: Superior performance on placement examination, Math. 401 or equivo.  
An honors course. The principles of chemical measurement (511), the properties of matter and qualitative analysis (512), systematic chemistry of the elements (513). Lippincott and Assistants. |
| 512         | General Chemistry W                        | U 5     | W. 3 cl., 4 lab. hrs.  
Prereq.: 511.  
Continuation of 511. |
| 513         | General Chemistry Sp.                      | U 5     | Sp. 3 cl., 4 lab. hrs.  
Prereq.: 512.  
Continuation of 512. |
| 521         | Quantitative Analysis Su (1st term)         | U 3 or 4| A, W, Sp. 2 cl., 5 to 8 lab. hrs.  
Prereq.: 406, 409 or 413, or equivo.  
Not open to students with credit for 421.  
A general course in quantitative analysis; gravimetric and volumetric analysis. Coley, Watters, Swett, Collat, Lanning, and Assistants. |
| 522         | Quantitative Analysis Su (2nd term)         | U 3 or 4| W, Sp. 2 cl., 5 to 8 lab. hrs.  
Prereq.: 521.  
Not open to students with credit for 422.  
Continuation of 521. |
| 523         | Quantitative Analysis                      | U 3 or 4| Sp. 2 cl., 5 to 8 lab. hrs.  
Prereq.: 522.  
Not open to students with credit for 423.  
Continuation of 522.  
Instrumental methods of analysis. |
| 524†        | Problems in Quantitative Analysis          | U 2     | Sp. 2 cl.  
Prereq.: 522 or 532, or equivo.  
Calculations in quantitative analysis and the interpretation of analytical data. Watters. |
| 531         | Quantitative Analysis A                    | U 5     | A. 3 cl., 8 lab. hrs.  
Prereq.: 406, 409, or 413 or equivo.  
Not open to students with credit for 431.  
The fundamental course in quantitative chemical analysis for students majoring in chemistry. Watters and Assistants. |
| 532         | Quantitative Analysis W                    | U 5     | W. 3 cl., 8 lab. hrs.  
Prereq.: 531.  
Not open to students with credit for 432.  
Continuation of 531. |
| 533         | Quantitative Analysis Sp.                  | U 5     | Sp. 3 cl., 8 lab. hrs.  
Prereq.: 532.  
Not open to students with credit for 433.  
Continuation of 533. |
| 551         | Organic Chemistry                          | U 5     | A. Sp. 3 cl., 8 lab. hrs.  
Prereq.: 406, 409, or 413, or equivo.  
Not open to students with credit for 451.  
A general introductory course in organic chemistry, including laboratory preparations, arranged for students preparing for dentistry, optometry, veterinary medicine, medical technology, and pharmacy. Henne and Assistants. |
| 552         | Organic Chemistry                          | U 5     | Su, W. 3 cl., 6 lab. hrs.  
Prereq.: 551.  
Not open to students with credit for 452.  
Continuation of 551.  
Henne and Assistants. |
| 630         | Recent Advances in Chemistry               | U G 5   | Su, A. 5 cl.  
Prereq.: Academic Year Science Institute students only.  
30 cr. hrs. of Chem.  
Not for graduate credit to students majoring in Chemistry.  
A course designed for high school science teachers. Recent developments in the theory of valence, particle nature of matter, colloids, high polymers, nuclear chemistry, fuels and plasticsynthesis. Lippincott. |
| 631         | Radiochemistry                             | U G 3   | Sp. 1 year Summer Institute only. 4 cl. each week.  
Prereq.: Academic Year Science Institute students only.  
3 year college Chem., 1 year college Physics.  
Not for credit to students majoring in Chem.  
The properties of nucleus, selection and preparation of isotopes for tracer work, the application of radioactive isotopes to chemical problems. Swett. |
| 647         | Organic Chemistry                          | U G 3   | A, Sp. 5 cl.  
Prereq.: 413 or 409.  
Not for graduate credit to students majoring in Chem.  
Not open to students with credit for 451 or 551.  
A fundamental course in organic chemistry designed for students preparing for medicine or high school teaching. |
| 648         | Organic Chemistry                          | U G 3   | Su, W. 3 cl.  
Prereq.: 647.  
Not for graduate credit to students majoring in Chem.  
Not open to students with credit for 452 or 552.  
Continuation of 647. |
649 Organic Chemistry Laboratory U G 3
A. Sp. 9 lab. hrs.
Prereq. or concur.: 647.
Not for graduate credit to students majoring in Chem.
Not open to students with credit for Chem. 451 or 551.
A preparation of a series of typical organic compounds, such as are studied in 64T-648, their purification and a study of their properties.

650 Organic Chemistry Laboratory U G 3
Su, W. 9 lab. hrs.
Prereq.: 649.
Not for graduate credit to students majoring in Chem.
Not open to students with credit for 452 or 552.
Continuation of 649.

655 Organic Chemistry U G 3
A. 3 cl.
Prereq.: 413 or 409.
Not open to students with credit for 451, 551 or 647.
Not for graduate credit to students majoring in Chem.
A fundamental course in chemistry designed for Chem. majors and chemical engineers. Henne, Sheetter and Assistants.

656 Organic Chemistry Laboratory U G 3
A. 6 or 9 hrs. lab.
Prereq. or concur.: 655.
Not open to students with credit for 451-452 or 649-650.
Not for graduate credit to students majoring in Chem.
The preparation, purification, characterization, and study of the properties of typical organic compounds. Henne.

657 Organic Chemistry U G 3
W. 3 cl.
Prereq.: 655.
Not open to students with credit for 453, 553, or 648.
Not for graduate credit to students majoring in Chem.
Continuation of 655.

658 Organic Chemistry Laboratory U G 3
W. 6 or 9 hrs. lab.
Prereq.: 656 or concur: 657.
Not open to students with credit for Chem. 451-452.
Not for graduate credit to students majoring in Chem.
Continuation of 658.

659 Organic Chemistry U G 3
Sp. 3 cl.
Prereq.: 657.
Not for graduate credit to students majoring in Chem.
Continuation of 657.

660 Organic Chemistry Laboratory U G 3
Sp. 6 or 9 hrs. lab.
Prereq.: 655 or concur: 659.
Not open to students with credit for Chem. 451-452 or 649-650.
Not for graduate credit to students majoring in Chem.
Continuation of 658.

670 Physical Chemistry U G 5
Sp. 5 cl.
Prereq.: 648-650 or 657-658, or equiv. Math. 418, and Physics 413 or equiv.
Not for graduate credit to students majoring in Chem.
A non-mathematical study of the fundamental principles of physical chemistry arranged for students in the biological sciences or in other non-mathematical fields. VanWinkle.

681 Physical Chemistry U G 3
A. 3 cl.
Prereq.: 533 or 533 or equiv., Physics 411-413 or 531, 532, 533 and Math. 528 or 543. 691 concur recommended.
Not for graduate credit to students majoring in Chem.
The fundamental course in physical chem. Calsert, Harris, VanWinkle, MacWood, D. White.

682 Physical Chemistry U G 3
W. 3 cl.
Prereq.: 681. 692 concur recommended.
Not for graduate credit to students majoring in Chem.
Continuation of 681.

683 Physical Chemistry U G 3
Sp. 3 cl.
Prereq.: 682. 693 concur recommended.
Not for graduate credit to students majoring in Chem.
Continuation of 682.

689 Introduction to the Theory of Chemical Equilibrium U G 4
Sp. 4 cl.
Prereq.: 406 or equiv., Math 543 and 608 or equiv., and Physics 614.
Not for graduate credit to students majoring in Chem.
Introduction to the thermodynamic and statistical theory of chemical equilibrium with applications to ideal gas and pure liquid and solid phases. MacWood.

690 Physical Chemistry Laboratory U G 3
A, Sp. 1 cl., 8 lab. hrs.
Prereq. or concur.: Chem. Expr. 3rd yr. standing. 670 or 693 or equiv.
Rubin, MacWood and Assistants.

691 Physical Chemistry Laboratory U G 2
A, W, Sp. 6 lab. hrs.
Prereq. or concur.: 681.
Quantitative measurements of phenomena of chemical interest and the application of chemical principles to their interpretation. D. White, MacWood, and Assistants.

692 Physical Chemistry Laboratory U G 2
A, W, Sp. 6 lab. hrs.
Prereq.: 691 or concur.: 682.
Continuation of 691.

693 Physical Chemistry Laboratory U G 2
A, W, Sp. 6 lab. hrs.
Prereq.: 692 or concur.: 683.
Continuation of 692.

701 Minor Problems in Chemistry U G 1-15
Prereq.: Satisfactory courses in field of the problem and permission of instructor. Repeatable.
A qualified student may conduct a minor investigation in Chemistry.

721 Advanced Analytical Chemistry U G 3
A. 3 cl.
Prereq.: 533, 648, 683, or equiv.
The principal topics are standards, sampling, special gravimetric methods, new titration methods, and separations, with special reference to the exact analysis of complex inorganic materials. Caley.
722 Advanced Instrumental Analysis U G 4
W. 2 cl., 6 lab. hrs.
Prereq.: 553, 653, or equiv.
Potentiometric and conductometric titration, pH determinations and the application of high frequency oscillator systems to chemical analysis. Collin, Leising.

723 Advanced Instrumental Analysis U G 4
Sp. 2 cl., 6 lab. hrs.
Prereq.: 722.
A continuation of 722 and including electrolytic analysis, coulometric analysis, and polarography. Collin, Leising.

726 Inorganic Micro Analysis U G 4
Sp. 2 cl., 6 lab. hrs.
Prereq.: 533 or 533, 663, or equiv.
Application of micro and microscopic methods to common chemical problems. Watters, Sweet, Leasing.

728 Spectroscopic Analysis U G 4
A. 2 cl., 6 lab. hrs.
Prereq.: Physics 412 or equiv.
Application of the emission spectograph to qualitative and quantitative analysis for the elements in metallurgical and biological materials. Watters.

729 Chemical Spectrophotometry U G 4
W. 2 cl., 6 lab. hrs.
Prereq.: Physics 412 or equiv.
Application of infrared, visible and ultraviolet spectrophotometers to problems involving inorganic and organic molecular structure, analysis, equilibria, and reaction rates. Watters.

742 Organic Micro Quantitative Analysis U G 4
A. 1 cl., 9 lab. hrs.
Prereq.: 533 or 433, 648-650, or 657-658, or equiv.
Quantitative organic analysis using micro methods. The common determination of organic quantitative analysis are studied. Sweet and Assistants.

751 Nuclear, Radio, and Radiation Chemistry U G 3
A. 3 cl.
Prereq.: 683 or equiv.
Nuclear properties, nature of radioactivity, radioactive decay and growth, interactions of radiation with matter, applications. Firestone.

752 Nuclear, Radio, and Radiation Chemistry U G 3
W. 2 cl.
Prereq.: 751.
Continuation of 751.

753 Nuclear Chemistry Laboratory U G 2 or 3
W. 8 or 9 lab. hrs.
Prereq.: 753 and/or concurs. 753.
Techniques of handling radioactive tracers, the detection and measurement of different types of radiation, neutron activations, and other related laboratory techniques. Firestone, Sweet.

754 X-rays and Crystal Structure U G 4
A. 3 cl., 3 lab. hrs.
Prereq.: Math. 538 or 543, Physics 413 or 533, or equiv.
An introduction to the methods of X-ray crystal analysis. Theory of symmetry of crystals and of diffraction will be discussed and applied. Harris and Assistants.

760 Chemistry of Organic Catalysis U G 3
Sp. 3 cl.
Prereq.: 660 and 680.
Not open to students with credit for 660.
Structure of organic catalysts and the mechanism of their reactions.

761 Advanced Inorganic Chemistry U G 3
Su. A. 3 cl.
Prereq.: 683 or permission of instructor.
An introduction to the concept and chemical systems of inorganic chemistry, including the periodic table, atomic structure, bonding, acid-base theories, co-ordination compounds, solid state, hydrides, organometallic compounds, etc. Shore, Busch, Wojcieck.

762 Advanced Inorganic Chemistry U G 3
W. 3 cl.
Prereq.: 761.
Continuation of 761.

763 Advanced Inorganic Chemistry U G 3
Sp. 3 cl.
Prereq.: 762.
A discussion of special topics in modern inorganic chemistry, including an introduction to the chemistry of substances in non-aqueous solvents, acid-base theory, and inorganic complex compounds. Meeke.

769 Solutions of Electrolytes U G 3
W. 3 cl.
Prereq.: 683.
Electrolytic solutions, the Debye-Huckel theory, the strength of acids and bases in various solvents, solubility of electrolytes in various solvents, and conductivity of solutions of electrolytes. Verhoeck.

772 Inorganic Chemistry Laboratory U G 3
Sp. 9 lab. hrs.
Prereq.: 683 or equiv.
Preparative techniques of inorganic chemistry including the use of liquefied gases, aqueous and non-aqueous solutions, anhydrous and oxygen-free systems, fusion reactions, etc. Shore.

773 Advanced Inorganic Chemistry Laboratory U G 3
Su. 1 cl., 8 lab. hrs.
Prereq.: 691; 692; and 693 or equiv; 761, or permission of instructor.
Advanced methods for the synthesis, purification, identification and characterization of inorganic substances. Shore, Wojcieck.

775 The Phase Rule U G 3
W. 3 cl.
Prereq.: 683, or equiv.
The phase rule and its application to chemical problems. MacWood.

777* Photochemistry U G 3
Sp. 3 cl.
Prereq.: 683, or equiv.
An advanced course covering the experimental techniques used in photochemistry. A detailed discussion will be given to the mechanisms of representative gas reactions which can be initiated by light. Cobert.

782 Chemical Bibliography U G 1
A. 1 cl.
Prereq.: 533 or 533, 452, 648 or 658, or equiv.
The use of chemical library including journals, dictionaries, reference books, and other sources of chemical research. Caley.
784 History of Chemistry U G 2
W. 2 cl.
Prereq.: 533 or 533, 452, 648 or 658, or equiv.
A general course in the history of chemistry with special reference to the development of the theories of the science. Caleg.

794 * Chemistry of the Carbohydrates U G 3
A. 3 cl.
Prereq.: 648 or 657, or equiv.
The occurrence, structure, synthesis, and reactions of the more important mono-, di-, and polysaccharides and their derivatives. Wolfrom.

795 Colloid Chemistry U G 3
W. 3 cl.
Prereq.: 683.

796† Theoretical Electrochemistry U G 3
W. 3 cl.
Prereq.: 683.
A fundamental course in theoretical electrochemistry. Rubin.

797 Oxidation-Reduction Systems U G 3
Sp. 3 cl.
Prereq.: 883 or equiv.

802 Systematic Course in Experimentation G 3
W. 9 lab. hrs.
Prereq.: Chem. grad. standing.
Training in the fundamental techniques of chemical research for graduate students intending to become candidates for the Ph.D. degree. Harris, Taylor, Macwood, D. White and Department Staff.

803 Systematic Course in Experimentation G 3
Sp. 9 lab. hrs.
Prereq.: 802.
Continuation of 802.

821 Chromatography G 3
A. 3 cl.
Prereq.: 842 and 881 or equiv.
The theory and practice of chromatographic processes and their application to problems involving inorganic separations, equilibria and kinetics.

824 Seminar in Analytical Chemistry G 2 or 3
A. 2 cl.

825† Seminar in Analytical Chemistry G 2
W. 2 cl.

826 Seminar in Analytical Chemistry G 2
Sp. 2 cl.

839 High Polymers G 3
Sp.
The chemistry and properties of high polymers including the organic chemistry of their preparation, the kinetics of polymerization and the physical chemistry of their solutions. Verhoeck, VanWinkle.

841 Advanced Organic Chemistry G 3
A. 3 cl.
541-842-843 to be taken in sequence.
An advanced course in the fundamental principles of chemistry covering (841) the aliphatic hydrocarbons and their derivatives. Newman, Shechter, Paquette.

842 Advanced Organic Chemistry G 3
W. 3 cl.
Prereq.: 841.
An advanced course in the fundamental principles of chemistry covering alicyclic, hydroaromatic and aromatic compounds. Newman, Shechter, Paquette.

843 Advanced Organic Chemistry G 3
Sp. 3 cl.
Prereq.: 842.
An advanced course in the fundamental principles of chemistry covering a survey of heterocyclic compounds, carbohydrates, proteins and enzymes. Newman, Shechter, Paquette.

844 Advanced Organic Chemistry Laboratory G 3
Su, Sp. 9 lab. hrs.
Prereq. or concurs. 841 and 842.
An advanced course in fundamental reactions and procedures with emphasis on recent advances in technique. Newman, Gassman.

845 Advanced Organic Chemistry Laboratory G 3
Sp. 8 lab. hrs.
Prereq.: 844.
Continuation of 844.

847 Theoretical Organic Chemistry G 3
A. 3 cl.
Prereq.: 2nd yr. grad. standing, 841-842.


848 Theoretical Organic Chemistry G 3
W. 3 cl.
Prereq.: 847.
Continuation of 847. Fraenkel, Ouellette, Horton.

849 Theoretical Organic Chemistry G 3
Sp. 3 cl.
Prereq.: 848.
Continuation of 848. Fraenkel, Ouellette, Horton.

850 Seminar in Organic Chemistry G 3
A. 3 cl.
Prereq.: Chem. 2nd yr. grad. standing and 841, 842 or equiv.
Topics to be announced.

851 Seminar in Organic Chemistry G 3
W. 3 cl.
Prereq.: Chem. 2nd yr. grad. standing and 841, 842, or equiv.
Continuation of 850. (Topics to be announced.)

852 Seminar in Organic Chemistry G 3
Sp. 3 cl.
Prereq.: Chem. 2nd yr. grad. standing and 841, 842, or equiv.
Continuation of 851. (Topics to be announced.)
COURSES OF INSTRUCTION

CHEMISTRY

853† Seminar in Organic Chemistry G 3
Su.
Prereq.: 852.
Continuation of 852. (Topics to be announced.)

861 Quantum Chemistry G 3
A. 3 cl.
Prereq.: 857 or equivo.
Introduction to quantum theory of molecular energy states. Taylor

862 Quantum Chemistry G 3
W. 3 cl.
Prereq.: 861 or equivo.
Quantum theory of the chemical bond and the structure of molecules and solids.

863 Quantum Chemistry G 3
Sp. 3 cl.
Prereq.: 862.
Continuation of 862.

864 X-ray and Electron Diffraction G 3
Sp. 3 cl.
Prereq.: 754.
An advanced consideration of the theory of X-rays and electron diffractions and their applications including Fourier Methods of parameter determination in crystals, etc. Harris.

866† Seminar in Inorganic Chemistry G 2 or 3
A. 2 cl.
Prereq.: 761 and 762.
The chemistry of non-aqueous solutions and the Lewis acid-base concept. Meek.

867 Seminar in Inorganic Chemistry G 2 or 3
W. 2 cl.
Prereq.: 761 and 762 or equivo.
Busch.

868 Advanced Inorganic Chemistry G 3
A. 3 cl.
Prereq.: 683, 762, or permission of instructor.
A survey of modern theories of valence and their application to the problems of structural inorganic chemistry. Shore.

869 Advanced Inorganic Chemistry G 3
W. 3 cl.
Prereq.: 868.
A detailed treatment of the chemistry of the transition elements from the standpoint of molecular and atomic structure and the mechanisms and equilibria involved in chemical reactions. Meek.

881 Chemical Kinetics G 3
A. 3 cl.
Prereq.: 681-683-683.
A study of the velocity of chemical reactions, with emphasis on reactions taking place in solution. Verhoek.

882 Chemical Kinetics G 3
W. 3 cl.
Prereq.: 881 or equivo.
A study of the velocity of gas reactions in homogeneous and heterogeneous systems, chain reactions. Verhoek.

884† Atomic Structure and Spectra G 3
A. 3 cl.
Prereq.: 683 and Physics 729 and 727.
Atomic structure is treated from the point of view of quantum theory. Topics treated include line and X-ray spectra, energy level diagrams, ionization and resonance potentials. MacWood.

8851* Molecular Spectra and Structure G 3
W. 3 cl.
Prereq.: 647-648 or 635-630, 620 and Physics 728 and 727.
Molecular structure is taken up from the quantum standpoint with particular emphasis on band spectra. MacWood.

887 Thermodynamics G 3
W. 3 cl.
Prereq.: 881 or equivo.
Introduction to thermodynamics. The main objective is training in the use of thermodynamics as a tool for solving chemical problems. MacWood.

888 Thermodynamics G 3
Sp. 3 cl.
Prereq.: 887.
Continuation of 887.

889 Advanced Thermodynamics G 3
A. 3 cl.
Prereq.: 861 or equivo.

890 Seminar in Colloid Chemistry and Electrochemistry G 3
A. 3 cl.
VanWinkle.

891 Seminar in Physical Chemistry G 3
A. 3 cl.
Prereq.: 881, 887-888 or equivo.
MacWood.

892 Seminar in Physical Chemistry G 3
W. 3 cl.
Prereq.: 891.
Taylor.

893 Seminar in Physical Chemistry G 3
Sp. 3 cl.
Prereq.: 892.
Harris.

910 Colloquium in Analytical Chemistry G 0
A discussion of current research in analytical chemistry.

911 Colloquium in Organic Chemistry G 0
A discussion of current research in organic chemistry.

912 Colloquium in Physical and Inorganic Chemistry G 0
A discussion of current research in physical and inorganic chemistry.

950 Research in Chemistry G Arr.
Research for thesis or dissertation purposes only.
Chinese

Office: 415 University Hall, 216 North Oval Drive
ASSISTANT PROFESSORS GRIDER (Chairman, Asian Division); and CHING; INSTRUCTORS HASHIMOTO and LYELL.

401 Elementary Chinese U 5
A. 5 cl.

402 Elementary Chinese U 5
W. 5 cl.
Prereq.: 401.

403 Intermediate Chinese U 5
Sp. 5 cl.
Prereq.: 402.

404 Intermediate Chinese U 5
A. 5 cl.
Prereq.: 403.

505 Chinese Conversation U 3
W. 3 cl.
Prereq.: 404 or permission of instructor.
Practice in conversation on timely topics of the day.

506 Chinese Composition U 3
Sp. 3 cl.
Prereq.: 406 or permission of instructor.
Practice in composing simple writings. Review of vocabulary and grammar.

517 Study Tour of Taiwan U 15
Su. 15 cl., two weeks at OSU; 8 weeks in Taiwan.
Prereq.: 25 cr. hrs. of Chinese 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 will be given daily by the tour leaders.

551 Chinese Literature in English Translation U 3
A. 3 cl.
Introduction to the great literary works of the past several hundred years. These include All Men Are Brothers, The Dream of the Red Chamber, Monkey, Romance of the Three Kingdoms.

571 Elements of Chinese Thought U 3
A. 3 cl.
A survey of the major philosophical trends that have prevailed in China. Discussion of Confucianism and Taoism in their various forms.

609 Advanced Reading, Conversation, and Composition I U G 3
A. 3 cl.
Prereq.: 505 and 506 or permission of instructor.
Reading of contemporary prose and verse, presentation of oral and written reports, drill in tone and intonation, practice in translation. Ching.

610 Advanced Reading, Conversation, and Composition II U G 3
W. 3 cl.
Prereq.: 609 or permission of instructor.
Continuation of 609. Ching.

611 Advanced Reading, Conversation, and Composition III Sp. 3 cl.
Prereq.: 610 or permission of registration.
Continuation of 610. Ching.

624 Chinese Phonetics U G 5
A. 3 cl.
Prereq.: 401 and Ling. 601 or permission of instructor.
A detailed analysis of the sound structure of Chinese dialects, especially Mandarin, and its relation to the sound structure of English.

626 The Structure of the Chinese Language W. 3 cl.
Prereq.: 401 and Ling. 601 or permission of instructor.
An investigation of the syntactic and phonological structure of Mandarin.

627 The History of the Chinese Language Sp. 3 cl.
Prereq.: 626 or permission of instructor.
An investigation of the relations between modern Chinese and its earlier stages, ancient and archaic Chinese.

651 Modern Chinese Literature U G 3
W. 3 cl.
Prereq.: 404.
A survey of Chinese literature of the past half-century. Reading of influential authors such as Lu Syun, Bu Chih, and others.

652 Classical Chinese Literature U G 3
Sp. 3 cl.
Prereq.: 404.
Selected readings from representative authors of classical times.

671 History of Chinese Thought U G 3
Sp. 3 cl.
Prereq.: 571 or permission of instructor.
Detailed examination of the major Chinese philosophical schools. Readings from selected Chinese texts.

695 Private Reading U G 2-5
Prereq.: Permission of department.
Repeatable to a maximum of 10 cr. hrs.

City and Regional Planning

Office: 107 Brown Hall, 110 West 17th Avenue
PROFESSOR: STOLLMAN; ASSOCIATE PROFESSOR: GERCKENS; ASSISTANT PROFESSOR: MILLS, and LECTURERS.

721 Recent History of City and Regional Planning Sp. Graduate standing in City and Regional Planning. Development of City and Regional Planning since 1890; evolution of planning concepts and methods in response to urbanization and resource development; emphasis on American work. Stollman.

A-45
722 Theory of City and Regional Planning  G  
Prereq.: Graduate standing in City and Regional Planning.
Planning processes; the general plan; formulating goals; land development policies and decisions; alternative urban and regional forms; role and scope of planning. Stollman.

742 History of City Planning to 1900  U G 3  
W. 3 cl.  
Prereq.: Senior standing or permission of instructor.
History of city planning from the earliest discovered settlements to the beginnings of contemporary planning. Gerckens.

751 Introduction to Planning Design  G 3  
A. 2 cl., 3 lab. hrs.  
Prereq.: Graduate standing in City and Regional Planning.
Principles and practices of environmental design applied to problems of urban scale; graphic presentation of planning information. Gerckens.

752 Elements of City Planning Practice  G 3  
W. 1 cl., 6 lab. hrs.  
Prereq.: 751; concurs. 763.
Physical components of urban areas; residential, commercial, industrial, pedestrian and vehicular circulation, other community facilities; analysis of design criteria and standards. Gerckens.

753 Elements of City Planning Practice  G 5  
Sp. 2 cl., 6 lab. hrs.  
Prereq.: 752, 763; concurs. 763.
Continuation of 752. Gerckens.

762 City and Regional Planning Analysis  G 5  
W. 3 cl., 6 lab. hrs.  
Concurs.: 753.
Techniques of research and analysis in planning: land-use, employment, population, housing market, transportation studies. Mills.

763 City and Regional Planning Analysis  G 3  
Sp. 2 cl., 3 lab. hrs.  
Prereq.: 762; concurs. 755.
Continuation of 762. Use of forecasts, analytic models; cost-benefit analysis and other tests of planning solutions. Mills.

791 Outlines of Urban Design  U G 3  
A. 2 cl., 3 lab. hrs.  
Prereq.: Graduate standing in City and Regional Planning, or senior standing in Architecture, or permission of instructor.
Elements and criteria of urban design; comparative evaluation of urban design work. Gerckens.

793 Outlines of Regional Planning  G 3  
Sp. 3 cl.  
Prereq.: Graduate standing in City and Regional Planning or in a Conservation program.
State, national and regional planning; components of regional development; regional analysis and design. Stollman.

799 Special Studies in City and Regional Planning  U G 1-5  
Prereq.: Permission of instructor
A. City and Regional Planning History  
B. Planning Theory  
C. Regional Planning  
D. Urban Design  
E. Planning Analysis  
F. Housing  
G. Circulation  
H. Open-space and Recreation

801 Planning Design  G 5  
A. 15 lab. hrs.  
Prereq.: 753, 763.
Preparation of general urban plans. Gerckens.

802 Planning Design  G 5  
W. 15 lab. hrs.  
Prereq.: 801.
Continuation of 801. Gerckens.

803 Planning Design  C’5  
Sp. 15 lab. hrs.  
Prereq.: 802.
Continuation of 803. Gerckens.

821 Land-Use Controls  G 4  
A. 3 cl.  
Prereq.: Graduate standing in City and Regional Planning.
Legal basis of land-use controls in the United States, provisions, procedures and issues in zoning, subdivision regulations, urban renewal, building and housing codes, acquisition of real property for public use. Stollman.

822 City and Regional Planning  G 3  
Administration  
W. 3 cl.  
Prereq.: Graduate standing in City and Regional Planning.
Administration of official planning agencies; professional practice; capital improvement programming. Stollman.

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

950 Research in City and Regional Planning  G Arr.  
Research for thesis purposes only.

Civil Engineering

Office: 228 Civil and Aeronautical Engineering Building, 2036 Neil Avenue.
PROFESSORS: IGRAW (Chairman), IBAKER, I. KARRER, LARGE (Emeritus), MANKS (Emeritus), OJALVO, PRIOR (Emeritus), SHANK (Emeritus), SMITH, and VAN WERK (Emeritus); ASSOCIATE PROFESSORS: I. L. TAYLOR, I. CHEN, I. ROSS, MINTZER, MONTZ (Emeritus), PERRY, and I. SCHWARTZ; ASSISTANT PROFESSORS: LINDLEY, I. MOAVENZADEH, PAGE, I. P. LOFF, SHUMATE, and I. REITZER; and INSTRUCTORS.

412 Elementary Surveying  U 5  
Sp. 3 cl. 2 3-yr. lab.  
Prereq.: Math. 439.
Use and adjustment of instruments, land surveying, leveling, profiles, use of plane table, mapping, and computations. Perts.
502 Surveying I U 5
A. W. 3 cl., 2 3-hr. lab.
Prereq.: Physics 531.

504 Photogrammetry U 4
W. 3 cl., 1 3-hr. lab.
Prereq.: 502.
Fundamental geometry and photogrammetric applications to engineering. Minster.

506 Surveying II U 5
Sp. 3 cl., 2 3-hr. lab.
Topographic mapping, curves, and earthwork. Parts.

604 Structural Analysis I U 4
W. 4 cl.
Stresses in statically determinate frames and trusses. Influence lines, moving loads, space frames. Smith, Ojalvo, Chen.

609 Observational Analysis U G 3
W. 2 cl., 2 3-hr. lab.
Prereq.: 502, Math. 543.
Theory and applications of observational analysis. Parts.

611 Fluid Mechanics U 3
A. Sp. 3 cl.
Fluid properties; fluid statics; viscous and turbulent fluid flow; dimensional analysis and similarity. Shumate.

616 Principles of Hydraulics U G 3
W. 3 cl.
Prereq.: Math. 440, Physics 411 or 531. Not open to students majoring in Civil Engineering.
Basic fluid dynamic concepts with special application to flow through porous media, stream flow measurements, solids transport, and ocean hydrodynamics.

620 Public Health Engineering U 3
W. 3 cl.
Prereq.: Chem. 406 or equiv., concur Microbiol. 607 or equiv.
A study of the human environment from a health engineering point of view, with emphasis on those facets of the health picture which are controllable by engineering developments. Cosens.

622 Soil Mechanics I U 4
Sp. 3 cl., 1 3-hr. lab.
Basic and engineering soil properties; fluid flow through soils; compaction; effective stresses and compression. Mr. Perloff.

623 Civil Engineering Materials U 4
A. 3 cl., 1 3-hr. lab.
Prereq.: 622.
Composition, properties, and production of portland cement concrete, bituminous materials and bituminous mixtures. Morsen-radetz.

624 Transportation I U 4
A. 3 cl., 1 3-hr. lab.
Prereq.: 506.
A study of the development, location, geometric design, economics, finances, and operation of transportation systems. Karrer, Treiberer.

650 City Surveying U 3
Sp. 2 cl., 1 3-hr. lab.
Prereq.: Geod. Sc. 640.
Not open to students with credit for Geod. Sc. 650.
City control surveys, coordinates of lot and block corners. Measurement of details, computation of areas. Setting out city plans.

701 Structural Design II U G 5
W. Sp. 3 cl., 2 3-hr. lab.
Not for graduate credit to students majoring in Civil E.
Basic theory and design of reinforced concrete structures. Large.

703 Principles of Sanitary Engineering I U G 5
W. 5 cl.
Prereq.: 728.
Not for graduate credit to students majoring in Civil E.
Basic principles of water resources including hydrology; reservoirs; design of transmission, distribution, and collection systems; supply and demand rates; statistical methods; construction materials and methods. Cosens.

705 Reinforced Concrete Structures U 4
A. Sp. 4 cl.
Prereq.: 625, 701.
Not for graduate credit to students majoring in Civil E.
Application of principles of structural engineering to the design of footings, retaining walls, and other reinforced concrete structures. Large, Chen.

710 Transportation Planning U G 5
A. 4 cl., 2 3-hr. seminar.
Prereq.: Permission of instructor.
Not 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.

711 Elementary Structural Engineering U G 3
W. 3 cl.
Not open to students majoring in Civil E.

714 Structural Design I U 5
A. 3 cl., 2 3-hr. lab.
Prereq.: 741. Not open to students with credit for 613.
Elastic design of simple steel structures, introduction to plastic design of continuous beams and simple bents. Smith.

715 Timber Design U G 3
W. 3 cl.
Basic properties of and design practice for timber when used as a construction material in engineering structures. Smith.

716 Principles of Sanitary Engineering II U 5
Sp. 5 cl.
Prereq.: 703, 728.
Not for graduate credit to students majoring in Civil E.
Unit operation in water supply and waste water recovery including selection, treatment methods and equipment, and water quality criteria. Cosens.

722 Fundamentals in Traffic Engineering U G 3
A. 2 cl., 1 3-hr. lab.
Prereq.: 624.
An introduction to traffic characteristics, measurements, controls and regulation. Elements in traffic operation, design and planning. Treiberer, Schuwar.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>723</td>
<td>Construction Methods and Equipment</td>
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<td>724</td>
<td>Transportation II</td>
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<td>725</td>
<td>Soil Mechanics II</td>
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<tr>
<td>726</td>
<td>Principles of Foundation Analysis and Design</td>
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<td>728</td>
<td>Applied Hydraulics</td>
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<td>731</td>
<td>Soil Stabilization</td>
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<td>733</td>
<td>Rigid Frame Structures</td>
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<td>734</td>
<td>Advanced Bridge Design</td>
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<td>735</td>
<td>Highway Location and Design</td>
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<td>739</td>
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<td>741</td>
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<td>743</td>
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<td>744</td>
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<td>745</td>
<td>Advanced Civil Engineering III</td>
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<tr>
<td>746</td>
<td>Civil Engineering Applications of Photo-Interpretation</td>
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<td>748</td>
<td>Sanitary Engineering Laboratory</td>
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<td>749</td>
<td>Sanitary Engineering Design</td>
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<tr>
<td>750</td>
<td>Mechanical Properties of Engineering Materials</td>
<td>UG 4</td>
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<tr>
<td>759</td>
<td>Advanced Civil Engineering</td>
<td>UG 3-5</td>
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</tbody>
</table>

**COURSES OF INSTRUCTION**

**CIVIL ENGINEERING**

Selection and management of construction equipment in building of highways, dams, airports, bridges, and structures. Karrer.

Design, construction and maintenance of embankments, drainage structures, and pavements for highways and airports. Karrer, Treitzer.

Stress distribution, shear phenomena, lateral earth pressure, settlement, soil stability. Perloff.

Civil engineering applications of fundamental fluid mechanics principles including pipe and open channel flow, masonry and earth dams, and pumps, with laboratory studies to support the above topics. Coseris, Moulton, Hanna.


Analysis and design of rigid frame concrete structures. Wind stress analysis. Large, Chem.

Stresses in and design of arch bridges. Smith, Ojala.

Geometric design of roads and streets. Determination of alignment, grade, intersections, and traffic capacity of rural roads. Karrer, Treitzer.

Types and chemical composition of asphaltic materials, physical and chemical properties of asphaltic materials and mixtures.


A laboratory study of the sanitary engineering indices pertinent to the control of water, sewage, streams, and industrial waste quality. Hanna, Shumate.

The design of unit operations and processes employed in the field of water supply and waste water including data collection and control instrumentation. Coseris, Hanna.

Structure of liquids and solids, elasticity, plasticity, and flow. viscosity, viscoelasticity, and surface phenomena. Mouazenadeh.

The advanced student is given opportunity to pursue advanced study. Work undertaken may be elected in the following fields of civil engineering:

- Structural Engineering.
- Soil Mechanics and Foundations.
- Sanitary Engineering.
- Highway and Transportation Engineering.
- Geodetic and Photogrammetric Engineering.
805 Structural Design of Pavements  
G 5  
Su., 5 cl.  
Prereq.: 815.  
Stresses in pavements and behavior under moving loads, design of flexible and rigid pavements for highways and airports. Moavenzadeh.

808 Geodesy  
G 3-5  
A. Sp.  
Prereq.: 609 and Math. 608. Civil Engr.: 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 Seepage in Permeable Materials  
G 5  
A. 5 cl.  
Prereq.: 622.  

815 Advanced Soil Properties  
W. 2 cl., 6 lab. hrs.  
Prereq.: 725.  
Detailed study and analysis of the mechanical properties of soils, with applications to foundation behavior. Gray.

816 Soil-Structure Interaction I  
Sp. 5 cl.  
Prereq.: 815.  

817 Slope Stability Theory  
W. 3 cl.  
Prereq.: 725, 810.  

818 Soil-Structure Interaction II  
Sp. 5 cl.  
Prereq.: 815.  

820 Traffic Engineering II  
W. 4 cl., 1 3-hr. lab.  
Prereq.: 851 or equiv.  

821 Traffic Engineering I  
A. 4 cl., 1 3-hr. lab.  
Prereq.: 722 or equiv.  

825 Highway Administration  
Sp. 5 cl.  
Prereq.: 722.  
A study of organization for planning, constructing, maintaining, and operating systems of roads and streets. Karver.

826 Advanced Structural Engineering I  
A. 4 cl., 1 3-hr. lab.  
Prereq.: 741 or equiv.  
Analysis and design of statically indeterminate beams, frames and trusses, using classical methods of analysis. Smith.

827 Advanced Structural Engineering II  
(Reinforced Concrete)  
W. 5 cl.  
Prereq.: 733.  
Effect of shrinkage and creep upon stress and deflection. Ultimate strength design of members, and moment redistribution. Prestressed beam design theory and practice. Large.

828 Plastic Analysis and Design  
A. 5 cl.  
Prereq.: 714, 741 or equiv.  
Structural behavior in the inelastic range. Prediction of collapse loads. Structural steel design according to the plastic method. Ojeda.

829 Concrete Shell Structures  
Sp. 5 cl.  
Prereq.: 705, 741, Math. 608.  
Analysis and design of folded plate, barrel, and other prismatic structures. Hyperbolic paraboloids.

831 Principles of Advanced Sanitary Engineering  
A. 3 cl., 2 3-hr. lab.  
Prereq.: 630, 716, 743.  
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. Cozens, Hamon.

832 Principles of Advanced Sanitary Engineering  
W. 3 cl., 2 3-hr. lab.  
Prereq.: 831.  
Continuation of 851.

833 Principles of Advanced Sanitary Engineering  
Sp. 3 cl., 2 3-hr. lab.  
Prereq.: 832.  
Continuation of 832.

835 Structural Analysis and Design for Dynamic Disturbances  
Sp. 5 cl.  
Prereq.: 705, 714, Eng. Mech. 607, or equiv. or permission of instructor.  

896 Interdepartmental Seminar in Polar and Alpine Studies  
Sp.  
(See under Interdepartmental Seminars)

899 Advanced Civil Engineering  
A. W., Sp.  
Prereq.: Graduate standing and permission of department 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 student an opportunity to pursue advanced study. Work undertaken may be elected in the following fields of civil engineering:

- Structural Engineering.
- Soil Mechanics and Foundations.
- Sanitary Engineering.
- Highway and Transportation Engineering.
- Geodetic and Photogrammetric Engineering.
COURSES OF INSTRUCTION

CIVIL ENGINEERING

949  Research Seminar  G 1
A.  1 cr.
Introduction to research activity.

950  Research in Civil Engineering  G Arr
Research for thesis or dissertation purposes only.

Classical Languages and Literatures

Office: 217 Derby Hall, 154 North Oval Drive.
PROFESSORS Titchener (Chairman), Abbott, and Forbes; Associate Professors W. B. Jones, 

See also Greek and Latin.

510  Classical Background of Scientific Terminology  U 3
A, W, Sp.  3 cr.
Study of technical and scientific terms from Greek and Latin sources; roots, word elements, word formation, analysis. Helpful in medical, biological, and kindred studies. Brunner, Lazzati.

520  The Greek Foundation of European Literature  U 5
Su, A.  5 cr.
Homer, tragedy, Aristophanes, with brief study of lyric and elegiac poetry, the development of prose and typical literature of the Alexandrian period. Forbes, Leonard, Leonard.

521  The Latin Contribution to European Literature  U 5
W.  5 cr.
The major poets and dramatists, with brief study of prose, historical, orontical, and philosophical. Emphasis will be placed on classicism in Classical Literature. Forbes, Leonard, Leonard.

522  Classical Mythology  U 5
A, W, Sp.  5 cr.

524  Classical Civilization: Greece  U 3
W.  3 cr.
An introduction to ancient Greek civilization, concentrating upon important facets of literature, history, art, and archaeology. Leonard.

607†  Roman Private Life  U G 3
W.  3 cr.
Not for graduate credit for majors in Classical Languages.
Lectures, illustrated with slides on the daily life and customs of the Romans, their business and family relations, their amusements, dress, homes, and household furniture.

Comparative Literature And Languages

Office: 112 Derby Hall, 154 North Oval Drive.
PROFESSOR H. ROGERS (Chairman of Committee).

401  Introduction to Western European Literature: The Greek Contribution  U 3
A.
1st or 2nd yr. standing only.
Development of Greek ideas and ideals from Homer to Plato. A course in great books of the western world and the part they play in the development of modern European and American culture.

402  Introduction to Western European Literature: The Latin Contribution  U 3
W.
1st or 2nd yr. standing only.
Virgil, Lucretius, Dante, Cervantes. A course in great books of the western world and the part they play in the development of modern European and American culture.

403  Introduction to Western European Literature: The Modern World  U 3
Sp.
1st or 2nd yr. standing only.
Chaucer, Milton, Moliere, Shakespeare, Goethe. A course in great books of the western world and the part they play in the development of modern European and American culture.

Conservation

Office: 101 Townshend Hall, 1885 Neil Avenue.
2C. A. DAMBACH (Chairman of Committee).

401  Introduction to Conservation of Natural Resources  U 3
A, Sp.  3 cr. and 1 2-day field trip.
An orientation on the nature and scope of natural resources and the technical, economic, social, and political aspects of conservation. Good, Johnson, Dambach.

514  Conservation Agencies  U 3
W.  3 cr.
Representatives of governmental agencies, private organizations, and university departments present programs and problems in their areas of conservation work. Johnson.

561  Field Experience in Conservation  U 5
Su, A, W, Sp.  10 weeks work experience.
Prereq: Permission of adviser.
Having secured approval prior to this work experience, the student registers for this course the following quarter, in addition to his normal load, and submits a written report to his adviser. Staff or cooperating departments.

Natural Resources Problems, Programs, and Policies
(See Agricultural Economics 607.)
Dairy Science

Office: 118 Plumb Hall, 735 Stadiom Drive.

PROFESSORS: VANDENMARK (Chairman), ELY (Emeritus),
GILMORE, HUBBS, KRAWUS, LUDWICK, and LISUTTEN;
ASSOCIATE PROFESSORS: IBRAKEL, ICNORAND, IPECH-
HEIMER, PORTER, SPRATT, and STAUBUS; ASSISTANT
PROFESSORS KAESER and WESSELI.

401 Fundamentals of Dairy Science  U 5
A, W, Sp.  3 cl., 2 2-hr. lab.
Not open to students with credit for 501 or 512.
A general survey of the production phases of the dairy industry
covering the dairy breeds, breeding, selection, and management
factors important in milk production. Barr, Ely, Kaeser, Rausch.

501 Dairy Cattle Production  U 5
A, Sp.  3 cl., 2 2-hr. lab.
Prereq.: Animal Sc. 402.
Not open to students with credit for 501 or 512.
Problems encountered by teachers of vocational agriculture
and agricultural extension workers, such as selection, feeding, breed-
ing, management, herd health, quality milk production, fitting,
and showing: Brakel.

504 Dairy Herd Management  U 5
W.  3 cl., 2 2-hr. lab.
Prereq.: Animal Sc. 402 or 503.
Problems and practices concerned with efficient production of
milk and successful operation of a dairy herd: Brakel.

507 Dairy Cattle Selection and Judging  U 3
Sp.  1 2-hr. lab., 1 4-hr. lab.
Comparative selection, ring technique, classification, dairy breed,
standards and their application to the breeders problem of herd
improvement. Visit to leading herds: Ely, Kaeser.

512 Milk Production  U 5
Sp.  3 cl., 2 2-hr. lab.
Not open to students who have credit for 401 or 501.
A course designed to give a broad scope of dairy production with
special emphasis on breeding, feeding, herd health, quality milk
production, and general management: Barr.

520 Principles of Animal Improvement  U 5
A, W, Sp.  5 cl.
Prereq.: 401 or Animal Sc. 401 or Poul. Sc. 401 or
equiv. and Zool. 400 or Biol. 402.
Not open to students with credit for 520, 630.
(Granted in cooperation with the Departments of Animal
Sc. and Poul. Sc.)
An introduction to the methods available for bringing about
genetic change in farm animals: Fechheimer, Jaap, Parker.

Principles of Animal Nutrition
(See Animal Sc. 500.)
(Granted in cooperation with the Departments of Dairy
Sc. and Poul. Sc.)

610 Physiology of Lactation  U G 3
A.  2 2-hr. cl.
Prereq.: Vet. Physiol. 517 or equiv. or permission of
instructor.
The physiological, endocrine, nutritional and environmental
factors influencing the synthesis and ejection of milk: Barr,
Porter.

612 Physiology of Reproduction and Growth
A.  3 1-hr. lec.
Prereq.: Vet. Physiol. 517 or equiv. or permission of
instructor.
(Offered in cooperation with the Departments of Animal
Sc. and Poultry Sc.)
Physiology of the reproductive system and of growth and
development in farm animals; factors influencing reproductive
performance: Ludwick.

614 Laboratory in Reproductive Physiology and Artificial
Insemination
A.  2 2-hr. lab.
Prereq.: or concurs. 612.
(Offered in cooperation with the Departments of Animal
Sc. and Poul. 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: Ludwick.

Marketing of Dairy Products
(See Agr. Sc. 626.)
(Offered in cooperation with the Department of Dairy Sc.)

Nutrition and Feeding of Ruminant Animals
(See Animal Sc. 611.)
(Offered in cooperation with the Department of Dairy Sc.)

701 Special Problems  U G 2-5
Prereq.: Permission of instructor.
Special assignments in the advanced phases of dairy husbandry
problems. Students will select work in desired subjects after con-
ference with the instructor in charge.

714 Research Methods and Techniques  U G 5
Sp.  3 cl., 1 4-hr. lab.
Prereq.: 20 cr. hrs. in Animal Sc. and Dairy Sc. and
permission of instructor.
Survey and analysis of research work in Dairy Sc. and Animal
Sc., literature reviews, collection of data, preparation of bibli-
ographies, and presentation of reports: Gomes.

720 Genetics of Animal Populations  U G 5
W.  4 cl., 1 2-hr. lab.
Prereq.: 520 or Zool. 604 or Biol. 604 and 10 cr. hrs.
in Math.
(Offered in cooperation with the Departments of Animal
Sc. and Poul. Sc.)
Theory and practice of analyzing and altering the genetic com-
position of animal populations: Fechheimer, Jaap.

801 Seminar in Dairy Science  G 1-3
Ely.

812 Advanced Reproductive Physiology
Sp.  2 2-hr. cl.
Prereq.: 612 or equiv.
(Offered in cooperation with the Departments of Animal
Sc. and Poul. Sc.)
Recent advances in research in mammalian reproduction; optional
individual research experience in reproductive problems with
small and large mammals for additional credit: VanDemark,
Gomes.
COURSES OF INSTRUCTION

DAIRY SCIENCE

515 Dairy Industry Apprenticeship

U 3
Su, A.W. Sp.
Graduation credit limited to those students completing the Dairy Tech. Curriculum. Ten weeks practical experience or equiv. in an approved dairy processing plant. Written report required.
Kristoffersen.

520 Evaluation and Selection of Dairy Products

U 3
Sp. 1 cl., 2 3-hr. lab.
Consumer and commercial methods and standards for the organoleptic selection and evaluation of milk and milk products; fundamentals of taste and odor perception; consumer preference techniques. Slatter.

601 Dairy Products Standards and Analysis

U 3
A. 3 cl.
Prereq.: 401 and/or concur. Chem. 521.
Not open for graduate credit to majors in Dairy Tech.

602 Dairy Products Standards and Analysis: Laboratory

U 3
A. 1 cl., 2 3-hr. lab.
Concur.: 601.
Not open for graduate credit to majors in Dairy Tech.
Application of modern analytical methods to dairy products; comparison and interpretation of results; laboratory project studies and report preparation. Kristoffersen.

603 Market Milk Industry

U 3
W. 3 cl.
Prereq.: 601, 602, Microbiol, 610 and 611 or equiv. and permission of instructor.
Science, engineering, and business of the fluid milk industry; procurement, processing, and distribution; process and quality control; nutrition and public health aspects. Harper.

604 Market Milk Industry: Laboratory

U 3
W. 1 rec., 2 3-hr. lab.
Prereq. or concur.: 603.
Unit processes in the fluid milk industry; equipment use and production planning; processing and production control; special products. Harper.

605 Management of Dairy Plants

U 3
W. 2 3-hr. cl.
Prereq.: 4th yr. standing.
Dairy plant management; operational practices, their relationship to efficiency, and product, waste, and water utilization; personnel management; and analysis of current industry problems. Gould, Slatter.

606 Dairy Plant Equipment and Buildings

U 3
A. 3 cl.
Prereq.: 511 and Agr. E. 510.
Principles of construction, operation, and maintenance of dairy and food processing equipment; engineering fundamentals of process control, materials handling, plant design, and construction. Blaisdell.

609 Concentrated Milk Products

U 3
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 603, 604.
Condensed, evaporated, and powdered milk and milk products are considered from business and scientific standpoint; chemical and physical properties, manufacturing and distribution methods; utilization of concentrated milk products.

Dairy Technology

Office: 222 Vician Hall, 2121 Fyffe Road.
PROFESSORS: GOULD (Chairman), BURGWALD (Emeritus), HARPER, KRISTOFFERSSEN, and SLATTER; ASSISTANT PROFESSORS ARMSTRONG (Emeritus), HARTLEY, MARTIN, MIKOLAJCIK, BLAISDELL, and HANSEN.

401 Survey of Industrial Dairying

U 3
A, Sp. 2 cl., 1 3-hr. lab.
Survey of the dairy products industry dealing with compositions, properties, quality, production and distribution of dairy products; introduction to certain practical analytical methods. Slatter.

415 Dairy Industry Apprenticeship

U 3
Graduation credit limited to students completing the Dairy Tech. curriculum. Ten weeks practical experience or equiv. in an approved dairy processing plant. Written report required.
Kristoffersen.

511 Dairy Refrigeration

U 5
W. 5 cl.
Prereq.: 601, 602, Engr. Dr. 400, Agr. E. 510.
Concepts of heat transfer; elementary thermodynamics of refrigeration systems and application of refrigeration equipment to dairy processing, dairy heat exchangers. Blaisdell.

A-52
610 Ice Cream Industry
   A. 3 cl. and 2 3-hr. labs.
   Prereq.: 603, 604.
   The technical, engineering, and business aspects of modern-day commercial manufacturing methods; quality control; sales and distribution.

626 Butter and Cheese Industries
   Sp. 3 cl.
   Prereq.: 603, 604.
   Industrial cheese and butter operations with application of chemistry and bacteriology to the products involved and with emphasis on modern management practices. Kristoffersen.

627 Butter and Cheese Industries: Laboratory
   Sp. 1 rec., 1 6-hr. lab.
   Prereq. or concurs.: 626.
   Project studies and experiences with commercial methods of manufacturing with product control practices, and with butter and cheese plant operation. Kristoffersen.

651 Junior Seminar
   A. 2 cl.
   Prereq.: Dairy Tech. 4th yr. standing.
   Not open for graduate credit to majors in Dairy Tech.

701 Special Problems
   Prereq.: Dairy Tech. 4th yr. standing and permission of instructor.
   Designed to permit students to make special studies of current problems and to obtain experience in planning and conducting project research.

710 Technical Control of Dairy Products
   Sp. 2 cl., 1 3-hr. lab.
   Prereq.: Dairy Tech. 4th yr. or grad. standing.
   The application of technical control methods to dairy plant operations and to the interpretation of laboratory findings. Chemical and bacteriological techniques and their use in solving dairy plant problems. Harper.

800 Seminar
   A. W, Sp. 1 cl., 1 hr. conf.
   Prereq.: Dairy Tech. graduate standing or special interest in this field.
   Students and faculty members will report on problems of special interest.

810 Research Methods in Dairy Technology
   Su, A, W, Sp. 1 cl., 6-12 lab. hrs.
   Prereq.: 15 cr. hrs. of organic Chem. and 15 cr. hrs. of Biol. Sci.
   Repeatability to a maximum of 15 cr. hrs.

898 Interdepartmental Seminar in Nutrition
   Sp.
   (See under Interdepartmental Seminars.)

950 Research in Dairy Technology
   Research for thesis or dissertation purposes only.

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Dental Hygiene

Office: 333 Dentistry Bldg., 305 West 12th Avenue.
PROFESSORS: TALLISON, BROWN, DEW, MECHMIDE, McCONNELL, NEWTON, PETTIT, W. D.; POSTLE, TWILSON, WISE, and WOELFEL; ASSOCIATE PROFESSORS BRUCE, KAISER, KOKAS, PERMAR, W. WALTON, and WILLIAMS; ASSISTANT PROFESSORS DEEDS, HARPER, HULL, MICHEL, H. POSTLE, REYNOLDS, and B. SNYDER; INSTRUCTORS D. COOK, DIERKSEN, PAPPAS, and WEISENSTEIN; ASSISTANT INSTRUCTORS: BEHRENS, BROWN, CRAWFORD, GREENE, MURPHY, MOFFITT, NOUZZER, SCHULTZ, STEINER, and WALSER.

401 Dental Anatomy
   A. 1 cl., 6 lab. hrs.
   Prereq.: Dent. Hyg. 1st yr. standing.
   The morphology of human teeth and surrounding structures. Permar.

402 Dental Anatomy
   Sp. 1 cl., 3 lab. hrs.
   Prereq.: Dent. Hyg. 1st yr. standing.
   A continuation of 401. The physiology of human teeth and surrounding structures. Permar.

403 Dental Prophylaxis
   Sp. 2 cl., 7 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, Wise and Staff.

404 Oral Hygiene
   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.

405 Materia Medica
   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.

501 General Pathology
   Sp. 2 cl.
   Prereq.: Dent. Hyg. 1st yr. standing.
   An introduction to general pathology including degenerative changes, inflammation, and repair. A discussion of the more common diseases affecting the human body. Bruce.

502 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. Wise and Staff.

503 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. Wise and Staff.

504 Dental Nursing
   Sp. 1 cl.
   Prereq.: Dent. Hyg. 2nd yr. standing.
   A continuation of 503. The Dental Hygienist's responsibilities to her profession. Wise and Staff.

A-53
COURSES OF INSTRUCTION
DENTAL HYGIENE

505 Dental Materials U 3
W. 1 cl., 6 lab. hrs.
Prereq.: Dent. Hyg. 2nd yr. standing.
A study of the composition, chemical and physical properties, manipulation and uses of various materials employed in the practice of Dentistry. Weisel.

506 Oral Histology and Embryology U 1
Sp. 1 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. Farnor.

507 Oral Pathology U 1
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.

508 Clinical Dental Prophylaxis U 3
A. 9 clinic hrs.
Prereq.: Dent. Hyg. 2nd yr. standing.
Clinical application of principles taught in 403. Wise and Staff.

509 Clinical Dental Prophylaxis U 5
W. 15 clinic hrs.
Prereq.: Dent. Hyg. 2nd yr. standing.
A continuation of 508. Wise and Staff.

510 Clinical Dental Prophylaxis U 5
Sp. 15 clinic hrs.
Prereq.: Dent. Hyg., 2nd yr. standing.
A continuation of 509. Wise and Staff.

511 Nursing Techniques for Dental Hygienists U 2
A. 2 cl.
Prereq.: Dent. Hyg. 2nd yr. standing.
A study of the principles of nursing as they apply to the Dental Hygienist. Newton and Staff.

512 Oral Radiography U 2
A. 2 cl., or 6 lab. hrs.
Prereq.: Dent. Hyg. 2nd yr. standing.
The theory and technical procedures of oral radiography. Pappas.

513 Oral Hygiene in the Schools U 2
W. 2 cl.
Prereq.: Dent. Hyg. 2nd yr standing.
The principles involved in effective Dental Health Education of the general public, especially school children. Wise and Staff.

514 Oral Hygiene in the Schools U 2
Sp. 2 cl.
Prereq.: Dent. Hyg. 2nd yr standing.
A continuation of 513. An application of principles learned in 513 by actual teaching experiences and by visits to the schools; the history and organization of dental public health. Harvey.

515 Anesthesia U 1
A. 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.

516 Office Practices and Economics U 2
Sp. 2 cl.
Prereq.: Dent. Hyg. 2nd yr standing.
The role of the Dental Hygienist in dental practice and the economics involved. Weisenstein.

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Dentistry

Office: 120 Dentistry Bldg., 305 West 12th Avenue.


301 Dental Anatomy P 2
A. 1 cl., 3 lab. hrs.
Prereq.: Dent. 1st yr. standing.
The morphology of human teeth and surrounding structures. Tripp and Staff.

302 Dental Anatomy P 5
W. 1 cl., 11 lab. hrs.
Prereq.: Dent. 1st yr. standing.
The physiology of human teeth and surrounding structures. Tripp and Staff.

305 Dental Materials P 1
W. 1 cl.
Prereq.: Dent. 1st yr. standing.

306 Dental Materials P 1
Sp. 1 cl.
Prereq.: Dent. 1st yr. standing.
Materials used in the restoration of various teeth, including dental cements, waxes, plastics, amalgams, gold foil, and casting gold alloys. Dew.

320 Orientation and History of Dentistry P 1
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. W. Postle, Harper.

381 Complete Prosthodontics P 4
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. Boucher and Staff.

382 Complete Prosthodontics P 4
W. 1 cl., 8 lab. hrs.
Prereq.: Dent. 1st yr. standing.
The principles and practices of the arrangement of artificial teeth and in processing and finishing complete dentures. Johnson and Staff.

386 Fixed Partial Prosthodontics P 1
Sp. 1 cl.
Prereq.: Dent. 1st yr. standing.
DENTISTRY

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. Heints and Staff.

403 Local Anesthesia
Sp. 1 cl.
Prereq.: Dent. 2nd yr. standing.
The theory, chemistry and technique of local anesthesia for dental procedures. H. Postle and Staff.

404 Dental Materials
A. 1 cl.
Prereq.: Dent. 2nd yr. standing.

413 Endodontics
Sp. 1 cl.
Prereq.: Dent. 2nd yr. standing.
Basic techniques and procedures used in the treatment of pulless teeth. Kaiser.

431 Operative Dentistry
A. 1 cl., 3 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
An introduction to the principles of Operative Dentistry, the theory and technique for simple cavity preparations. H. Postle and Staff.

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 fillings and the use of amalgams and silicates as restorative materials. H. Postle and Staff.

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 foils as restorative materials. Preparation for the clinical aspects of Operative Dentistry. H. Postle and Staff.

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. Pettit and Staff.

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. Pettit, Williams and Staff.

462 Periodontics
W. 1 cl.
Prereq.: Dent. 2nd yr. standing.
The etiology, pathology, and diagnosis of periodontal disease. Willem.

463 Periodontics
Sp. 1 cl.
Prereq.: Dent. 2nd yr. standing.
Fundamental methods of prevention and treatment of periodontal disease. Willem and Staff.

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. Larriner and Staff.

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. Boucher and Staff.

484 Fixed Partial Prosthodontics
A. 1 cl., 3 lab. hrs.
Prereq.: Dent. 2nd yr. standing.

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-removable connectors, gold and acrylic pontics. Long and Staff.

486 Fixed Partial Prosthodontics
Sp. 1 cl., 6 lab. hrs.
Prereq.: Dent. 2nd yr. standing.
Construction of fixed partial restorations with basic retainers and connectors and glazed porcelain pontic. Fabrication of acrylic jacket crown. Long and Staff.

487 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. Heints and Staff.

489 Removable Partial Prosthodontics
Sp. 1 cl.
Prereq.: Dent. 2nd yr. standing.
The advanced principles and design of removable partial dentures and their clinical applications. Stegel and Staff.

501 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, Snyder.

502 Oral Surgery
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.

511 Endodontics
A. 1 cl.
Prereq.: Dent. 3rd yr. standing.
Clinical applications of the principles and technical procedures in endodontics. Kaiser.
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Prerequisites</th>
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</thead>
<tbody>
<tr>
<td>Clinical Endodontics</td>
<td>P 1</td>
<td>W. 2 clinic hrs.</td>
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<tr>
<td>Kaiser and Staff</td>
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<td>513clinical Endodontics</td>
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<td>Sp. 2 clinic hrs.</td>
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<tr>
<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>Continuation of 512. Kaiser and Staff</td>
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<tr>
<td>531 Operative Dentistry</td>
<td>P 4</td>
<td>A. 1 cl., 6 clinic hrs.</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>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 and Staff.</td>
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<tr>
<td>532 Operative Dentistry</td>
<td>P 4</td>
<td>W. 2 cl., 6 clinic hrs.</td>
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<tr>
<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>Detailed study of restorative materials; indications and contraindications for each; their manipulation and individual requirements in cavity preparation. Beckwith and Staff.</td>
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<tr>
<td>533 Operative Dentistry</td>
<td>P 4</td>
<td>Sp. 1 cl., 6 clinic hrs.</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>Clinical application of the theories and techniques of restoring carious and defective teeth. Beckwith and Staff.</td>
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<tr>
<td>540 Oral Histology and Embryology</td>
<td>P G 4</td>
<td>A. 2 cl., 6 lab. hrs.</td>
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<td>Prereq.: Anat. 680. Dent. 2nd yr. standing.</td>
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<tr>
<td>Embryology and histology of teeth and surrounding structures and their correlation to the practice of dentistry. Moit and Staff.</td>
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<tr>
<td>541 Oral Pathology</td>
<td>P G 4</td>
<td>A. 3 cl., 3 lab. hrs.</td>
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<td>Prereq.: Dent. 3rd yr. standing, 540 and Path. 655.</td>
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<tr>
<td>The histopathologic and clinical study of oral disease processes that are chiefly of local origin. Kolas and Staff.</td>
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<tr>
<td>542 Oral Pathology</td>
<td>P G 1</td>
<td>W. 1 cl.</td>
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<tr>
<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>The histopathologic and clinical study of oral disease processes that are associated with systemic disease or diseases of specific organ systems. Kolas and Staff.</td>
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<tr>
<td>545 Oral Diagnosis and Treatment Planning</td>
<td>P 1</td>
<td>W. 1 cl.</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>The principles and methods of oral diagnosis, with emphasis on the medical and dental history of the patient. Bruce.</td>
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<tr>
<td>546 Oral Diagnosis and Treatment Planning</td>
<td>P 1</td>
<td>Sp. 1 cl.</td>
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<tr>
<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>The interpretation of signs and symptoms, medical laboratory tests, and treatment planning for the patient. Bruce and Staff.</td>
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<td>547 Oral Radiography</td>
<td>P 1</td>
<td>A. 1 cl.</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>548 Oral Radiography</td>
<td>P 1</td>
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<tr>
<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>Bisection of the angle and long cone techniques used in intraoral radiography. Extraoral radiographic techniques. O’Brien.</td>
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<td>549 Oral Radiography</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<td>551 Pedodontics</td>
<td>P 1</td>
<td>A. 1 cl.</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>552 Clinical Pedodontics</td>
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<tr>
<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>Pettit and Staff</td>
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<td>553 Clinical Pedodontics</td>
<td>P 1</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>Continuation of 552. Pettit and Staff</td>
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<td>555 Orthodontics</td>
<td>P 1</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>The etiology and classification of malocclusion, physiology of tooth movement, character of tissues involved. Williams.</td>
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<tr>
<td>556 Orthodontics</td>
<td>P 2</td>
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<tr>
<td>Prereq.: Dent. 3rd yr. standing</td>
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<td>Methods and appliances for the correction of malposed teeth. Williams.</td>
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<td>560 Periodontics</td>
<td>P 1</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>561 Clinical Periodontics</td>
<td>P 1</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>Wilson and Staff</td>
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<td>562 Clinical Periodontics</td>
<td>P 1</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<td>Continuation of 561. Wilson and Staff</td>
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<td>563 Clinical Periodontics</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>Continuation of 561. Wilson and Staff</td>
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<tr>
<td>572 Pharmacology</td>
<td>P 1</td>
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<td>Prereq.: Dent. 3rd yr. standing</td>
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<tr>
<td>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. Hintt.</td>
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</table>
573 Pharmacology P 1
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. Host.

581 Complete Prosthodontics P 2
A. 1 cl., 2 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
The principles and practices of maxillomandibular relation records, articulating instruments and occlusion. Boucher and Staff.

582 Complete Prosthodontics P 3
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 artifical dentures. Boucher and Staff.

583 Complete Prosthodontics P 3
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. Boucher and Staff.

584 Fixed Partial Prosthodontics P 1
A. 1 cl.
Prereq.: Dent. 3rd yr. standing.

585 Fixed Partial Prosthodontics P 2
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. McBride and Staff.

586 Fixed Partial Prosthodontics P 3
Sp. 1 cl., 6 clinic hrs.
Prereq.: Dent. 3rd yr. standing.

587 Removable Partial Prosthodontics P 1
A. 1 cl.
Prereq.: Dent. 3rd yr. standing.
Complex problems of removable partial dentures and their clinical application. Steffee.

593 Individual Studies in Dentistry P 1-6
Individual studies in any of the recognized fields of Dentistry or Summer Clinic.

600 Histologic Laboratory Technique G 1-3
Prereq.: Permission of instructor.
The preparation of oral and dental tissues for microscopic study. Perman.

601 Anesthesia P 2
A. 1 cl., 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
History taking; physical evaluation techniques; common laboratory analyses; nose, throat, and mouth examinations; physiology of normal and pathologic respiration, heart functions and circulation of blood. Allison, Wallace, and Staff.

602 Anesthesia P 2
W. 1 cl., 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Oxygen and carbon dioxide transport; electrolyte and fluid balance; pharmacologic action of sedatives, hypnotics, analgesics, narcotics, intravenous barbiturates, muscle relaxants, inhalation anesthetic agents. Allison, Wallace and Staff.

603 Anesthesia P 2
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 techniques, and analgistics. Allison, Wallace and Staff.

604 Oral Surgery P 2
A. 1 cl., 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Wound healing, inflammation, infection, their mechanism, diagnosis and treatment. Surgical management of exostosis, hyperplasia, and surgical preparation of the mouth for prosthodontics. Allison, Wallace and Staff.

605 Oral Surgery P 2
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, antibiotics, sutures and suturing. Allison, Wallace and Staff.

606 Oral Surgery P 2
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, Wallace and Staff.

612 Clinical Endodontics P 2
W. 4 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Kaiser and Staff.

613 Clinical Endodontics P 1
Sp. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 612. Kaiser and Staff.

621 Dental Practice Administration P 1
A. 1 cl.
Prereq.: Dent. 4th yr. standing.
Dental jurisprudence; legal aspects of the practice of dentistry. W. Posey, Harper.

622 Dental Practice Administration P 1
W. 1 cl.
Prereq.: Dent. 4th yr. standing.
Dental economics, records, tax liability. W. Posey, Harper.

623 Dental Practice Administration P 1
Sp. 1 cl.
Prereq.: Dent. 4th yr. standing.

631 Operative Dentistry P 5
A. 1 cl., 8 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Review of the basic principles of operative dentistry and their clinical application to special problems. Taylor and Staff.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>632</td>
<td>Operative Dentistry</td>
<td>P 5</td>
<td>P 663 Clinical Periodontics&lt;br&gt;Sp. 2 clinic hrs.&lt;br&gt;P 663 Wilson and Staff.</td>
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<td>W. 1 cl., 8 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
<td></td>
<td>Continuation of 632. Advanced theories, technical procedures, and materials in Operative Dentistry, their value, limitations, and clinical application. Taylor and Staff.</td>
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<tr>
<td>633</td>
<td>Operative Dentistry</td>
<td>P 5</td>
<td>P 662 Clinical Periodontics&lt;br&gt;W. 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>Sp. 1 cl., 8 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>Continuation of 632. Advanced theories, technical procedures, and materials in Operative Dentistry, their value, limitations, and clinical application. Taylor and Staff.</td>
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<td>645</td>
<td>Clinical Oral Diagnosis and Treatment Planning</td>
<td>P 1</td>
<td>P 662 Wilson and Staff.</td>
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<td>646</td>
<td>Clinical Oral Diagnosis and Treatment Planning</td>
<td>P 1</td>
<td>P 664 Clinical Fixed Partial Prosthodontics&lt;br&gt;A. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>647</td>
<td>Clinical Oral Radiography</td>
<td>P 1</td>
<td>P 665 Clinical Fixed Partial Prosthodontics&lt;br&gt;A. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>648</td>
<td>Clinical Oral Radiography</td>
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<td>P 666 Clinical Fixed Partial Prosthodontics&lt;br&gt;A. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>649</td>
<td>Clinical Oral Radiography</td>
<td>P 1</td>
<td>P 667 Clinical Fixed Partial Prosthodontics&lt;br&gt;A. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>651</td>
<td>Pedodontics</td>
<td>P 2</td>
<td>P 668 Clinical Fixed Partial Prosthodontics&lt;br&gt;A. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>A. 1 cl., 3 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>652</td>
<td>Clinical Pedodontics</td>
<td>P 1</td>
<td>P 669 Clinical Fixed Partial Prosthodontics&lt;br&gt;A. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>W. 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>Continuation of 651. Pettiit and Staff.</td>
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<td>653</td>
<td>Clinical Pedodontics</td>
<td>P 1</td>
<td>P 670 Clinical Fixed Partial Prosthodontics&lt;br&gt;A. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>661</td>
<td>Clinical Periodontics</td>
<td>P 1</td>
<td>P 671 Clinical Fixed Partial Prosthodontics&lt;br&gt;A. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>662</td>
<td>Clinical Periodontics</td>
<td>P 1</td>
<td>P 672 Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>W. 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>663</td>
<td>Clinical Periodontics</td>
<td>P 1</td>
<td>P 673 Pharmacology&lt;br&gt;Sp. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<td>672</td>
<td>Pharmacology</td>
<td>P 2</td>
<td>P 674 Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td></td>
<td>W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
<td></td>
<td>Continuation of 672. Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td>673</td>
<td>Pharmacology</td>
<td>P 2</td>
<td>P 675 Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td></td>
<td>Sp. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
<td></td>
<td>Continuation of 673. Pharmacology&lt;br&gt;Sp. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td>681</td>
<td>Complete Prosthodontics</td>
<td>P 3</td>
<td>P 676 Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td></td>
<td>A. 1 cl., 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
<td></td>
<td>Continuation of 681. Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td>682</td>
<td>Clinical Removable Prosthodontics</td>
<td>P 2</td>
<td>P 677 Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td></td>
<td>W. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
<td></td>
<td>Continuation of 682. Pharmacology&lt;br&gt;W. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td>683</td>
<td>Clinical Removable Prosthodontics</td>
<td>P 2</td>
<td>P 678 Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td></td>
<td>Sp. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
<td></td>
<td>Continuation of 683. Pharmacology&lt;br&gt;Sp. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td>684</td>
<td>Clinical Fixed Partial Prosthodontics</td>
<td>P 2</td>
<td>P 679 Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td></td>
<td>A. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
<td></td>
<td>Continuation of 684. Pharmacology&lt;br&gt;A. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td>685</td>
<td>Clinical Fixed Partial Prosthodontics</td>
<td>P 2</td>
<td>P 680 Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td></td>
<td>W. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
<td></td>
<td>Continuation of 685. Pharmacology&lt;br&gt;W. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td>686</td>
<td>Clinical Fixed Partial Prosthodontics</td>
<td>P 2</td>
<td>P 681 Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
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<tr>
<td></td>
<td>Sp. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
<td></td>
<td>Continuation of 686. Pharmacology&lt;br&gt;Sp. 4 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td>693</td>
<td>Individual Studies in Dentistry</td>
<td>G 1-5</td>
<td>P 682 Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
<tr>
<td>800</td>
<td>Special Problems in Dentistry</td>
<td>G 1-5</td>
<td>P 683 Pharmacology&lt;br&gt;W. 1 cl., 2 clinic hrs.&lt;br&gt;Prereq.: Dent. 4th yr. standing.</td>
</tr>
</tbody>
</table>
800B Advanced Orthodontics G 1-5
Prereq.: Orthodontics grad. standing.
Applied osteology and myology in cephalometric roentgenographic interpretations; review of cephalic growth and development factors in normal occlusion; correction of maloccclusions and dento-facial malformations. Williams, Wade and Staff.

800C Advanced Periodontics G 1-5
Prereq.: Periodontics grad. standing.
Diagnosis and treatment of periodontal disease. Correlation between the diseases of the periodontium and probable systemic maladjustments, and maladjustments of a purely dental nature. Wilson.

800D Advanced Prostodontics G 1-5
The diagnosis, treatment, and replacement of missing or lost teeth and parts of the mouth by prosthetic appliances; complete removable partial, or fixed partial restorations. Boucher, McBrine.

800E Advanced Oral Pathology and Diagnosis G 1-6
Prereq.: Oral Pathology grad. standing.
The interrelationships of gross, microscopic, and clinical pathology. Current advances in the field of oral pathology and diagnosis. Kolts.

800F Advanced Endodontics G 1-5
Prereq.: Endodontics grad. standing.
Clinical problems in endodontics and their correlation with the problems in related fields of dentistry and medicine. Surgical methods will receive attention. Kaiser.

800G Advanced Pedodontics G 1-5
Prereq.: Pedodontics grad. standing.
A study and clinical application of diagnosis and treatment of problems occurring in the various areas of pedodontics. Pettit.

800H Advanced Dental Materials G 1-5

800I Advanced Oral Histology and Embryology G 1-5
The principles of histology and embryology applied to the structures in the oral region—their development, morphology, functions, and clinical relationships. Wilson.

800J Advanced Operative Dentistry G 1-5
Clinical problems in operative dentistry and their correlation with the problems in the related fields of dentistry and medicine. Special attention given to preventive dentistry. Wilson.

805 Seminar in Dentistry G 1
Prereq.: Dent. graduate standing.
A discussion of recent advances in all branches of dental science. Review of original literature. Wilson, Ferrar, and Staff.

950 Research in Dentistry G Arr.
Research for thesis purposes only.

Economics

Office: 239 Hagerty Hall, 1775 South College Road.

PROFESSORS: CRAIG (Chairman), BODENHORN, BOWERS, CONDOIDE, ICONS, HARRISON, HUANG, KINDIG, LOVESTEIN, LYNCH, MILLER, FOSTER, PARNE, QUANTUS, SHERRY, and TIBBY; ASSOCIATE PROFESSORS: BICKELHAUPT, IDEWALD, FLETSCHER, ICKELLEY, IMACOMON, STUTTLE, and WARN; ASSISTANT PROFESSORS BOTTE, CAMERON, L'ESPERANCE, LEVINE, MICHAEL, NESTEL, and WOODWARD; LECTURER: STOCKER.

The Department of Economics offers opportunities for special study in the following fields:
- Economic Theory: History and Economic Thought
- Economic History, American and European
- Money and Banking
- Public Finance
- Economic Statistics: Econometrics
- Business Fluctuations: National Income Accounting
- International Economic Relations
- Public Control
- Labor
- Institutions and Methods of Economic Planning
- National Security Economics
- Special Fields to be arranged

501 Principles of Economics U 5
Su, A, W, Sp. 5 cl.
Not open to freshmen, nor to students with credit for 401, 403, 404, 406, 504, 506, or 507.
A study of the organization and functioning of modern economic society, with emphasis on price determination, employment, and monetary problems and policies. Woodard, Lovestein, and Staff.

502 Principles of Economics U 5
Su, A, W, Sp. 5 cl.
Not open to freshmen, nor to students with credit for 401, 403, 404, 406, 504, 506, or 507.
A study of the organization and functioning of modern economic society, with emphasis on price determination, income distribution, and special economic problems. Woodard, Lovestein, and Staff.

503 Principles of Economics for Engineers U 3
A, W, Sp. 3 cl.
Not open to freshmen, nor to students with credit for 401, 403, 406, 501, 506, or 507.
Macro economic principles. A study of capitalism, income determination, monetary and fiscal policies, economic problems and economic growth. Fletcher and Staff.
504 Principles of Economics for Engineers A, W, Sp. 3 cl.
Not open to freshmen, nor to students with credit for 402, 404, 406, 503, 506 or 507.
Microeconomic principles: A study of the economics of the firm, allocation of productive factors and factor income distribution; international economics. Fitchett and Staff.

506 Outlines of Economics U 5
Su, A, W, Sp. 5 cl.
Not open to freshmen, nor to students with credit for 401, 403, 405, 406, 501, 502, 503, 504 or 507.
Analysis of basic characteristics of American economic system; study of significant problems arising in its operation and an appraisal of proposed solutions. Harrison and Staff.

507 Fundamentals of Economics U 5
Su, A, W, Sp. 5 cl.
Prereq.: Hist. 423.
Not open to students with credit for 401, 402, 403, 404, or 406, or 501, 502, 503, 504, 506.
Study of basic characteristics, processes, and institutions of the economic system; significant problems arising in its operation; proposed solutions. Lawrence and Staff.

542 Elementary Economic Statistics U 4
Su, A, W, Sp. 3 cl., 1 2-hr. lab.
Prereq.: 10 hrs. of college-level mathematics.
Not open to students with credit for 522.
Ratios, index numbers, frequency distributions, measures of central tendency, dispersion, simple probability distributions, statistical inference and testing pertaining to means and proportions, simple linear correlation, time series. Tuttle, L'Esperance, Cameron, Nestel, and Staff.

560 International Economic Relations U 3
Su, A. 3 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not open to students with credit for 515 or 664-665-666.
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 organizations. Coons, Michael and Staff.

600 Ideas of the Great Economists U G 3
Sp. 3 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not open to graduate students in Economics.
Critical analysis of ideas of great economists, factors which influenced those ideas; their impact upon social and economic development of the modern world. Harrison and Staff.

606 Current Economic Problems U G 3
Su, W. 3 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not open to students with credit for 604-605 or to graduate students in Economics or to majors in Economics.
Examination of current problems; optimum levels of employment; conditions underlying consumer expenditures; savings; investments; inflation; deflation, agriculture, public works, housing; regional development. Coons and Staff.

610 Economic Development U G 5
A. 2 2-hr. cl.
Prereq.: 633.
Empirical and theoretical consideration of long-term economic changes, including changes in industrial structure, technology, and level of national product; emphasis on developing economies.

612 Economic and Business History of Selected American Firms U G 3
Sp. 3 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not open to students with credit for 630.
Evolving corporate enterprise within the framework of American capitalist doctrine. Analysis of outstanding firms; influence of unions and government on innovation, pricing, and other practices. Harrison.

623 Money and Banking U G 5
Su, A, W, Sp. 5 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not open to students with credit for 520 or to graduate students in Economics.
Organization, operation, and economic significance of our monetary and banking system are discussed with special reference to current conditions and problems. Craig, Quantus, Dewaud, and Staff.

625 National and International Money Markets U G 3
A. 3 cl.
Prereq.: 620.
Not open to students with credit for 631 or 633 or 632.
Organization, functions, and control of money markets and their submarkets. Flow of funds in these markets and investment policies of market participants. Quantus.

634 Fiscal Economics U G 5
A. 3 cl.
Prereq.: 636 or permission of instructor.
Not open to students with credit for 631 or 633 or 632.
The economics of government spending and taxation; analysis of the fiscal role and instruments of government and their effects on the economy. Cameron, Woodard, Stocker.

636 Government Finance in the American Economy U G 5
Su, A, W, Sp. 5 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
For College of Commerce students and majors in economics, 620.
Not open to students with credit for 509 or 530 or 631 and 632.
Not open to graduate students in Economics.
Analysis of fiscal institutions and decision-making in the public sector of the American economy; budget planning and execution; taxation, debt, fiscal policy. Cameron, Woodard, Stocker and Staff.

644 Mathematical Economic Theory U G 3
A. 3 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507, college algebra and permission of instructor.
Not open to students with credit for 675.
Application of essential concepts of calculus to deriving principal theorems of economic marginal analysis. Problems and examples. Tuttle.

A-60
ECONOMICS

651 Consumption Economics

UG 3

W. 3 cl.

Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.

Not open to students with credit for 645.

Consumption from the standpoint of the individual and society; cost of living; standards and levels of living; consumer budgets; influences determining consumer choice. Warne.

653 Population

UG 3

A. 3 cl.

Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507, or equiv. and permission of instructor.

Not open to students with credit for 660.

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. Harrison.

655 Income Distribution and Public Policy

UG 3

Sp. 3 cl.

Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.

Trends in income distribution; analysis of measures of income distribution; policies influencing distribution; effects of income distribution on the economy. Craig, Warne.

656 National Income and Flow of Funds Analysis

UG 3

A. 3 cl.

Prereq.: 532 or 542 and Acc. 402 or 405 or 412 or 502 or 510.

Theory and practice of social accounting as applied to national income and flow of funds. Coons.

657 Analysis and Control of Business Fluctuations

UG 3

Sp. 3 cl.

Prereq.: 520.

Not open to students with credit for 627.


663 Economic Problems of Western Europe

UG 5

Su, W. 5 cl.

Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.

Not open to students with credit for 679.

European reconstruction; European Economic Community and the Free Trade Area; implications, Condoleeza.

665 International Trade and Finance

UG 5

W. 5 cl.

Prereq.: 633.

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.

666 International Commercial Policy

UG 3

S. 3 cl.

Prereq.: 520.

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.

667 Economics of Planning

UG 3

Sp. 3 cl.

Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.

Analysis of the economics of planning and its major applications to private and public planning: procedures and techniques of economic planning. Lovesten.

668 Labor Economics and Industrial Relations

UG 3

Su, A, W, Sp. 3 cl.

Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.

Not open to students with credit for 510 or 580 or 641 or 686. Not open to graduate students in Economics.

Survey of the field of labor economics; trade unionism, collective bargaining; wage determination, employment, unemployment; labor legislation. Miller, Farnes, Levine, Kelley, and Staff.

670 Competition and Public Policy

UG 3

W. 3 cl.

Prereq.: 671 or 20 cr. hrs. of Econ.

Not open to students with credit for 609.

Nature, role, and regulation of competition; market structure and social performance; antitrust laws; current economic, legal, and policy problems in the antitrust area. Lynn, Fletcher.

671 Government and Business

UG 5

A, Sp. 5 cl.

Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.

Economic and legal aspects of Government regulation of business in the United States; philosophies and concepts of public control; contemporary problems. Fletcher, Lynn.

672 Public Utilities and Public Works

UG 3

Sp. 3 cl.

Prereq.: 671 or 20 cr. hrs. of Econ.

Not open to students with credit for 648.

Study of general economic characteristics and regulation of water, gas, electric, communications, and related industries, including atomic power. Government regulation versus public ownership. Tybout, Fletcher.

676 Transportation Economics

UG 5

A, W, Sp. 5 cl.

Prereq.: 671 or 20 cr. hrs. of Econ. or permission of instructor.

Not open to students with credit for 618, 692-693, or 771-772.

Study of general economic characteristics and government regulation of rail, motor, water, air, and pipeline carriers. Consideration of competitive relations between modes of transportation. Tybout, Fletcher.

677 Transportation Planning and Coordination

UG 3

Sp. 3 cl.

Prereq.: 676.

Transportation, local development and industrial location. Criteria for public investment in highway, airport, and other transportation facilities. Tybout, Fletcher.

680 Social Insurance

UG 3

Su, A, Sp. 3 cl.

Prereq.: 580 or permission of instructor.

Not open to students with credit for 699.

Social insurance systems to provide economic and social security against the hazards of unemployment, sickness and injury, dependant old age, premature death and liability claims. Bowers.
683 Unions and Collective Bargaining U G 5
Su. A. 3 cl.
Prereq.: 608.
Not open to students with credit for 657 or 694-695 or 780-781.
Development of unionism in the United States; structure and government of contemporary labor organizations; collective bargaining; settlement of labor-management disputes. Miller, Parnes, Levine.

684 Labor and the Government U G 3
Su. W. 3 cl.
Prereq.: 580.
Not open to students with credit for 683.
Public policy with respect to labor problems and industrial relations. Role of legislative, judicial, and executive branches of state and federal governments. Miller, Parnes, Levine.

688 Economics of the Labor Market U G 5
Sp. 3 cl.
Prereq.: 668.
Not open to students with credit for 650.
Materials and methods of labor market analysis; the measurement and behavior of unemployment, employers' and employees' labor market behavior; wage determination and labor allocation. Parnes.

690 Contemporary Economic Systems U G 3
Sp. 3 cl.
Prereq.: 403 or 404 or 406 or 502 or 504 or 506 or 507.
Comparative study of development and operation of economic institutions and principles in capitalistic, socialist, communist, and fascist economic systems. Lorenzstein.

697 Economics of Socialism U G 3
W. 3 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not open to students with credit for 633 or 669 or 671.
Survey of socialist thought and movements; relations of socialist thought to the theory and practice of socialist economics; planning, allocation, pricing, controls. Lorenzstein.

698 Soviet Economic System U G 5
Su. Sp. 5 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not open to students with credit for 533 or 564.
Survey of the Soviet economy with emphasis on planning; allocation of resources; spending, saving, and investing; public finance; agriculture; labor; and international economic relations. Gundrade.

699 Special Problems in Economics U G 1-5
Advanced courses in Econ. and related fields. Juniors registered for 699 must have an average of B or better in all Econ. courses and a cumulative point hour of 3.0 or better. 1-5 cr. hrs. each qtr. in any one field, repeatable to a maximum of 15 hrs. Senior Staff.
a. Economic Theory; History of Economic Thought
b. Economic History, American and European
c. Money and Banking
d. Public Finance
e. Economic Statistics; Econometrics
f. Business Fluctuations; National Income Accounting

g. International Economic Relations
h. Public Control
i. Labor
j. Institutions and Methods of Economic Planning
k. National Security Economics
l. Special Fields to be arranged

700 Honors Course U G 1-5
A. W. Sp.
Open only to students enrolled in the Honor Program of the College of Arts and Sciences or the College of Commerce and Administration. Repeatable to a maximum of 15 qtr. hrs., but must be taken for at least two quarters.
Program of readings, conferences and reports arranged for the student who is a candidate for "Degree with Distinction" in Economics. Dewsail.

National Security Policy Studies (See National Security Policy Studies 702-703-801.)

708 Intermediate Micro-economic Theory U G 5
Prereq.: 530 or 630.
Nature of economic analysis; theory of demand, costs, and prices; factor price determination and functional income distribution; competition, oligopoly, monopolies, and monopsony. Parnes, Miller, and Staff.

709 Intermediate Macro-economic Theory U G 3
A. W. 2 cl.
Prereq.: 708.
Theory of income and employment; Keynesian aggregate supply and demand; consumption, saving, and the multiplier; determinants of investment and the accelerator; government's role. James, Craig, Dewald, and Staff.

713 Economic History of the United States U G 5
W. 3 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not open to students with credit for 594-605-806 taken prior to 1958 or with credit for 816-817-818 taken after 1958.
General survey from discovery of America to present, European economic background, Westward movement and its effects. Development of economic institutions in the U. S. Harrison.

714* Economic History of Western Europe U G 5
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
General survey from ancient to modern times. Interrelations between economic institutions, general culture, and economic thought. Modern capitalism. Agricultural, commercial, and industrial revolutions in modern times. Harrison.

740 Statistical Analysis U G 2
A. 1-2 hr. cl.
Prereq.: 4 cr. hrs. of statistics.
Not open to students with credit for 703-704 or 743-744 or 710-711-712.
Elements of discrete and continuous probability theory and applications; Statistical inference and testing using binomial, Poisson, normal and t probability distributions. Tuttle, L'Esperance.
741 Statistical Analysis UG 2
W. 1 hr. cl.
Pre: 740.
Theory and application of chi-square and F distributions; analysis of variance; statistical design of experiments and surveys. Tuttle, L'Esperance.

742 Statistical Analysis UG 2
Sp. 1 hr. cl.
Pre: 741.
Simple, partial and multiple correlation and regression; multivariate probability distributions. Tuttle, L'Esperance.

745 Linear Programming and Economic Analysis UG 3
A. 3 cl.
Pre: 402 or 404 or 406 or 502 or 504 or 506 or 507. Math. 417 or 422, or permission of instructor.
Techniques of linear programming applied to economic problems of allocation and valuation within the firm. Tufis.

770 Economics of National Security UG 3
A. 3 cl.
Pre: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not open to students with credit for 691.
Analysis of economic problems arising from defense and war. Emphasis on implications of defense and war economy and on economic theory and institutions. Lerner, Sherman.

798 Special Studies in Economics UG 1-5
Advanced courses in Econ. and related fields. 1-5 cr. hrs. each qtr. in any one field. Not more than 5 cr. hrs. may be received in any one field or a total of more than 15 hrs. in the course. Senior Staff.
- Economic Theory; History of Economic Thought
- Economic History, American and European
- Money and Banking
- Public Finance
- Economic Statistics; Econometrics
- Business Fluctuations; National Income Accounting
- International Economic Relations
- Public Control
- Labor
- Institutions and Methods of Economic Planning
- National Security Economics
- Special Fields to be arranged.

800 Research Methods in Economics G 2
A, W. 1 hr. cl.
Methods of economic research, choice of research topics, and presentation and evaluation of results obtained. Required of all new graduate students in Economics. Coons, and Staff.

801 History of Economic Thought G 5
W. 3 cl.
Economic writings from the earliest times to Alfred Marshall (1890).

802 History of Economic Thought G 3
Sp. 3 cl.
Pre: 801.
Orthodox and critical authors from Alfred Marshall to J. M. Keynes.

803 History of Economic Thought G 3
W. 3 cl.
Pre: 802.
Not open to graduate students in Economics.
Economic writings from Smith to Keynes.

804 Modern Economic Analysis G 5
2 hr. cl.
Not open to students with credit for 816-817-818 taken prior to 1958-1959 or with credit for 804-805-806 taken prior to 1962-1963.
To be taken in sequence.
A. Sp. Advanced micro-economic theory
B. A. Advanced macro-economic theory

807 Theories of Welfare Economics G 3
Sp. 3 cl.
Pre: 708.
Study of economic standards and their application to economic welfare or well-being. Mathematical techniques are employed. Tufis.

810 Seminar in Economic Development G 3
W.
Pre: 610 or permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
Selected topics in economic development: theories of economic growth, problems of capital formation, investment criteria, economic planning.

811 Seminars in Economic History, American and European G 3
Sp.
Pre: 713 and 714, or permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
Selected research topics in Economic History. Harriman.

820 Monetary Theory G 3
W. 3 cl.
Pre: 620, 625, and 709.
Not open to students with credit for 863.
Role of money in theoretical analysis of forces determining and influencing level of income, employment, and prices. Craig, Davidson.

821 Central Banking and Monetary Policy G 3
Sp. 3 cl.
Pre: 620, 625, and 709.
Not open to students with credit for 864.

830 Seminar in Fiscal Economics G 3
W, S. 1 cl.
Repeatable to a maximum of 6 qtr. hrs.
Analysis of theoretical and applied aspects of fiscal economics in the American and foreign economies. Selected topics of current and permanent importance. Lynes.

831 Legal and Economic Problems in State and Local Taxation A.
Legal, economic and administrative problems of state and local taxation with particular attention to the State of Ohio and its local governments. (Offered in cooperation with the College of Law.) Lynes, Glidden.

A-63
COURSES OF INSTRUCTION
ECONOMICS

848 Seminar in Econometrics  G 2
Prereq.: Differential and integral calculus, and permission of instructor.
Repeatable to maximum of six hours.
Examination of economic problems whose solutions may advantageously be sought by use of the methods of mathematics and mathematical statistics. L'Esperance.

851 Seminar in Business Fluctuations and National Income Accounting  G 2
Sp.
Not open to students with credit for 844.
Current business cycle theory and national income accounting; evaluation of statistical measures of these phenomena; consideration and appraisal of recent literature in the field. Coons.

852 General Business Conditions Analysis  G 3
Prereq.: 20 cr. hrs. in Econ. and/or Bus. Org. and permission of instructor.
Not for graduate credit to majors in Economics.
Theoretical and applied analysis of general economic conditions and their relation to decisions of the firm. Craig, Coons, and Staff.

860 Seminar in International Economic Problems  G 3
A.
Prereq.: 665-666.
Not open to students with credit for 838.
Seminar in analytical problems, theoretical and applied, of international economic adjustments; development of techniques for implementation of policies. James.

870 Seminar in Economy and Policy W 3
W.  670 or 672 or 676 or 773.
Not open to students with credit for 834.
Economic bases for government participation in business activities: antitrust, regulation, and collective decision making.

871 Problems in National Security Economics W 3
3-5 credit hrs., at option of instructor.
Repeatable to a maximum of 10 credit hours.
Seminar designed to analyze in depth selected economic problems of national defense and defense-related activities. Sherman, Loesemann.

879 Political Economy W 3
Open only to doctoral candidates in Department of Business Organization.
An evaluation of selected topics in economics.

880 Seminar in Industrial Relations W 3
657 or 683, or permission of instructor.
Not open to students with credit for 643.
Selected topics and issues in contemporary trade unionism and collective bargaining. Miller, Barnes.

881 Seminar in the Economics of the Labor Market A 3
Prereq.: 650 or 688 or permission of instructor.
Selected topics and issues in wage determination, employment and unemployment. Miller, Barnes.

882 Seminar in Social Insurance G 3
Sp.
Prereq.: 639 or 686, or permission of instructor.
Not open to students with credit for 877.
Analysis of federal and state social insurance measures and economic problems raised by them, the place of social insurance in the economic system. Bowett.

891 Seminar in Institutions and Methods of Economic Planning G 3
Sp.
Prereq.: 690 or 697 or 698 or equiv. or permission of instructor.
Comparative analysis of economic planning, institutions and methods at national, regional, and local levels; consideration of degrees of planning ranging from centrally planned economies to quasi-public bodies. Lorenstein.

898 Seminar in Soviet Economic Problems W 3
Prereq.: 698 or permission of instructor.
Current problems of the Soviet economy; economic growth, price policies, changing structure of the economy. Condeide.

900 Interdepartmental Seminars G 1-5
(See under Interdepartmental Seminars.)

950 Research in Economics G Arr.
Research for thesis or dissertation purposes only.

Education
Office: 149 Arps Hall, 1845 North High Street.

PROFESSORS: JENSON (Chairman), ALBETY (Emeritus), FAWCETT (Emeritus), GOOD (Emeritus), HECK (Emeritus), STREITZ (Emeritus), THIEF (Emeritus), ZIBBBES (Emeritus), IALLEN, ANDERSON, MADIGAN, INBRETT, RUMIE, RASSER, DONOVAN, PUGH, CROW, COOK, COOON, CORBALLY, TIIUN, BERTSON, DALE, DIABITZ, JEBERTH, JEPSON, HAM, IFRASER, IFRID, IGURA, IHANNA, HARRINGHAM, IFRAZIER, IFRIMIE, YYIBA, IHADIA, IHARDING, IHAW, HENDRICKSON, IEHRRICK, IHREDS, IIHISON, IHUCK, IIHELSMAN, IJENNINGS, IIJEMET, IEKEM, IIKCHER, IILHOB, ILAUGHLIN, IILAZAB, LIVINGSTON, IMATZ, IMACH, IMACCA, IMACCA, IMERIE, IMER, IMJI, IMJAC, IMMAC, IMMOI, IMMEY, IMMUEI, IPETERS, IPHELPS, IRASSEY, IRAY, IRFSHEE, IFRETED, IIHICHIKSON, IISCHB, ISINGER, IISCHNEIDER, IISTAU, IISTEWART, ITOMLINSON, ITIMBLE, ITYLER, ITWANER, ITWELS, and ITWOHLERS; ASSOCIATE PROFESSORS: IIBRAUNER, ITYIPHEBT, ITBON, ITACK, HUNT, ITJOHNSON, ITKING, ITLARMEE, ITLEWIS, IOR, ITRAMET, ITROO, ITRODEN, ITSESSIONS, ITSTROM, ITSTTON, ITOWERS, ITWILLAMS, and ITZIDONIS; ASSISTANT PROFESSORS: ANDERSON, BRIDGES, CRAWFORD, CROSSWHITE, CULLINAN, FOGARTY, THOUGH, HOWE, KOSTE, LANGUS, T. MILLER, T. MILLER, SANDERS, SCHROEDER, SHREY, SMITH, STULL, SUES, TEPWSEBURY, and WOODRUFF.
### Areas

**Adult Education**—600B, 770, 771, 774, 800B, 835B, 896, 950.

**Audio Visual Materials**—6005, 602, 6068, 835S, 950.

**Curriculum and Supervision**—K12, 600Y, 701, 702, 704, 800Y, 863, 888, 887 950.

**Dental Hygiene Education**—507A.

**Educational Administration**—600M, 699, 727, 800M, 808, 823, 835M, 838, 877, 84, 85, 870, 871, 872, 873, 875, 876, 880, 890, 950.


**Exceptional Children**—537E, 537L, 600T, 608, 669, 611, 612, 613, 617, 619, 644, 850, 851, 866, 713, 718, 719, 720, 730, 735, 734, 735, 736, 794, 796, 772, 800T, 830T, 849, 950.

**Fine Arts**—520C, 536C.


**Health Education**—536M.

**Higher Education**—600E, 768, 800E, 812, 832, 835E, 845, 848, 890, 891, 884, 895, 950.

**Introduction to Education**—408.

**Music**—520A, 520B, 535A, 536B.


**Physical Education**—509A, 520T, 530T, 555T, 539T.


**Research Techniques**—600V, 710, 800V, 802, 804, 835V, 950.

**School Library Science**—503S, 550, 551, 552, 600W, 640, 647.

### Secondary Education

**General Field**—525E, 600X, 676, 703, 704, 705, 708, 800K, 831, 835K, 841, 865, 886, 950.

**Teaching of English**—536N, 600N, 663, 669, 670, 671, 674, 800N, 853N, 950.


**Teaching of Science**—536Q, 600Q, 604, 605, 606, 681, 706, 712, 800Q, 835Q, 851, 950.


### Vocational and Practical Arts Education


**Distributive Education**—530X, 600X, 717, 780, 781, 782, 800X, 835X, 950.


**Trade and Industrial Education**—536H, 575, 600H, 685, 800H, 833H, 950.

**Workshops and field experience**—505, 649, 682, 799.

### Education

401 **Beginning Typewriting**

A. **4 cl.**

Reqd. in the 2nd yr. of students majoring in business education who lack proficiency required for admission to Ed. 471.

Placement test for students having had previous training in typewriting will be given during the first class meeting of 401, 402, and 403. Students reporting for placement tests need not be registered in the course. Davis.

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<tr>
<th>Course</th>
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<th>Units</th>
<th>Remarks</th>
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</table>
| 402 | Beginning Typewriting | U 0 | W. 4 cl.  
Prereq.: 401.  
Continuation of 401. Davis. |
| 403 | Beginning Typewriting | U 0 | Sp. 4 cl.  
Prereq.: 402.  
Continuation of 402. Davis. |
| 404 | Beginning Shorthand | U 2 | A. 4 cl.  
Reqd. in the 2nd yr. of students majoring in business education who lack proficiency reqd. for admission to Ed. 471.  
Placement tests for students having had previous training in shorthand will be given during first class meeting of 404, 405 and 406. Students reporting for placement tests need not be registered in the course. Hanna. |
| 405 | Beginning Shorthand | U 2 | W. 4 cl.  
Prereq.: 404.  
Continuation of 404. Hanna. |
| 406 | Beginning Shorthand | U 2 | Sp. 4 cl.  
Prereq.: 405.  
Continuation of 405. Hanna. |
| 408 | Introduction to the Study of Education | U 3 | Su, A, W, Sp. 3 cl.  
Reqd. in teacher education program in all fields (except Fine Arts and Music) of freshmen and students transferring into education with less than 50 cr. hrs. Reqd. enrollment in the earliest possible quarter.  
An introductory study of cultural factors that affect education, with students helped to understanding through an examination of their own lives. Oppenheim and Staff. |
| 441 | Elements of Woodworking | U 4 | W. 5 2-hr. cl. and lab.  
Prereq.: 440 and 460 and Engr. Dr. 460.  
Experience in planning and developing skills and knowledge of the construction of articles made of wood and of the industries involved. Towers. |
| 442 | Elements of Woodworking | U 4 | A, Sp. 5 2 hr. cl. and lab.  
Prereq.: 441.  
Continuation of 441. Towers. |
| 443 | Elements of Metalworking | U 4 | W. 5 2-hr. cl. and lab.  
Prereq.: 440, 460, Engr. Dr. 460.  
Experience in planning and developing skills and knowledge of the construction of articles made of metal and of the industries involved. Ensign. |
| 444 | Elements of Metalworking | U 4 | A, Sp. 5 2-hr. cl. and lab.  
Prereq.: 440, 460, Engr. Dr. 460.  
Continuation of 443. Ensign. |
445 Elements of Printing U 4
A. Sp. 5 2-hr. cl. and lab.
Prereq.: 440, 460 and Engr. Dr. 400.
Experience in letter press, planography, and miscellaneous processes of printing, binding, and an over-view of the graphic arts industry. Haus.

446 Elements of Electricity in Industrial Arts U 4
W. 5 2-hr. cl. and lab.
Prereq.: 440, 460 and Engr. Dr. 400, Math. 416 and Physics 413.
An introduction to the principles and practices of electricity and electronics as these apply to industrial arts programs in secondary schools, and a study of the industries involved. Haus.

450 Introduction to Power Mechanics U 4
A. 5 2-hr. cl. and lab.
Prereq.: 440, 460, Engr. Dr. 400, Physics 411, and Math. 416.
An introduction to the field of industrial arts power and transportation. An overview of the design, function, and operation of internal combustion engines and their auxiliaries. Staff.

451 Internal Combustion Engines U 4
W. 5 2-hr. cl. and lab.
Prereq.: 450.
A technical study of internal combustion engines and automotive, marine, and aircraft equipment. Experiences in engine analysis, malfunction diagnosis, maintenance, and repair. Staff.

456 Residential and Industrial Utilization of Electrical Power U 4
Sp. 5 2-hr. cl. and lab.
Prereq.: 440.
an introduction to the principles and practices of electricity and electronics applicable to industrial arts programs in secondary schools, and a study of the industries involved. Haus.

460 Problem Planning in Industrial Arts U 3
A. Sp. 2 2-hr. cl. and lab.
Prereq.: Engr. Dr. 400 or 401.
The planning of problems and projects suitable for the different areas and grade levels of the secondary school with references to function, style, and construction. Haus.

471 Advanced Shorthand, Typewriting, and Transcription U 4
A. 5 2-hr. cl.
Prereq.: Educ. 3rd yr. standing or Com. and Ad. 2nd yr. standing, and 403 and 406 or permission of the instructor.
For placement test in typewriting and shorthand, see Ed. 401 and 404. Continued skill developments with emphasis upon transcription and business report and letters. Jackson.

472 Advanced Shorthand, Typewriting, and Transcription W.
Prereq.: 471.
Continuation of 471. Jackson.

473 Advanced Shorthand, Typewriting, and Transcription Sp.
Prereq.: 472.
Continuation of 472. Jackson.

503 Organization and Administration of the School Librery U 3
W. 3 cl.
Practice in essential library routine. Purchase of materials, preparation for use, care and repair of books, simple loan systems will be emphasized.

505 Field Service Projects in Education U 2-15
Su., A, W., Sp. 2 cl., lab. arr.
Professional service with children or youth in some school or community agency. Supervision by both college and agency staff, weekly seminar and evaluation paper. Anderson and Staff.

School Related Experience

505A Interpretation of September Field U 2
experience in Schools A.
Limited to students who have completed 10 full school days of service in schools in the immediately preceding September.

505E A, Sp. U 3
For students in the Speech and Hearing Therapy Curriculum.

505K A, W., Sp. U 3
For students in the Able Student Program.

Experience in Community Agencies—Non School

505B A, W., Sp. U 2-15
For students in all curricula in teacher education (elementary, secondary, and special subject areas) except those students registering for the special sections as listed below.

505C A, W., Sp. U 2-5
For students in the curriculum in Fine Arts Education.

For students in the curriculum in Public Recreation.

505S A, W., Sp. U 2-5
For students in the curriculum in Physical Education for Men.

505T A, W., Sp. U 2-5
For students in the curriculum in Physical Education for Women.

505U Su., A, W., Sp. U 2-5
For students in the curriculum in Speech and Radio-Speech.

509 Kindergarten and Pre-School Teaching U 3
Su., A, W., Sp. 3 cl., and observation.
Prereq.: 514 or equiv.
Recent development in the education of young children and its influence on the selection and guidance of appropriate activities. Miller, Foster.

510 Elementary Education: Arithmetic U 3
Su., A, W., Sp. 3 cl.
Prereq. or concurs.: 514 and Math. 410.
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. Harding and Still.
Observe, participation, and responsible teaching in a public school in the greater Columbus area. Individual and group conference or seminars. (Maximum transfer credit accepted is 6 hrs.) Miller, Foster, and Staff.

516A A, W, Sp. U 6-15
For students in the regular elementary education degree program.

For approved students with 3 or more yrs. of successful teaching experience.

516C Sp. U 6
For students in the program for graduates with Bachelor of Arts or comparable degrees.

516D Sp. U 6
Second enrollment for students in the Study-Service Program.

520 Elementary School Student Teaching U 3-7
In Special Fields
Prereq.: 3rd yr. standing. Educ.
Andrews and Staff.

520A Instrumental Music U 3-7
Wilson, Brenner.

520B Vocal Music U 3-7
Thomas.

520C Fine Arts U 3-7

520S Physical Education (Men) U 3-7
Cootes.

520T Physical Education (Women) U 3-7
Schoreder.

521 Introduction to Children's Literature U 3
Su, A, W, Sp. 3 cl.
Prereq. or concur.: 514.
Study of literature for children with emphasis on standards for selecting materials with reference to the interest, needs, and abilities at different age levels. Kotses, Huch, Ramsey.

522 Elementary Schools Industrial Arts Activities U 5
Su, A, W, Sp. 5 2-hr. cl., and lab.
Prereq.: 514 or equiv. Major standing in Elementary or Special Education.
Laboratory experiences involving the use of tools, materials, processes, and products through which society supplies its needs for food, clothing, shelter, tools, machines, records, utensils, and transportation. Haws and Staff.

528 Elementary Education: Science U 3
Su, A, W, Sp. 3 cl.
Prereq.: 514 and Bot. 402; Zool. 401 or Chem. 402, Physics 432 or Geol. 418.

A-67
## COURSES OF INSTRUCTION

### EDUCATION

<table>
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<tr>
<th>Course Code</th>
<th>Title of Course</th>
<th>Credits</th>
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<td>535</td>
<td>Theory and Practice in Secondary Education</td>
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<td>536</td>
<td>Student Teaching in Secondary Schools</td>
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<td>536A</td>
<td>Instrumental Music</td>
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<td>Continuation of 530A, Benner, Wilson.</td>
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<td>536B</td>
<td>Vocal Music</td>
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<td>Wells, Hanna.</td>
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<td>537</td>
<td>Student Teaching in Special Fields</td>
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<td>Dental Hygiene Education</td>
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<td>School Psychological Service</td>
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<td>538</td>
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<td>Social Studies</td>
<td>3-15</td>
<td>U</td>
</tr>
<tr>
<td></td>
<td>Jewett.</td>
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</tbody>
</table>
542 Teaching Stenographic and Clerical Subjects U 3
A. 3 cl.
Prereq.: 4th yr. standing and 403, 406 or equiv., 535.
Objectives, methods, classroom procedures, and materials for teaching shorthand, transcription, typewriting, office practice, and business English. Wells.

543 Teaching Bookkeeping and Office Machines U 3
A. 3 cl.
Prereq.: 4th yr. standing and 535, Acc. 403 or 413 or 503.
The objectives, methods, classroom procedures, and materials for teaching bookkeeping and accounting, office machines and business arithmetic. Hanna.

544 Teaching the Basic Business Subjects U 3
W. 3 cl.
Prereq.: 4th yr. standing and 25 cr. hrs. in Geog., Econ., and Bus. Org., and 535.
Objectives, methods, classroom procedures, and materials for teaching general or consumer business, business law, economics, business organization, and salesmanship in the high school Wells.

547 The Teaching of Driver Education U 3
Su, A, Sp. 1 2-hr. cl., 2 hr. lab.
Prereq.: 4th yr. standing, valid driver's license and 535.
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. Towers, Beatty.

550* Library Materials for the Secondary Schools U 3
Sp. 3 cl.
Prereq.: 535.
Course is designed to develop ability in the choice of materials for library collection. Criteria, book selection aids, and evaluative study of materials are included.

551* Classifying and Cataloging in the School Library A.
Prereq.: 535.
Introduction to the principles of classifying and cataloging the simpler types of library materials.

552 Practice Library Work U 5
Sp. Cl. and lab. arr.
Prereq.: 503, 550, 551.
Designed to bring students into touch with actual library conditions through practice work in approved school libraries.

560 Letter Press and Offset Printing U 4
W. 5 2-hr. cl. and lab.
Prereq.: 445, Photo. 511.
Experience in letter press, photolithography, composition, bookbinding, editing, and publishing a limited edition. Professional consideration include course materials, and planning a graphic arts laboratory. House.

561 The Teaching of Industrial Arts I U 3
A. 4 cl.
Prereq.: 3rd yr. standing, and 535.
A critical study of objectives, methods of presentation, evaluation class and laboratory procedures, and professional problems. Warner.

562 The Teaching of Industrial Arts II U 3
W. 3 cl.
Prereq.: 3rd yr. standing, and 561.
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. Towers.

563 The Teaching of Industrial Arts III U 3
Sp. 3 cl.
Prereq.: 3rd yr. standing, and 561.

575 Trade and Industrial Education U 3-6
A, Sp. Cl. hrs. arr.
Prereq.: Temporary vocational teaching certificate in a trade or industrial subject, or eligibility for such certificate, and permission of instructor.
Repeatable to a maximum of 18 cr. hrs.
Reese.

581 Work Experience in Industry U 3-6
Su, A, W, Sp. 5 2-hr. cl.
Prereq.: Major standing in Indus. Arts or Trade and Indust. Ed., and permission of instructor.
Credit in 595, 536, and 581 not to exceed 22 hrs.
A first hand study of the working conditions, methods, and processes of industry and their implication for the teaching of industrial arts.

585 The Handicrafts U 4
A, W, Sp. 5 2-hr. cl. and lab.
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 art. Ray, Suss.

600 Individual Studies in Education U G 1-4
Prereq.: 514 and permission of instructor.
600A Business Education Wells, Hanna.
600B Adult Education Hendrickson.
600C Elementary Education Burr, Harding, Huck, Tomlinson, Ramsey, King, Teasbile, Fraser, Stem.
600D Guidance Kemp, Riccio, Piers.
600E Higher Education Anderson, Burnett, Kesper.
600F History of Education and Comparative Education Sutton, Mehl, Mosca, Sanders.
600G Industrial Arts Education
600H Trade and Industrial Education Reese.
600I Philosophy of Education Kircher.

A-69
600J Radio and Television Education
Tyler.
600K Secondary Education
600M Educational Administration
600N Teaching of English
Eberhart, Zidona.
600O Teaching of Foreign Language
Allen.
600P Teaching of Mathematics
Crosswhite, lesser, Trumbull.
600Q Teaching of Sciences
600R Teaching of Social Studies
Jewett, Souers, Shaver.
600S Audio-Visual Materials of Instruction
Date.
600T Exceptional Children
Lewis.
600U Speech Education
600V Research Techniques
600W Library Science
600X Distributive Education
Logan.
600Y Curriculum and Supervision: K-12
Klohr.

601 Radio and Television in Education U G 3
A. 2 2-hr. cl.
Prereq.: 4th yr. standing.
The varied types of educational broadcasting in relation to objectives, planning, production, utilization, and evaluation. Tyler.

602 Audio-Visual Materials of Instruction U G 3
Su, A, W, Sp. 3 cl. hrs.
Prereq.: 4th yr. standing.
The contribution of audio-visual materials to educational objectives emphasizing the classroom use of such materials, utilization practices, basic sources of information, selection, and evaluation of field trips, films, records, etc. Miller.

604 The Teaching of Secondary School U G 4
Science
Su, A, W, Sp. 4 cl.
Prereq.: 535 and a major or minor in physical or biological science.
Not open to students with credit for 683-684.
Objectives, problems and procedures, preparing teaching plans, use of demonstrations, experiments and projects, science curriculum and evaluation, materials and procedures, tests and reference materials. Schlessinger, House, Richardson.

605 Problems in the Teaching of Biological Science U G 3
Su, A, W, Sp. 3 2-hr. cl.
Prereq.: 604, Bot. 402, Zool. 401.
Not open to students with credit for 540.
Use and design of simple apparatus, demonstrations and experiments; collection and preservation of biological materials; the role of the living organism in the classroom. Schlessinger, House.

606 Problems in the Teaching of Earth Science U 3
A, Sp. 3 2-hr. labs.
Prereq.: 604 and 30 qtr. hrs. in Earth Science courses.
Use of the laboratory and local field environment in teaching earth science; materials, demonstrations and experimental methods. Shrum.

607 Philosophy of Education U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 4th yr. standing.
A study of various philosophies of education and their influences on methods, choice of subject matter, and the administration of the public schools. Kircher, Mehl and Staff.

608 Principles and Methods of Teaching U G 3
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. Hunt.

609 Principles and Methods of Teaching U G 3
Braille: Advanced
Su, W. 3 cl.
Theory and practice in learning and teaching braille reading and writing with emphasis on contractions, punctuation, manuscript writing. Preparation for certification in braille writing. Hunt.

611 Techniques of Teaching Speech to the Deaf U G 3
Su, A. 3 cl.
Study and practice in developing speech in the deaf. Crawford.

612 Methods in Speech and Hearing Therapy U G 3
Sp. 2 2-hr. cl.
Prereq. or concur.: 516 or 535 or equivo., Speech 683 and 697.
Organizing and hearing therapy programs in schools. State requirements; professional relationships; "Coordination Day" evaluation of progress; observation and child study; group vs. individual instruction. Brittin.

613 Behavioral Aspects of Language Disabilities U G 3
W. 2 2-hr. cl.

617 Evolution of Instruction and Guidance of the Deaf W. 3 cl.
Prereq.: Psycho. 609.
Evolution of the oral and manual approaches of instruction of the deaf and their implication for the life adjustment problems of the deaf. Crawford.

619 Principles and Methods in the Education of Partially Seeing Children
Su, W. 3 cl.
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 partially seeing. Hunt.

A-70
624 Social Education  UG 3
Su, W.  3 cl.
Prereq.: 3rd yr. standing and 514 or 535 or permission of instructor.

Analyses of social structures and processes in classroom groupings; teacher social roles; school traditions, ceremonies, clubs, and athletics. Jewett.

627 The Teaching of Speech in Secondary Schools  UG 4
Su, Sp.  4 cl.
Not open to students with credit for 675.

The relationship of speech to the total school program with special emphasis on fundamental processes, forensic activities, and radio speech. Lewis.

628 Teaching Dramatic Arts in Secondary Schools  UG 3
Su, A.  3 cl.
Prereq.: 535, Speech 205, 521, 541, and 545.

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.

632 The History of Western Education  UG 4
Su, A, W, Sp.  4 cl.
Development of educational systems in the Western world since ancient times; education in relation to other social institutions; continuity of its evolution. Sutton, Meal. and Staff.

636 Historical Foundations of American Education  UG 4
W.  4 cl.
Development of education in the United States since colonial times. Major emphasis on American education since 1830, including twentieth century developments. Meal.

641 History of Practical Arts and Vocational Education  UG 3
A.  2 cl.
Prereq.: Educ. or Agric. 3rd yr. standing.

History of those vocational and non-vocational phases of agriculture, business, industry, and homemaking which concern education. Warner.

643 Science in Elementary Education  UG 3
Su, Sp.  3 cl.
Prereq.: 518 or 538 or 3 yrs. of teaching experience.

The significance of research for elementary school sciences, the relation of sciences to the elementary school curriculum, and the functions of supervisory personnel. Ramsey.

644 Practicum in Educational Planning for Partially Seeing Children  UG 3
Su, Sp.  3 cl.
Prereq.: 619.

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.

646† Use of Library Materials in Teaching  UG 3
3 cl.
Prereq.: 521 or equiv.

Includes selection, evaluation, and study of library materials correlating with units of work in elementary grades or high school.

647† Reference Work in the School Library  UG 3
3 cl.
Prereq.: 514 or 535.
Includes study of the basic reference materials such as encyclopedias, dictionaries, atlases, handbooks, gazetteers, pamphlets, and bulletins.

649 Practicum in Problems of Public Education  UG 3
Su, A, W, Sp.  3 cl.
Prereq.: 514 or 535 or equiv.
Repeatable to a maximum of 9 cr. hrs.

Open to experienced teachers and administrators. Groups are organized around specific problems. Requests must be received by department chairman in time to allow for planning.

650 Techniques of Developing Language in the Deaf  UG 3
Su, A.  3 cl.
Prereq.: Psycol. 609, Speech 689.

A study of the techniques and procedures for developing elementary vocabulary and syntax for deaf children. Crawford.

651 Techniques of Developing Advanced Language in the Deaf  UG 3
W.  3 cl.
Prereq.: 650.
Study of techniques and procedures for developing advanced vocabulary and syntax with deaf students. Crawford.

654 Mathematics in Elementary Schools  UG 3
Su, A.  3 cl.
Prereq.: 518 or 536 or 3 yrs. teaching experience.
Not open to students in elementary education except by permission of departmental adviser.

Applications of research and theory to improvement of children's competence in computation and problem solving. Organization of instructional programs and contemporary instructional questions are considered. Harding.

655 Industrial Arts in the Elementary School  UG 3
W.  3 cl.
Prereq.: 440 or 522 or equiv.
Selection, development, and evaluation of typical experience units in both classrooms and practical arts laboratory situations at all levels of the elementary school. Hess.

656 Language Arts in the Elementary School  UG 3
Su, Sp.  3 cl.
Prereq.: 518 or 536 or 3 yrs. teaching experience.
Not open to students in elementary education except by permission of departmental adviser.

Problems and concerns for inservice teachers stressing current methods, issues and practices through study of significant literature and research findings. Buck.

657 Social Studies in the Elementary School  UG 3
Su, A.  3 cl.
Prereq.: 518 or 538 or 3 yrs. teaching experience.
Not open to students in elementary education except by permission of departmental adviser.

The educational values of social studies, reasons for, and ways and means of integrating history, geography, and civics. Burr, Frazier, Tomlinson.

A-71
659 Teaching Mathematics in Secondary U G 4
Schools I
Su, A, W, Sp. 4 cl. and 20 hrs. participation, during the qtr. in appropriate secondary school Math. classes.
Prereq.: 535 and Math. 440.
A study of the concepts and principles of mathematics appropriate for secondary school students, including a consideration of teaching procedures applicable to mathematics. Crosslisted.

660 Teaching Mathematics in Secondary U G 4
Schools II
A, W, Sp. 4 cl.
Prereq.: 659.
Selected problems in the teaching of mathematics, preparation and evaluation of teaching materials including textbooks, library books, study guides, and multisensory aids. Crosslisted.

661 Guidance Problems in the U G 3
Elementary School
W. 3 cl.
Prereq.: 514 or 535.
Selected problems which the elementary teacher faces in providing individual, small-group, and large-group guidance. Tomlinson.

663 Grammar-Usage Materials for U G 3
High-School Teachers
Su, A, W. 3 cl.
Prereq.: Engl. 418.
A study of traditional and modern linguistic systems of grammar and their bearing on the work of the English teacher. Zidonis.

666 Introduction to the Education of U G 3
Mentally Retarded Children
Su, A, W. 3 cl.
Prereq.: Psychol. 609.
Study of causal factors, evaluations, learning potential, and general characteristics of the retarded child. Cashin, Amen.

667 Instructional Programs for U G 3
Exceptional Children
Su, A. 3 cl.
Prereq.: 15 cr. hrs. in Psych.
Problems, evaluation, adjustments related to the participation of exceptional children in the regular classroom, grades one through twelve.

669 Literary Material for English and U G 3
Social Studies
Su, A, W, Sp. 3 cl.
Prereq.: 535.

670 Teaching Literature in Secondary U G 4
Schools
Su, A, W, Sp. 4 cl.
Prereq.: 535 and 20 cr. hrs. in Engl. including Engl. 410 and 564. At least one of the two courses in methods of teaching Eng. (Educ. 670, 671) must be completed prior to student teaching and the other not later than concurrently with student teaching.
The objectives of the literature program and techniques for developing appreciation and improving skills in the reading of various types of prose and poetry. Eberhart, Zidonis.

671 Teaching Grammar and Composition U G 4
in Secondary Schools
Su, A, W, Sp. 4 cl.
Prereq.: 535 and 20 hrs. in Engl. 564. At least one of the two courses in methods of teaching Eng. (Educ. 670, 671) must be completed prior to student teaching, and the other not later than concurrently with student teaching.
The role of grammar and linguistics in the English program and techniques for the teaching of oral and written expression in high school. Eberhart, Zidonis.

674 The Supervision of Journalism in U G 3
Secondary Schools
Su, W. 3 cl.
Prereq.: 535 or equiv.
Not open for graduate credit to jour. majors.
For journalism teachers in secondary schools and advisors. Covers editorial, advertising, circulation, mechanical production, and publishing phases of school newspapers, magazines, and annuals. Brown.

676 The Core Program in the Junior U G 3
High School
A. 3 cl.
Prereq.: 535 or equiv.
A study of the various types of core programs, their nature, development, organization, and evaluation, with special emphasis upon teaching-learning procedures.

677 The Teaching of the Social U G 4
Studies I
A, W, Sp. 4 cl.
Prereq.: 535 and Hist. 404 or 493.
Illustrative materials will be drawn primarily from history, with some attention to the other social studies. Meszig.

678 The Teaching of the Social U G 4
Studies II
Su, A, W, Sp. 4 cl.
Prereq.: 535 and Hist. 404 or 493.
A continuation of Ed. 677. The illustrative materials will be drawn primarily from fields of economics, sociology, and political science, with some attention to geography and anthropology. Jewett.

681 Laboratory Practicum for Teachers U G 2-3
of Science
Su, A, W, Sp. 3 3-hr. cl.
Prereq.: 535 or 634 or equiv. and major or minor standing in Physics, Chem., Physics-Chem., or Comprehensive Science.
Repeatable to a maximum of 5 cr. hrs.
The preparation, assembly and construction of demonstration and laboratory apparatus and visual aids as related to their use in science teaching. Schleister.

682 Field Laboratory in Conservation U G 6-8
Education
Su.
Prereq.: 514 or 535 or permission of instructor. Full
time for first term.
Courses on conservation education. Cooperatively staffed by four state universities of Ohio. Descriptive leaflet available from Departments of Education at Kent, Miami, Ohio, and Ohio State University. Johnson and Staff.
688 Methods and Techniques of Teaching Romance Languages I U G 4
4 cl.
A. W. For French majors and minors.
B. Sp. For Spanish majors and minors.
Prereq. or concur.: 535.
Practice in the use and preparation of teaching materials, tapes, discs, and other types of audio-visual aids. Allen.

689 * Field and Laboratory Work for Teachers of Mathematics U G 3
Su. 2 3-hr. cl.
Prereq.: 660 or equivo. and a major or minor in Math.
The laboratory teaching of mathematics. Actual experience with a wide variety of physical devices including classroom equipment and field instruments. Crosslist.

692 The Teaching of Modern Foreign Language U G 4
A. W. 4 cl.
a. A. The Teaching of French II
b. A. The Teaching of Spanish II
c. W. The Teaching of German
d. W. The Teaching of Russian
Prereq.: 535, and French 410 and 515, Spans. 410 and 517, or Ger. 503 and 15 additional hrs. in Ger., or Russ. 403 and 414.
Study of the preparation and use of new instructional materials. Evaluation and testing. Practical problems in the teaching of vocabulary, pronunciation, grammar, and reading.

694 The Teaching of Latin U G 3
Sp.
Prereq. or concur.: 555, Latin 407, 408, and an additional 6 cr. hrs. in Latin.

695 Trade and Industrial Vocational Education for Out-of-School Youths and Adults U G 3
A. 3 cl.
Prereq.: 575 or equivo. and permission of instructor.
Teaching or supervising experience reqd. for grad. credit.
Philosophy, facilities, subject matter, instructional methods, teacher education, supervision, coordination, records and reports, types of programs and relationships. Reese.

699 Student Activities in the Secondary School U G 3
A. 3 cl.
Prereq.: 535 or equivo.
A study of the student activities program including house room, assemblies, clubs, publications, debating, dramatics, social activities, athletics, administration, and financial control. Loughlin.

701 Fundamentals of Curriculum U G 3
Prereq.: 703 or 747.
Not open to students with credit for 707, 824, or 831.
A beginning course in curriculum designed to serve as an overview of the field of curriculum and instruction: Kindergarten through 12 grade. Kilbr.

702 Fundamentals of Supervision G 3
Prereq.: 701.
Not open to students with credit for 826 and 829.
A beginning course in supervision of instruction emphasizing general principles and practices in elementary and secondary schools. Kohr, Burr.

703 The Role of the Secondary School in the Social Order G 3
Su. W, Sp. 3 cl.
Prereq.: 518 or 536 or equivo.
An orientation course for teachers and administrators which deals with the basic purposes of secondary education in relation to major issues and current trends. Frymier.

704 Laboratory Study of the Ohio State University School G 3
Su. Sp.
Prereq.: 514 or 525 or equivo.
Reqd. minimum of 13 hrs. of observation.
The philosophy and program of the University School, as revealed through reading, directed observation, and planned conferences with the staff. Jennings.

705 Trends in the Organization of Secondary Education G 3
Su. A, Sp. 3 cl.
Prereq.: 518 or 536 or equivo.
Historical background and present status of American secondary education, district organization, vertical and horizontal organization, state and federal control. Hough.

706 The Supervision of School Science Programs G 3
W, Sp. 4 cl.
Prereq.: 604 or equivo. and teaching or supervisory experience.
For those concerned with the supervision of teacher training programs in science. Objectives, curricula, recent trends, classroom management, evaluation of teaching, professional literature. Richardson.

708 Evaluation in Secondary Schools G 3
Su. A, W. 3 cl.
Prereq.: 518 or 536 or equivo.
Study of techniques of evaluation in secondary schools. Attention is given to current evaluation practices with emphasis on procedures appropriate to Ohio schools. Frymier.

710 Introduction to Educational Research G 3
Su. A. W, Sp. 3 cl.
Prereq.: 518 or 536 or equivo.
Not open to students with credit for 802.
Problems in the philosophy and logic of educational research. Application of research methods to the solution of classroom problems. Techniques of inquiry and research design.

711 History of the Universities G 3
Su. Sp. 3 cl.
The university as an institution through ten centuries; patterns of development in different countries; German, English, American contributions to the ideas of the American university. Sutton.

712 Science in the School Curriculum G 3
Su. 3 cl.
Prereq.: 708 or equivo.
Foundations for science curriculum, current developments, planning and evaluation procedures, research.
713 Educational Planning for Mentally Retarded Children and Youth U G 3
Su, W.
Prereq.: 688 or equiv.
Not open to students with credit for 778.
A basic course for teachers and administrators which deals with curriculum goals and related educational planning for mentally retarded children and youth. Credit.

714 Industrial Arts Curriculum Planning U G 3
Su. 3 cl.
Prereq.: 526 or equiv.
Review of resource reports, general and special criterion developments, formulation of curriculum guides, and laboratory manuals of instruction. Towers.

715 Planning Industrial Arts Facilities U G 3
Su. 3 cl.
Principles of industrial arts and technical laboratory planning including equipment selection for all school levels and meeting all curriculum requirements. Towers.

717 Survey of Vocational Education U G 3
Su. 2 cl.
Prereq.: 533 or equiv.
Open to superintendents, secondary school principals, supervisors of Indus. Arts, Vocational Ed. guidance personnel, and teachers of Indus. Arts and Vocational Ed.
A survey of vocational education, vocational guidance, and industrial arts. Logan and Staff of the Division of Vocational Education of the State Department of Education.

718 Practicum in Educational Planning for Mentally Retarded Children; Communicative Arts; Arithmetic; Natural and Social Science U G 3
Su, W. 3 cl.
Prereq.: 688 and 713.
Casino.

719 Practicum in Educational Planning for Mentally Retarded Children; Communicative Arts; Arithmetic; Natural and Social Science U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 718.
Continuation of 718. Casino.

720 Practicum in Educational Planning for Mentally Retarded Children; Communicative Arts; Arithmetic; Natural and Social Science U G 3
Su, Sp. 3 cl.
Prereq.: 719.
Continuation of 719. Casino.

722 Principles of Business Education U G 3
A. 3 cl.
Prereq. or concur.: 4th yr. standing and 542 or 543.
Meaning, purpose, and scope of the total business education program. The course is designed specifically for business teachers and administrators. Hanna.

723 Organization and Teaching of Office Practice U G 2
Su.
Prereq.: 4th yr. standing and Bus. Org. 516.
The purpose, content, organization, and materials for an office practice course with practical application in an office practice laboratory. Welz.

724 Administration and Supervision of Business Education U G 3
Su. 3 cl.
Prereq. or concur.: 4th yr. standing and 542 or 543.
Administrative problems involved in the evaluation of the business education program and facilities, co-operative training programs, placement and follow-up graduates, and public relations. Hanna.

725 Improvement of Instruction in Basic Business Subjects U G 3
Su. 3 cl.
Prereq.: 543 or equiv.
A study of objectives, methods, and materials for courses such as general business and business law. Development of units of work. Welz.

726 Teaching Bookkeeping and Related Subjects U G 2
Su.
Prereq.: 543 or equiv.
Evaluation of the content and methods of teaching bookkeeping, accounting, and business arithmetic. Improvements in materials, tests, standards, and teaching procedures are considered. Hanna.

727 Introduction to School Administration U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 518 or 519 or equiv.
The nature of educational administration—its purposes, the tasks, situational factors, processes; qualifications for the job-personal assessment, preparation, continued growth, professional opportunity and challenge. Ramsay, Lerner, Laughlin, Hack, Staub.

728 Improvement of Instruction in Secretarial Subjects U G 2
A, W. 2 cl.
Prereq.: 542 or equiv.
Teaching procedures basic to the development of vocational proficiency in typewriting, shorthand, and transcription. Available instructional materials, evaluation, standards of achievement. Welz.

730 Educational Implications of Visual Impairments U G 3
Su. A. 3 cl.
Prereq.: Biol. 402 or Zool. 400, and Zool. 401 or equiv. and/or concur. Psychol 609.
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. Hunt.

731 Trends and Issues in Teaching Reading in the Elementary School U G 3
Su, Sp. 3 cl.
Prereq.: 658 or permission of instructor.
An evaluation of the current trends and issues in the teaching of reading based upon the study of historical conceptions and comprehensive research in the field. Ring.
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Prerequisites</th>
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<tr>
<td>732</td>
<td>Theory and Practice in the Education of Blind Children</td>
<td>U G 3</td>
<td>Su, Sp. 3 cl.</td>
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<td>Prereq.: 730.</td>
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<td>734</td>
<td>Teaching Reading and Arithmetic to the Deaf</td>
<td>U G 4</td>
<td>W. 4 cl.</td>
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<td>Prereq.: 850.</td>
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<td>735</td>
<td>Teaching Social Studies and Science to the Deaf</td>
<td>U G 3</td>
<td>Sp. 3 cl.</td>
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<td>Prereq.: 734.</td>
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<td>736</td>
<td>Education of Multihandicapped Children</td>
<td>U G 3</td>
<td>Su, Sp. 3 cl.</td>
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<td>Prereq.: Psychol. 600.</td>
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<td>741</td>
<td>Advanced Course in Children's Literature</td>
<td>U G 3</td>
<td>W. 3 cl.</td>
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<td>Prereq.: 521 or 656.</td>
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<td>747</td>
<td>Foundations of Elementary Education</td>
<td>G 3</td>
<td>Su, A. 3 cl.</td>
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<td>748</td>
<td>The Changing American Elementary School</td>
<td>G 3</td>
<td>Su, W. 3 cl.</td>
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<td>Prereq.: 518 or 536 or teaching experience.</td>
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<td>749</td>
<td>Evaluation in Elementary Schools</td>
<td>G 3</td>
<td>Su, Sp. 3 cl.</td>
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<td>Prereq.: 518 or 536 or teaching experience.</td>
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<td>750</td>
<td>Introduction to Guidance Services</td>
<td>U G 3</td>
<td>Su, A, W, Sp. 3 cl.</td>
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<td>Prereq.: 535.</td>
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<td>752</td>
<td>Group Processes</td>
<td>G 3</td>
<td>Su, A, W, Sp. 3 cl.</td>
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<td>Prereq.:</td>
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<td>753</td>
<td>School Problems in Child Development</td>
<td>G 3</td>
<td>Su, Sp. 3 cl.</td>
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<td>Prereq.: 750 or equiv.</td>
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<td>754</td>
<td>Organization and Administration of Guidance Services</td>
<td>G 3</td>
<td>Su, A, W, Sp. 3 cl.</td>
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<td>Prereq.: 750.</td>
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<tr>
<td>756</td>
<td>Resources for Educational and Vocational Guidance</td>
<td>G 3</td>
<td>Su, A, W, Sp. 3 cl.</td>
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<td>Prereq.: 750 or equiv.</td>
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<td>757</td>
<td>Conceptions of Mind in Educational Theory</td>
<td>U G 3</td>
<td>Su, W. 3 cl.</td>
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<td>Prereq.: 607 or equiv.</td>
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<td>758</td>
<td>The Thinking Process in Its Educational Bearings</td>
<td>U G 3</td>
<td>Su, Sp. 3 cl.</td>
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<td>Prereq.: 607 or equiv.</td>
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<td>759</td>
<td>Modern Trends in Educational Philosophy</td>
<td>U G 3</td>
<td>Su, A. 3 cl.</td>
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<td>Prereq.: 607 or equiv.</td>
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<td>760</td>
<td>Moral and Religious Ideals in Education</td>
<td>U G 3</td>
<td>Su, Sp. 3 cl.</td>
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<td>Prereq.: 607 or equiv.</td>
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COURSES OF INSTRUCTION

EDUCATION

761 The Use of Certain Concepts of Philosophy and Logic in the Teaching of Mathematics
Su, W, Sp. 3 cl.
Prereq.: 660 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. Lanzara.

762 The Teaching of Algebraic Concepts
U G 4
Su, Sp. 4 cl.
Prereq.: 660 or equiv.
The role of algebra in the secondary school, the selection of major concepts, the development of relational thinking and teaching procedures which emphasize mathematical structure. Trimble, Crousewhite.

764 Supervised Teaching in Special Classes
U G 3-5
Prereq.: 518, or 536. Psychol. 609 or permission of instructor.
Student teaching for qualified students in any area of special education, including the special curriculum in speech and hearing therapy.

766 Education of the Emotionally and Socially Maladjusted
U G 3
Su, Sp. 3 cl.
Prereq.: Psychol. 609.

768 Directing Student Teaching
G 3
Su, A, W, Sp. 3 cl.
Prereq.: Teaching certificate and teaching experience.
Principles and techniques for public school teachers and college instructors in supervising student teaching and other professional laboratory experience in teacher education. Andrews.

770 Adult Education
U G 3
Su, A, W. 3 cl.
Prereq.: 4th yr. standing, for Ed. Majors, 514 or 535.
The nature, extent, and significance of adult education; psychological characteristics of the adult; history and types of adult education; present trends and future developments. Hendrickson.

771 Parent Education
U G 3
Su, W. 3 cl.
Prereq.: 4th yr. standing, for Ed. Majors, 514 or 535.
Nature, extent, and significance of the parent education movement; home and school relationships; methods and resource training of professional and lay leaders; local and state programs. Hendrickson.

772 Preparation of Handicapped Children, U G 3
For Post-School Adjustment
Su, Sp. 3 cl.
Prereq.: 667 or equiv.
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. CLOSE.

774 Discussion Methods in Adult Education
G 3
W. 3 cl.
Prereq.: 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. Hendrickson.

775 The History of Educational Thought: Ancient and Medieval
U G 3
A. 3 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.

776 The History of Educational Thought: Modern
U G 3
Su, Sp. 3 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.

777 Comparative Education I: Europe and the English-Speaking Countries
U G 3
Su, Sp. 3 cl.
Prereq.: 632 or 636.
Social and cultural factors influencing the differential development of educational institutions and organization in the countries whose universal school systems are several generations old. Sutton.

778 Comparative Education II: Asia, Africa, Latin America
U G 3
Su, W. 3 cl.
Prereq.: 632 or 636.
Social and cultural factors affecting stability and effectiveness of educational institutions and organizations in the many countries where programs of universal education are of recent origin. Sutton.

780 Methods of Teaching Distributive Education
U G 3
Su, W. 3 cl.
Prereq.: 535.
The organization and preparation of teaching plans for distributive education classes; analysis of current on-the-job training methods in business establishments. Logan.

781 Curriculum Content for Distributive Occupational Subjects
U G 3
3 cl.
Prereq.: 750.
Securing, evaluating, and organizing instructional material and experiences for distributive cooperative education and adult extension courses. Logan.

782 Organization and Administration of Education for the Distributive Occupations
Su, W. 3 cl.
Prereq.: 535.
A practical study of the development and operation of a distributive education program. Logan.

Methods of Teaching Nursing
U G 4
(See Nursing 796.)

799 On-Campus Education Workshops
U G 4-8
Su. 4 cr. hrs. for 3 week workshops, 8 cr. hrs. for 6 week workshops.
Prereq.: 514 or 535 or equiv. teaching experience and permission of the workshop director.
Intensive study of a problem common to the participating leaders and/or administrators for the purpose of developing sound principles and practices relating to it.

A-76
EDUCATION

799A  Workshop on Office Automation and its implications for Business Education in the Secondary School and the Community College.  
Su. (June 21-July 9)

799C  Elementary Education Workshop: Reading.  
Su. (June 21-July 9)

799C  Elementary Education Workshop: Science.  
Su. (July 26-August 13)

799D†  Workshop on Guidance and Counseling in the Elementary School.  

799J†  Modern Media Workshop: Cross Media Approaches to Learning.  

799K  Workshop in Junior High School Education.  
Su. (July 26-August 13)

799M  On-Campus Education Workshop: Simulation of Selected Problems in School Administration.  
(July 26-August 13)

800  Seminars in Education  G 2-5  

Students, with permission of advisers, may register for more than one section of 800 or for the same section two or more times.

Research Problems in:

800A  Business Education.  
Su.

800B  Adult Education.  
A. Hendrickson.

800C  Elementary Education  
Su. Tomlinson, Burr, Harding  
A. Research and Experimentation in the Language Arts for the Elementary School.  
Huck, Ring.  
Burr.

800D  Guidance.  
A. Foundation for Guidance and Counseling.  
Kemp.  
W. Professional Problems of Counselor Educators. Ricciot.  

800E  Higher Education.  
Anderson, Burnett.

800F  History of Education and Comparative Education.  
Su. Advanced Topics for Major Students.  
Sutton.  
A. History of American Education. For International students only.  
Sutton.  
W. Methods of Historical Research in Education. Mehl.  
Advanced Topics for Major Students.  
Sutton.  
Advanced Topics for Major Students.  
Sutton.

800G  Industrial Arts Education.  
Warner, Ray.

800H  Trade and Industrial Education.  
Su., W.  
Reese.

800I†  Philosophy of Education.  
A. Bronner.

800J  Radio and Television Education.  
A. W.  
Tyler.

800K  Secondary Education.  
Frymier, Hough.

800M  Educational Administration.  
Stambaugh, Larson, Ramsey.

800N  Teaching of English.  
Su., W, Sp.  
Eberhart.

800O  Teaching of Foreign Languages.  
Sp.  
Allen.

800P  Teaching of Mathematics.  
Trimble, Crosswhite.

800Q  Teaching of Sciences.  
Richardson.

800R  Teaching of Social Studies.  
Jewett, Muesig, Shaver.

A-77
COURSES OF INSTRUCTION
EDUCATION

800S Audio-Visual Communication.  
A.  
Dale.  

800T Exceptional Children.  
Su.  

Staff.  

800U Speech.  
A. College Service Course Program. Knosner.  
W. Communication and Persuasion.  

800V Research Techniques.  

800X Distributive Education.  

Lehman.  

800Y Curriculum and Supervision: K-12.  
Su, Sp.  
Klohr.  

802 Research Methods  G 3  
Su, W. 3 cl.  
Prereq.: Master’s Degree and 710 or equiv.  
Problem selection, data analysis, organizational and writing problems involved in thesis preparation are considered. Ramsayer.  

804 Educational Experimentation  G 2-5  
Su, A. 1 2-hr. lab. conf. arr.  
Prereq.: 710 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. Frysier.  

808 Administration of the Secondary School  G 3  
Su, W. 2 cl.  
Prereq.: 727 or equiv.  
Major problems and issues in the organization and administration of the secondary school. Laughlin.  

809 Social Philosophies and Their Educational Bearings  G 3  
Su, Sp. 3 cl.  
Prereq.: 607.  
A study of social philosophies in terms of their significance for educational procedures and programs. Jewett.  

810* The Educational Philosophy of John Dewey  G 3  
Su, Sp. 3 cl.  
Prereq.: 758 or equiv.  
A systematic study of the writings of John Dewey in their bearing upon educational theory and practice.  

812 Seminar in Methods of College Teaching in the Sciences Basic to the Health Professions  G 2  
Sp. 2 cl.  

815 Organization and Administration of Industrial Education  G 5  
Su. 3 cl.  
Prereq.: 856.  
Not open to students with credit for 716.  
International and historic background curriculum resources and development, physical organization, administrative organization, supervisory operation, and professional policies. Warnar.  

818 Practicum in School Guidance Work  G 3  
Su, A, W, Sp. 2-3 hr. cl., 2 to 4 hr. lab.  
Prereq.: 732, 735, 756, Psychol. 821 and permission of instructor.  
Repeatable to a maximum of 9 cr. hrs.  
Emphasis on practical experience in counseling and working with the supporting guidance service including:  
a. Introduction to high school counseling.  
b. Supervised practice in high school counseling.  
c. Supervised field experience in the high school.  
d. Group procedures practicum.  
e. Group counseling practicum.  
Corwell.  

823 Legal Aspects of School Administration  G 5  
Su, Sp. 3 cl.  
Prereq.: 727 or equiv.  
A study of statutory and case law, legal principles and provisions as related to educational administration district, personnel, finance, curriculum, contracts, property, liability and organization. Ramsayer.  

825 The Elementary School Principalship  G 3  
Su, A. 3 cl.  
Prereq.: 727.  
Emphasis is given to the elementary-school principal’s role in providing leadership in policy making, personnel matters, public relations, research and business management. Burr.  

831 Laboratory in Curriculum Development  G 3  
In Secondary Schools  
Sp. 3 cl.  
Prereq.: 707 or equiv.  
An advanced course in techniques of curriculum development and organization. Specific problems in curriculum development which are of concern to the students enrolled are studied. Frysier.  

832 The Community Junior College  G 3  
Su, W. 3 cl.  
Origin and development of the community college, including an evaluation of general, college-parallel, terminal, and adult education programs in public and private institutions. Burnett.  

835 Advanced Studies in Education  G 3  
Prereq.: Graduate standing in the M. Ed. Program.  
Permission of the instructor.  
Designed to enable candidates pursuing the Master of Education degree to demonstrate ability to attack and deal with problems independently.  

835A Business Education.  
Wells, Hovis.  

835B Adult Education.  
Hendrickson.  

835C Elementary Education.  
Burr, Harding, Huck, Tomlinson, King, Ramsey, Frost.  

835D Guidance.  
Peters, Kemp, Riccio.  

835E Higher Education.  
Anderson, Kircher, Burnett, Sanders.  

A-78
835F History of Education and Comparative Education.  
Sutton, Mohr, Maccia, Sanders.  
835G Industrial Arts Education.  
Huey, Warner.  
835H Trade and Industrial Education.  
Reese.  
835I Philosophy of Education.  
Kircher.  
835J Radio and Television Education.  
Tyler.  
835K Secondary Education.  
Staff.  
835M Educational Administration.  
835N Teaching of English.  
Eberhart.  
835O Teaching of Foreign Language.  
Allen.  
835P Teaching of Mathematics.  
Lazar, Trimble.  
835Q Teaching of Science.  
Richardson, Schlessinger.  
835R Teaching of Social Studies.  
Jewitt, Muesig.  
835S Audio-Visual Materials of Instruction.  
Deel.  
835T Exceptional Children.  
Staff.  
835U Speech.  
Lewis.  
835V Research Techniques.  
Staff.  
835X Distributive Education.  
Logan.  

836 Practicum in Educational Administration G 4  
A. 1 cl., lab. arr.  
Prereq.: Master's degree, 737.  
Two yrs. teaching experience or equiv. and permission of the instructor.  
A study of the literature and methods of school surveys, as a basis for the investigation of practical problems in school administration and supervision. Ramseyer, Laughlin.  

837 Practicum in Educational Administration G 4  
W. 1 cl., lab. arr.  
Prereq.: 836.  
Continuation of 836. Larmee, Laughlin.  

838 Practicum in Educational Administration G 4  
Sp. 1 cl., lab. arr.  
Prereq.: 837.  
Continuation of 837.  
Staub, Hack.  

840 The Teaching of Geometric Concepts G 4  
Su. 5 cl.  
Prereq.: 695 or 660 or equiv.  
The role of demonstrative geometry, two and three-dimensional concepts, the nature of proof and teaching procedures which emphasize both deductive and algebraic methods. Crosswhite, Larson.  

841 Guiding Learning Activities in the Secondary School G 3  
Su, W. 3 cl.  
Prereq.: 703, 705, and 707.  
An advanced course dealing with basic principles and generalized techniques involved in developing, organizing, and evaluating learning activities. Hough.  

844 Administrative Problems of the High School Principal G 2-3  
Sp. 3 cl.  
Prereq.: 708 or equiv.  
An advanced course dealing with selected problems in the administration of secondary schools. Laughlin.  

845 Administration of Higher Education I G 3  
A, Sp. 2 1/2-hr. cl.  
A study of the purposes and scope of higher education. Patterns of general control, theories of administration, allocation of function, and coordination in higher education. Barnett.  

848 Theories and Curricula of Higher Education G 5  
Su, A. 2 1/2-hr. cl., 1 hr. arr.  
A study of current theories of general education of representative and experimental college programs in the United States. Kircher.  

849 Organization of Programs for Exceptional Children G 3  
Su, Sp. 3 cl.  
Prereq.: 667 and 727, Psychol. 609.  
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. Cassidy.  

850 Teacher Training G 5  
Su, W. 2 1/2-hr. cl.  
History, organization, administration, curriculum and method, student personnel (including measurement) peculiar to teacher training institutions. Anderson.  

851 Science Education in Higher Education G 4  
Su, W.  
Prereq.: 604 or 684 or equiv. and 706 or 712 or equiv.  
Courses and curricula for teacher preparation programs in science programs for preparation of science, directing student teaching, on-and off-campus co-operative arrangements, provision for equipment and evaluation. Richardson.  

853 School Community Relations G 3  
Su, A. 3 cl.  
Prereq.: 737 or equiv.  
Principles and practices in developing and maintaining appropriate school community relationships; professional vs. lay roles; institutional relationships; opinion analysis, communication processes; and decision-making patterns. Staub.  

854 Administration of Higher Education II G 5  
Sp. 2 1/2-hr. cl., 1 hr. arr.  
Prereq.: 845.  
Principles and problems of control, allocation of function, coordination, financial support, business administration, and evaluation in higher education, including graduate and professional education. Anderson.  

A-79
855  Interaction of the Student and the College Environment  G 3
   Su, A.  3 cl.
   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. Burnett.

856  Practicum in Industrial Arts Education  G 3-5
   Su, A.  3 cl.
   Prereq.: 536.
   Derivation of doctrine, formulation and evaluation of basic programs, curriculum development, organizational implementation, leadership problems, and professional progress, both here and abroad. Warner.

859  Comparative Philosophy of Education  G 3
   Sp.  3 cl.
   Prereq.: 758 or 759 or equiv.
   A study of alternative philosophies of education and the speculative development of their implications for educational practice. Kircher.

863  Curriculum Theory  G 3
   A.  3 cl.
   Prereq.: 702 or equiv.
   An advanced course in curriculum: Kindergarten through 12th grade. Klohr.

864  Problems of Elementary School Curriculum and Supervision  G 3
   Su, W.  3 cl.
   Prereq.: 748 and 702.
   An analysis of the programs and practices involved in facing major problems in the elementary schools. Supervision and curriculum will be synthesized. Frazier, King.

865  Problems of Secondary School Supervision and Curriculum Development  G 3
   Su, Sp.  3 cl.
   Prereq.: 702.
   An advanced course in supervision and curriculum development emphasizing the problems involved in initiating and conducting change in the secondary school curriculum. Frierier.

866  Research in the Laboratory of Industries  G 3
   W.  3 cl.
   Prereq.: 714 or 715 or 716, teaching experience in Indust. 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. Warner.

868  Supervision Theory  G 3
   W.  3 cl.
   Prereq.: 702 or equiv.
   An advanced course in supervision of instruction: Kindergarten through 12th grade. Klohr.

870  Administrative Problems of Beginning Superintendents  G 3
   Sp.  3 cl.
   Prereq.: 727 or equiv.
   Emphasis on such problems as school-community relations, finance, school facilities, staff personnel, pupil personnel, instruction, and organization. Hack.

871  Administrative Problems of the City Superintendent  G 3
   Sp.  0 cl.
   Prereq.: 727 or equiv.
   A study for practicing administrators of the problems peculiar to the educational administrator in large public school systems. Stoeck, Larmee.

872  Administration of Pupil Personnel  G 3
   Su, W.  3 cl.
   Prereq.: 727 or equiv.
   Organizational and administrative problems in pupil personnel area are analyzed. Legal phases of the program, policy development, and staffing relationships also are considered. Stoeck, Larmee.

873  Staff Personnel Administration  G 3
   Su, A, Sp.  3 cl.
   Prereq.: 727 or equiv.
   A study of problems of personnel administration in school districts—recruitment, orientation, appraisal, in-service training, promotion, certification, dismissal, personnel policies, salary provisions, and welfare. Larmee.

875  School Finance  G 3
   Su, A.  3 cl.
   Prereq.: 727 or equiv.
   General school finance problems; finance and organization; sources of school support; variations in financial ability and effort; state-local finance plans; federal role. Hack.

876  Business Administration of Schools  G 3
   Su, W.  3 cl.
   Prereq.: 727 or equiv.
   Function of business administration in schools; administrative relationships; personnel; budget making, procuring revenue, financial outlay and accounting; managing plant, facilities, and supplies; payroll, transportation. Hack.

880  School Plant Planning  G 3
   Su, W.  1-2 hr. cl., 1 hr. arr.
   Prereq.: 727 or equiv.
   Problems and techniques in determining school building needs, evaluating school building, planning new construction or remodel, utilizing specialized personnel; related legal and financial aspects. Conner.

885  Practicum in Curriculum and Supervision  G 4  
   A.  1 cl. plus lab to be arr.
   Prereq.: Master's degree and 702. Not open to students with credit for 831.
   A study of the literature and methods of curriculum development and supervision of instruction in a field setting. Frazier.

886  Practicum in Curriculum and Supervision  G 4
   W.  1 cl. plus lab. to be arr.
   Prereq.: Master's degree, 702 and 885. Not open to students with credit for 831.
   Continuation of 885. Frierier.

887  Practicum in Curriculum and Supervision  G 4
   Sp.  1 cl. plus lab. to be arr.
   Prereq.: Master's degree, 702 and 886. Not open to students with credit for 831.
   Continuation of 886. Klohr.
ELECTRICAL ENGINEERING

615 Circuit Theory IV U G 4
A, W. 3 or 4 cl.
Prereq.: 614, concur. 626, Math. 624.
Not for graduate credit to students majoring in Elec. E.

617 Field Theory I U G 3 or 4
A, W. 3 or 4 cl.
Prereq.: Physics 533, Math. 543, concur. 613.
Not for graduate credit to students majoring in Elec. E.
Vector relations, static electric fields, dielectric materials, boundary conditions, field mapping, steady electric currents and their magnetic fields, motion of charged particles.

618 Field Theory II U G 3 or 4
W, Sp. 3 or 4 cl.
Prereq.: 617, concur. Math. 609.
Not for graduate credit to students majoring in Elec. E.
Ferromagnetic materials, time changing electric and magnetic fields, Maxwell’s equations, relations between field and circuit theory, plane waves, Poynting vector, energy relations, boundary value problems.

619 Transmission and Radiation U G 3 or 4
A, Sp. 3 or 4 cl.
Prereq.: 618.
Not for graduate credit to students majoring in Elec. E.
General transmission theory, infinite line, terminated line, impedance transformation, rectangular waveguides, group and phase velocity, impedance of waveguides, simple antenna systems.

625 Experience in Practice U 5
A. Ten weeks of experience in practice following the 8th qtr., or 1 yr. of acceptable industrial experience before the end of the 8th yr.
Students must register with and obtain complete information and forms from course supervisor. Apsr.

626 Electron Device Circuit Theory I U G 3 or 4
A, W. 3 or 4 cl.
Prereq.: 614 and 617 or equiv.
Not for graduate credit to students majoring in Elec. E.
Elementary theory of electron device terminal characteristics; large and small signal analysis of electron devices as circuit components; applications to rectification and to amplification.

627 Electron Device Circuit Theory II U G 3 or 4
W, Sp. 3 or 4 cl.
Prereq.: 615 and 626.
Not for graduate credit to students majoring in Elec. E.
Multistage amplifier coupling; broadbading; feedback analysis and applications; power amplifiers; Class B and C large signal analysis; single-frequency oscillators.

628 Electron Device Circuit Theory III U G 4
A, Sp. 4 cl.
Prereq.: 627.
Not for graduate credit to students majoring in Elec. E.
Amplitude, angle, and pulse modulation, modulators; demodulators, AM and FM; switching networks utilizing thyristors, transistors, and transducers; control circuits; system applications.
642 Electrical Engineering U 4
A, W, Sp. 3 cl., 3-hr. lab.
Prereq.: Physics 553, Math. 543.
Not open to students majoring in Elec E. or Eng. Physics.
Introduction to circuit analysis; circuit analysis concepts and their
extension to mechanical and thermal systems by analogy. Electrical
instruments and measurements. Cowan, Weed.

643 Electrical Engineering U 4
A, W, Sp. 3 cl., 3-hr. lab.
Prereq.: 642 or equiv.
Not open to students majoring in Elec E. or Eng. Physics.
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 intro-
duced in the preceding course. Cowan.

644 Electron Devices and Controls U 4
A, W, Sp. 3 cl., 3-hr. lab.
Prereq.: 642.
Theory and applications of semiconductors, transistors; photo-
electric, vacuum and gas filled tubes. Study of control circuits,
feedback, amplifiers, oscillators, filters, magnetic amplifiers and
instrumentation. Weed.

650 Electrical Energy Conversion I U G 4
A, W. 4 cl.
Prereq.: 614 and 618.
Not for graduate credit to students majoring in Elec E.
Properties and theory of magnetic circuits as applied to electro-
mechanical energy conversion. Transformers, non-linear magnetic
devices. Introduction to rotating machine analysis.

651 Electrical Energy Conversion II U G 4
W. Sp. 4 cl.
Prereq.: 650.
Not for graduate credit to students majoring in Elec E.
Field and circuit concepts of idealized rotating machines; steady
and transient states; thermal transitions; control machines and
systems.

652 Electrical Energy Conversion III U G 4
A, Sp. 4 cl.
Prereq.: 651.
Not for graduate credit to students majoring in Elec E.
Field and circuit concepts of realistic rotating machines; general-
ized two-phase machines as control components; magnetic am-
lifiers.

662 Electrical Laboratory I U 2
A, W. 1 cl., 1 3-hr. lab.
Concur: 618 or 617. Prereq.: Math 543 and Physics 553.
Introduction to digital computer programming; characteristics and
capabilities of electrical instruments; measurement of resistance,
capacitance, inductance, and impedance at audio frequencies;
two-dimensional field plotting. Gilfert.

663 Electrical Laboratory II U 2
W. Sp. 1 cl., 1 3-hr. lab.
Prereq.: 662, concur. 613.
A laboratory study of electric circuits including resonant circuits,
current and voltage loop, coupled circuits, network theorems, and
circuit transients. Gilfert.

664 Electrical Laboratory III U 2
A, Sp. 1 cl., 1 3-hr. lab.
Prereq.: 663, concur. 614 and 619.
Transmission line parameters; attenuation, magnitude and phase
of voltage, and current on lines; reflected waves; waveguide
characteristics and techniques; antenna patterns and impedances.
Peters.

665 Electrical Laboratory IV U 2
A, W. 1 cl., 1 3-hr. lab.
Concur: 663, concur. 615 and 626.
Determination of terminal characteristics of vacuum, gaseous, and
solid state electron devices; non-sinusoidal wave form frequency
analysis; power supplies, three-phase rectifiers, single stage ampli-
fiers. Campbell.

666 Electrical Laboratory V U 2
W, Sp. 1 cl., 1 3-hr. lab.
Prereq.: 665 and 650, concur. 627.
Tube and transistor multistage amplifiers and broadbanding:
audio and radio frequency power amplifiers; characteristics and
equivalent circuits of linear motion and saturable core devices:
general magnetic networks and transformers. Davis, Smith.

667 Electrical Laboratory VI U 2
A, Sp. 1 cl., 1 3-hr. lab.
Prereq.: 666, concur. 626.
Amplitude modulation; demodulation of a modulated wave; pro-
duction of shaped waveforms; switching and control circuit ap-
lications; design and evaluation of a single-frequency oscillator;
filters. Enidman.

668 Electrical Laboratory VII U 2
A, W. 1 cl., 1 3-hr. lab.
Prereq.: 652 and 666.
Study of selected transient and steady-state performances of direct
current, synchronous and induction machines. Smith.

669 Electrical Laboratory VIII U 2
W, Sp. 1 cl., 1 3-hr. lab.
Prereq.: 668 and 716.
Laboratory study of feedback amplifiers, control systems and their
components, operational amplifiers, and analog computers. Bacon.

707 Advanced Circuits U G 3
A. 3 cl.
Prereq.: 627.
Introduction to network synthesis. W. Davis.

716 Introduction to Feedback Analysis U G 3 or 4
A, W. 3 or 4 cl.
Prereq.: 615 and 628, or 644 and Math. 544 with per-
misson of instructor.
Feedback systems, block diagrams and signal flow graphs, stability
criteria, frequency response and pole-zero analysis; application of
feedback to amplifiers and control systems; non-linear con-
iderations.

718 Radiation from Antennas U G 3
W. 3 cl.
Prereq.: 610, concur. 719.
Dipole, loop, aperture, reflector, lens, surface wave and other
antennas; array theory; radiation resistance, directivity and input
impedance. Kraus.

719 Antenna Laboratory U G 1
W. 1 3-hr. lab.
Prereq.: 664, concur. 718.
Measurements and interpretation of antenna field patterns, im-
pedances, gains, and current distribution. Kraus.

723 Digital Computer Laboratory U G 2
Sp. 1 cl., 1 3-hr. lab.
Concur. 742.
Laboratory study of counting, arithmetic and digital circuits.
Coşgriff.
724 Microwave Circuits Laboratory U G 1  
A. 1 3-hr. lab.  
Prereq.: 619 and 664, concurr. 739 or permission of instructor.  
Measurement of field and power distribution in waveguides; impedances, components and microwave generator properties.  
D. Davis.

725 Control Systems Laboratory I U G 2  
W. 1 cl., 1 3-hr. lab.  
Concurr. 728 or 733.  
Experiments chosen by student interest from the course content of open cycle control and instrumentation and feedback control systems. Weed, Weimer.

728 Open Cycle Control and Instrumentation U G 3  
W. 3 cl.  
Prereq.: 651 and concurr. 716, or 643 and 644 with permission of instructor.  
Industrial electronic control and instrumentation using semiconductor, vacuum and gaseous electron devices; timing, pulse counting circuits; trigger methods; programmed sequence control; radio frequency heating; X-ray. Weed.

731 Magnetic Amplifiers U G 3  
Sp. 3 cl.  
Prereq.: 652, 716; or 643 and 644, with permission of instructor.  

733 Feedback Control Systems U G 3  
W. 3 cl.  
Prereq.: 716 and 655 or 643 with permission of instructor. Math. 608 or 611.  
Application of feedback principles to control systems; performance criteria; compensation, carrier systems, multi-variable systems. Weimer.

734 Control Systems Laboratory II U G 2  
Sp. 1 cl., 1 3-hr. lab.  
Concurr.: 731 or 738.  
May be taken without 725.  
Experiments chosen by student interest from the course content of advanced control systems and magnetic amplifiers. Weed, Weimer.

738 Advanced Control Systems U G 3  
Sp. 3 cl.  
Prereq.: 733.  
Practical control systems with non-ideal components; non-linear systems. Weed.

739 Microwave Circuits U G 3  
A. 3 cl.  
Prereq.: 619, concurr. 724 or permission of instructor.  
Advanced waveguides, waveguide devices, amplifiers, generators and detection devices; special microwave techniques. D. Davis.

740 Logic Circuit Theory U G 3  
A, W. 3 cl.  
Prereq.: 638 or 644 with permission of instructor.  

741 Economics and Organization of the U G 4  
Electrical Industry  
W. Sp. 4 cl.  
Prereq.: 614 or 643.  
Not for graduate credit to students majoring in Elec. E.  
Principles of engineering economy and financial analysis applied to electrical industry in its principal divisions; power supply, communications, manufacturing and merchandising. Ayres.

742 Theory and Design of Digital Computers U G 3  
Sp. 3 cl.  
Prereq.: 740.  
Number systems, introduction to computer programming, design of arithmetic units, counters, and digital control systems, use of redundant codes and redundant equipment. Congriff.

743 Communication Theory U G 3  
W. 3 cl.  
Prereq.: 628.  
Theory of communication, information content, frequency spectra, noise, methods of modulation, modulators, and demodulators. W. Davis.

744 Communications Laboratory I U G 2  
W. 1 cl., 1 3-hr. lab.  
Prereq.: 628 and 667.  
Theory and laboratory study of non-linear amplifiers and oscillators, modulators, and detectors. D. Davis, Gilfert.

746 Space Communications U G 3  
Sp. 3 cl.  
Prereq.: 743.  
A study of space communication systems. Long-distance transmission, wave propagation, and system considerations. D. Davis, Paule.

747 Communications Systems U G 3  
Sp. 3 cl.  
Prereq.: 743.  
A study of the synthesis of amplitude and frequency modulated communication systems, with emphasis on transmitters and receivers. W. Davis.

748 Communications Laboratory II U G 2  
Sp. 1 cl., 1 3-hr. lab.  
Prereq.: 744.  
Laboratory study of communications systems. D. Davis, Gilfert.

756 Elements of Radio Wave Propagation U G 3  
W. 3 cl.  
Prereq.: 619.  
Practical calculations and procedures for predicting refraction and reflection by a plane or spherical earth, tropospheric, ionospheric, and scatter propagation. Lewis.

760 Advanced Theoretical Study in Electrical Engineering U G Arr.  
A.  
Prereq.: Permission of instructor.

761 Advanced Theoretical Study in Electrical Engineering U G Arr.  
W.  
Prereq.: Permission of instructor.

762 Advanced Theoretical Study in Electrical Engineering U G Arr.  
Sa, Sp.  
Prereq.: Permission of instructor.

763 Circuit Theory of Solid State Devices U G 3  
Su, W. Sp.  
Prereq.: 628 and 769 or equiv.  
764 Solid State Device Laboratory \hspace{1cm} UG 2
W. 1 cl., 1 3-hr. lab.
Prereq.: 667, concur. 763.
Laboratory study of solid state devices and materials. Boone, Thatcher.

765 Special Advanced Laboratory \hspace{1cm} UG Arr.
A.
Prereq.: Professional division standing and permission of instructor.

766 Special Advanced Laboratory \hspace{1cm} UG Arr.
W.
Prereq.: Professional division standing and permission of instructor.

767 Special Advanced Laboratory \hspace{1cm} UG Arr.
Su, Sp.
Prereq.: Professional division standing and permission of instructor.

768 Electron Device Physical Theory I \hspace{1cm} UG 3 or 4
Su, A, Sp. 3 or 4 cl.
Vacuum electron devices; potential distribution; device current analysis; vacuum device circuit parameters; electron and ion motion in vacuum devices; gaseous conductors.

769 Electron Device Physical Theory II \hspace{1cm} UG 3 or 4
Su, A, W.
Prereq.: 768.
Applications of band theory of electron energy states; junction theory applications to transistors; photodetectors; thermoelectric, piezoelectric, and ferroelectric devices; dielectric and magnetic phenomena.

781 Advanced Electronic Circuits \hspace{1cm} UG 3
Su, Sp.
Prereq.: 628.
Integrating and differentiating circuits; counting circuits; timing circuits; pulse circuits; wave-forming and wave-shaping circuits. W. Davis.

782 Advanced Electronic Circuits Laboratory \hspace{1cm} UG 2
Su, Sp.
Prereq.: 618 and 667, concur. 781.
Laboratory study of integrating and differentiating circuits; counting circuits; timing circuits; pulse circuits wave-forming and wave-shaping circuits. W. Davis.

784 Radio Astronomy Instrumentation \hspace{1cm} UG 3
A. 3 cl.
Prereq.: 615, 619, and 627, or Physics 612 and 713, or permission of instructor.
Theory and design of radio telescope antennas and receivers for radio astronomy and space research. Kraus, Ko.

787 Quantum Electron Devices \hspace{1cm} UG 4
A. 4 cl.
Prereq.: 768, Physics 610 and Math. 609 or equiv.
Electronic energy levels in quantum electron devices; application to energy transitions in crystalline and gaseous media; applications to semiconductors, masers, and lasers. Chang.

788 Microwave Electronics \hspace{1cm} UG 3
W. 3 cl.
Prereq.: 619, 788.
Interactions between electromagnetic fields and electron beams; transit time effects, velocity modulation phenomena, and space charge waves; klystrons, magnetrons, and traveling wave devices. Cornett.

789 Parametric Electron Devices \hspace{1cm} UG 3
W. 3 cl.
Prereq.: 619 and Physics 619 or equiv.
Coupled modes of oscillation, parametric interactions in lumped circuit devices, coupled modes of propagation, parametric interactions in traveling wave devices, microwave and optical parametric devices. Hsu.

790 Introduction to Electric Power Systems \hspace{1cm} UG 3
A. 3 cl.
Prereq.: 619 and 652.
System stability and related calculations of transmission line and apparatus constants. Ayres, Smith.

791 High Voltage Laboratory \hspace{1cm} UG 2
W. 1 cl. 1 3-hr. lab.
Prereq.: 619 and 652.
A laboratory study of high voltage insulation. Ayres, Smith.

792 Electric Power Networks \hspace{1cm} UG 3
W. 3 cl.
Prereq.: 619 and 652.
Fault calculations, network analysis, relaying studies, and traveling wave analysis applied to electric power system problems. Ayres, Smith.

793 Power System Laboratory \hspace{1cm} UG 2
Sp. 1 cl., 1 3-hr. lab.
Prereq.: 668, 792.
A laboratory study of power system engineering problems. Ayres, Smith.

794 Problems in Electric Power Systems \hspace{1cm} UG 3
Sp. 3 cl.
Prereq.: 652.
Analog and digital computer applications to design and operation. Recent developments in engineering techniques to meet current changes in systems and apparatus. Ayres, Smith.

801 Advanced Theoretical Study in Electrical Engineering A.

802 Advanced Theoretical Study in Electrical Engineering \hspace{1cm} G Arr.

803 Advanced Theoretical Study in Electrical Engineering \hspace{1cm} G Arr.

805 Advanced Laboratory Study of Electrical Engineering Equipment A.

806 Advanced Laboratory Study of Electrical Engineering Equipment \hspace{1cm} G Arr.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>807</td>
<td>Advanced Laboratory Study of Electrical Engineering Equipment</td>
<td>G Arr.</td>
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<tr>
<td>815</td>
<td>Transients in Linear Systems</td>
<td>G 3</td>
<td>Su, A, W. 3 cl.</td>
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<td>Prereq.: 620; concurrent Math. 601 or equiv.</td>
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<tr>
<td>817</td>
<td>Advanced Electromagnetic Theory I</td>
<td>G 3</td>
<td>A. 3 cl.</td>
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<td>Prereq.: 832 or equiv.</td>
</tr>
</tbody>
</table>
|            | Representation of fields by vector wave functions and dyadic Green's functions; Huygen's principle for electromagnetic waves; application to antenna and scattering problems. Kuo. }
| 818        | Advanced Electromagnetic Theory II               | G 3   | W. 3 cl.                                   |
|            |                                                  |       | Prereq.: 817.                              |
|            | Asymptotic methods and the geometrical theory of diffraction; integral equations and variational methods; propagation through inhomogeneous media and anisotropic media; surface waves. Kuo. |
| 827        | Communication Theory I                           | G 3   | W. 3 cl.                                   |
|            |                                                  |       | Prereq.: 815, concurrent Math. 607.        |
| 828        | Communication Theory II                          | G 3   | Sp. 3 cl.                                  |
|            |                                                  |       | Prereq.: 827 and Math. 607.                |
|            | Continuation of 827. Warren.                     |       |                                            |
| 830        | Network Synthesis I                              | G 3   | Sp. 3 cl.                                  |
|            |                                                  |       | Prereq.: 815 and Math. 607.                |
|            | Modern theory of network synthesis with applications to advanced design of filters, equalizers, and compensators. Warren, W. Davis. |
| 831        | Network Synthesis II                             | G 3   | A. 3 cl.                                   |
|            |                                                  |       | Prereq.: 930.                              |
|            | Continuation of 830. Warren, W. Davis.           |       |                                            |
|            |                                                  |       | Prereq.: 619 or equiv.                     |
|            | Solution of Maxwell's equations by scalar, vector, and bessian potentials; plane waves in dielectric, conducting, and anisotropic media; polarization, boundary value problems, radiation, and scattering. Kraus, Kuo.       |
| 833        | Electromechanical Systems                        | G 3   | A. 3 cl.                                   |
|            |                                                  |       | Prereq.: 815, or concur.                   |
|            | Application of the methods of electric circuit analysis to mechanical, acoustical, electromechanical and electrotactile systems. Consiglio. |
| 834        | Analysis of Non-Linear Systems                   | G 3   | Sp. 3 cl.                                  |
|            |                                                  |       | Prereq.: 815.                              |
|            | An advanced study of methods of analysis of non-linear systems with applications in the field of electric circuit theory and control systems. Consiglio. |
| 841        | Methods of Analysis of Electron Tubes            | G 3   | A. 3 cl.                                   |
|            |                                                  |       | Prereq.: 768 and 832 or permission of instructor. |
|            | Conformal transformations; space-charge effects; noise; induced currents and Ramo's Theorem; electron inertia effects. Boone. |
| 842        | Theory of Electron Guns and Electron Beams       | G 3   | W. 3 cl.                                   |
|            |                                                  |       | Prereq.: 768 and 832 or permission of instructor. |
|            | Electron optical principles; effect of thermal velocities; effect of space charge; electron guns; periodic focusing. Cornetet. |
| 844        | Plasma Dynamics                                  | G 3   | W. 3 cl.                                   |
|            |                                                  |       | Prereq.: 768 or 833, or equiv.             |
|            | Motion of ions and electrons, ionization processes, electromagnetic phenomena in plasma, electron beams in plasma. Ko, Peters. |
| 845        | Velocity Variation Electron Tubes                | G 3   | W. 3 cl.                                   |
|            |                                                  |       | Prereq.: 841.                              |
|            | Transit time effects at high frequencies; velocity variation and theory of bunching; klystrons and related devices; harmonic generation. Boone, Cornetet. |
| 846        | Electron Interaction with Traveling Waves        | G 3   | Sp. 3 cl.                                  |
|            |                                                  |       | Prereq.: 845.                              |
|            | Theory of electron interaction with traveling waves; applications to traveling-wave tubes; klystrons, magnetrons, and linear accelerators. D. Davis. |
| 847        | Theory and Design of Feedback Control Systems    | G 3   | W. 3 cl.                                   |
|            |                                                  |       | Prereq.: 716 and 815, or permission of instructor. |
|            | Linear feedback theory, signal-flow graphs, return difference, stability studies with parameter variation, independent control of transmission and sensitivity functions, multi-variable systems, approximation methods. Weiner. |
| 848        | Synthesis of Linear Feedback Control Systems     | G 3   | Sp. 3 cl.                                  |
|            |                                                  |       | Prereq.: 847.                              |
|            | Sampled-data systems, the Z-transform, digital compensation; synthesis of systems with statistical inputs and constraints; advanced topics. Weiner. |
| 850        | Waveguides and Resonators                        | G 3   | W. 3 cl.                                   |
|            |                                                  |       | Prereq.: 822.                              |
|            | General theory of waveguides, modes, discontinuities, losses, cavities, and power considerations. Feakle. |
| 851        | Radiation and Radiating Systems                  | G 3   | Sp. 3 cl.                                  |
|            |                                                  |       | Prereq.: 832.                              |
|            | Radiation theory; dipole, linear, loop, helical, biconical, and aperture antennas; beam shaping, aperture distribution, self and mutual impedance, microwave optics; radio telescope, antenna temperature. Kraus. |
| 852        | Propagation of Electromagnetic Waves             | G 3   | Sp. 3 cl.                                  |
|            |                                                  |       | Prereq.: 756 and 832.                     |
|            | Advanced study of transmission and reception of radio waves in the presence of the earth and its atmosphere; tropospheric, ionospheric, and scatter propagation. Levi. |
853 Theory of Microwave Components  G 3  
Sp.  3 cl.  
Prereq.: 850.  
General circuit theory of one port and multi-ports; impedance and scattering concepts; reciprocity in microwave circuits; impedance transformation; directional devices; non-reciprocal devices; non-linear elements. Peake.

854 Solid State Electron Devices I  G 3  
A.  3 cl.  
Prereq.: 658, 780, 765, Math. 609, or equive.  
Introduction to solid state electron devices; conduction mechanisms; magnetic effects; electrical properties of imperfections; dynamics of single crystals at high temperatures; control of impurity distributions. Thurston.

855 Solid State Electron Devices II  G 3  
W.  3 cl.  
Basic analysis of conduction phenomena in semiconductors, carrier lifetime; theory of p-n junction rectifiers, and junction transistors. Thurston.

856 Solid State Electron Devices III  G 3  
Sp.  3 cl.  
Prereq.: 855.  
Design theory of junction diodes, junction transistors, unigold transistors, four-layer switchers, variable capacitance diodes, and parametric amplifiers. Thurston.

857 Quantum Electron Devices  G 3  
A.  3 cl.  
Prereq.: 787, 853, Math. 733 and Physics 728, or equive.  
Analysis of energy of atomic gases as applied to gas lasers; crystal structure of solid-state maser and laser materials. Chang.

858 Quantum Electron Devices  G 3  
W.  3 cl.  
Prereq.: 857.  
Quantum mechanical and statistical analysis of energy levels in solids and of microwave and optical energy conversions in masers and lasers.

859 Quantum Electron Devices  G 3  
Sp.  3 cl.  
Prereq.: 858.  
Theory and design of masers and lasers; current research in quantum electron devices.

860 Theory and Analysis of Magnetic Amplifiers  G 3  
W.  3 cl.  
Prereq.: 688, 815, or equive.  
Theory of magnetic materials. Steady state and transient analysis of magnetic amplifiers; suppressed and free harmonics; power gain; resistive, inductive and capacitive load. Weed.

861 Analysis of Magnetic Amplifiers, Memory Devices and Components  G 3  
Sp.  3 cl.  
Prereq.: 860 and 847, or equive.  
The analysis of magnetic amplifiers with extrinsic and intrinsic feedback; a-c, d-c, or combination control; switching properties; and applications. Weed.

870 Advanced Antenna Design  G 3  
Su.  A.  3 cl.  
Prereq.: 851.  
Repeatable to a maximum of 6 cr. hrs.  
Topics selected from such subjects as traveling wave antennas, excitation of surface waves, interaction of antennas with dielectric and metal bodies. Richmond, Waller.

881 Seminar in Electrical Engineering  G 1-3  
Prereq.: Permission of instructor. Repeatable.  
a. Research Topics in Electromagnetics. 
W. Kennaugh.  
Sp. Thurston.  
c. Information Theory. 
W. Sp. Saltzer.  
d. Parametric Electronics. 
Su. Hsu.  
e. Modern Control Theory. 
f. Recent Developments in Quantum Electronics. 

895 Interdepartmental Seminar in Radio Astronomy  G 1-5  
(See under Interdepartmental Seminars.)

Radio Astronomy Theory I  
See under Astronomy 895.

Radio Astronomy Theory II  
See under Astronomy 897.

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

950 Research in Electrical Engineering  G Arr.  
Research for thesis or dissertation purposes only.
Engineering Drawing

PROFESSORS YARRINGTON (Chairman), COOPER, FIELD (Emeritus), Paffenbarger (Emeritus), PARKINSON, SHupe, KEARNS, and WATKINS; ASSOCIATE PROFESSORS HANG, HENSON, and REED; ASSISTANT PROFESSORS ACKLEY, BALDWIN, BROWN, DENNING, DEVEREAUX, RICKLEY, and ROMEO; INSTRUCTORS.

400 Elementary Engineering Drawing U 4
A, W, Sp. 4 2-hr. cl. and lab.
Use of instruments, projection drawing, auxiliary views, sections, size descriptions, pictorial drawing. Brown.

402 Principles of Engineering Drawing U 4
W, Sp. 4 2-hr. cl. and lab.
Prereq.: 400 or permission of instructor.
Auxiliaries, dimensioning, working drawings, slide rule, charts, and graphs. Brown.

439 Drawing in Business U 3
W. 3 2-hr. cl. and lab.
Requ. in industrial management curriculum.
Not open to students who have previous credit in Engr. Dr.
Fundamentals of engineering drawing with emphasis on reading and understanding. Orthographic and pictorial shapes, description, conventional practices, thread dimensions, tolerances, working drawings, slide rule. Parkinson.

440 Principles of Orthographic Projection U 3
Su, A, W, Sp. 3 2-hr. cl. and lab.
Prereq.: One unit of high school Geometry or Math. 416 or 459.
Not open to students with credit in Engr. Dr. 401 and 403.
Lettering; applied geometry; orthographic projection, freehand and with instruments, to include reading, auxiliary and oblique views, and the elements of engineering geometry. Shupe.

441 Principles of Engineering Drawing U 3
Su, A, W, Sp. 3 2-hr. cl. and lab.
Prereq.: 440.
Not open to students with credit in Engr. Dr. 401 and 403.
Intersections and developments of surfaces. Representation of machine parts; sections and conventions; pictorial drawing; basic dimensioning, freehand and with instruments. Cooper.

442 Principles of Working Drawings and Graphs U 3
Su, A, W, Sp. 3 2-hr. cl. and lab.
Prereq.: 441.
Not open to students with credit in Engr. Dr. 405.
Screw threads, fasteners, and graphic symbols; working drawings, allied materials; charts and graphs; curve fitting; graphical calculation; slide rule. Watkins.

504 Technical Drawing U 4
A. 4 2-hr. cl. and lab.
Prereq.: 402 or 442.
Dimensioning applied to detail and assembly drawings with an introduction to limits and tolerances. Technical sketching of machine parts; representation and specifications of gears, piping, and welding. Rickley.

506 Structural Drawing U 4
W. 4 2-hr. cl. and lab.
Prereq.: 504 or 442.
Introduction to structural drafting. Includes steel and frame structures; riveted, bolted and welded connections; terminology and erection requirements. Reed.

508 Production Illustration U 4
Sp. 4 2-hr. cl. and lab.
Prereq.: 508 or permission of instructor.
Commercial and industrial applications of pictorial representation. Instrument drafting techniques, rendering, templates, automated drafting and reproduction methods. Hong.

537 Graphic Presentation U 5
A. 5 2-hr. cl. and lab.
Prereq.: 2nd yr. standing.
Representation of three-dimensional subjects by precise graphics; orthographic and pictorial; shades and shadows. Parkinson.

755 Chemical Plant Design U G 3
Sp. 2 3-hr. cl. and lab.
Sketching and preliminary layout for industrial chemical plants, including design and selection factors for equipment and process auxiliaries. Parkinson.

Engineering Mechanics

Office: 211 Communications Laboratory, 215 W. 19th Ave.
PROFESSORS IWEST (Chairman), ICLARK, IFOLK, IGRA-HAM, ILEA, IMOULTON, IJEDZNFUHR, IJIT (Emeritus), and POWELL (Emeritus); VISITING ASSOCIATE PROFESSOR iTUCKER (Emeritus); ASSOCIATE PROFESSOR 1KIRK; ASSISTANT PROFESSORS TBARNES, TBOSSMAN, TCHIN, TGRAFF, TKORDA, TMAHIG, and TWU; and INSTRUCTORS.

511 Applied Mechanics U 4
A. 3 cl., 2 2-hr. labs.
Prereq.: Math. 440.
Statics of force systems by analytical and graphical methods; centroids and moment of inertia; stresses and strains of structural members; combined stresses by Mohr's Circle; columns; deflections and statically indeterminate beams by area moments. Denning.

512 Applied Mechanics U 4
W. 3 cl., 2 1-hr. labs.
Prereq.: 511.
Continuation of 511.

513 Applied Mechanics U 4
Sp. 3 cl., 2 1-hr. labs.
Prereq.: 512.
Continuation of 512.

A-87
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>521 Statics</td>
<td>U 5</td>
</tr>
<tr>
<td>Su, A, W, Sp. 5 cl.</td>
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<tr>
<td>Prereq.: Physics 521 and/or concurs. Math. 543.</td>
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<tr>
<td>Resultants and equilibrium of coplanar and noncoplanar force systems;</td>
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<tr>
<td>trusses, frames, and connected bodies; friction; centroids and</td>
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<tr>
<td>moment of inertia of masses and areas. Barnes.</td>
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<tr>
<td>602 Strength of Materials</td>
<td>U 5</td>
</tr>
<tr>
<td>A, W, Sp. 4 cl., 2 1-hr. labs.</td>
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<tr>
<td>Prereq.: 521.</td>
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<tr>
<td>Normal and shearing stress and strain; tension; flexural stress; beam</td>
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<tr>
<td>deflections; combined stress; theories of failure; columns.</td>
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<tr>
<td>605 Stress Analysis I</td>
<td>U G 3</td>
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<tr>
<td>A, W, Sp. 3 cl.</td>
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<tr>
<td>Prereq.: 502.</td>
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<tr>
<td>Statistically indeterminate and variable section beams by area</td>
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<tr>
<td>moments; bending of non-symmetrical section; energy of bending and beam</td>
<td></td>
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<tr>
<td>limit design; torsion of open and closed non-circular sections. Mohig.</td>
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<tr>
<td>606 Stress Analysis II</td>
<td>U G 3</td>
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<tr>
<td>A, W, Sp. 3 cl.</td>
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<tr>
<td>Prereq.: 502.</td>
<td></td>
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<tr>
<td>Not open to students with credit for 714. Failure theories; Mohr’s circle</td>
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<tr>
<td>for strain meteors; thick cylinders; non-circular torsion; curved beams;</td>
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<tr>
<td>Castigliano’s theorem. Folkman.</td>
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<tr>
<td>607 Dynamics</td>
<td>U 3</td>
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<tr>
<td>A, W, Sp. 3 cl.</td>
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<tr>
<td>Prereq.: 521.</td>
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<tr>
<td>Linear and angular motion from constant and variable forces;</td>
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<tr>
<td>connected bodies; impulse; momentum; energy. China.</td>
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<tr>
<td>617 Dynamics</td>
<td>U G 5</td>
</tr>
<tr>
<td>W. Sp. 5 cl.</td>
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<tr>
<td>Prereq.: 502 or concurs. Math. 544 or 611.</td>
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<tr>
<td>Dynamics of particles and rigid bodies; impulse; momentum; work; energy;</td>
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<tr>
<td>three dimensional vector acceleration; conservative systems; single degree</td>
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<tr>
<td>of freedom vibration analysis. China.</td>
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<tr>
<td>650 Digital Computer Programming: Engineering Applications</td>
<td>U 3</td>
</tr>
<tr>
<td>A, W, Sp. 2 cl, 1 2-hr. lab.</td>
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<tr>
<td>Prereq.: Professional division standing.</td>
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<tr>
<td>Algebraic language programming. Processing of programs using</td>
<td></td>
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<tr>
<td>facilities of the Numerical Computation Laboratory. Engineering</td>
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<tr>
<td>applications. Graham, Barnes.</td>
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<tr>
<td>703 Experimental Stress Analysis</td>
<td>U G 2</td>
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<tr>
<td>A, Sp. 4 lab. hrs.</td>
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<tr>
<td>Prereq.: 502.</td>
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<tr>
<td>Experiments with electric strain gauges, stress coat, brittle models, and</td>
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<tr>
<td>photoelastic analysis of structures; determination of fatigue limits.</td>
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<tr>
<td>Barnes.</td>
<td></td>
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<tr>
<td>704 Photoelasticity</td>
<td>U G 2</td>
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<tr>
<td>A, W, Sp. 4 lab. hrs.</td>
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<tr>
<td>Prereq.: 602.</td>
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</tr>
<tr>
<td>Construction of two and three dimension models and analysis of stress</td>
<td></td>
</tr>
<tr>
<td>distribution by photoelastic methods. Clark, Barnes.</td>
<td></td>
</tr>
<tr>
<td>707 Mechanical Vibrations</td>
<td>U G 3</td>
</tr>
<tr>
<td>A. 3 cl.</td>
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<tr>
<td>Prereq.: 607 and Math. 544 or 611.</td>
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<tr>
<td>Acceleration, velocity, and displacement from variable cyclic forces;</td>
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<tr>
<td>free and forced vibrations; torsional vibrations; dynamic balance;</td>
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<tr>
<td>vibration and whipping of shafts. West, China.</td>
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<tr>
<td>712 Advanced Strength of Materials</td>
<td>U G 3</td>
</tr>
<tr>
<td>W. 3 cl.</td>
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<tr>
<td>Prereq.: 502 and/or concurs. Math. 609 or 626.</td>
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<tr>
<td>Beams on elastic foundations; beam columns; deflection curves;</td>
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<tr>
<td>trigonometric series; limitations of superposition. Mahig, Wu.</td>
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<tr>
<td>715 Theory of Elastic Stability</td>
<td>U G 3</td>
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<tr>
<td>A. 3 cl.</td>
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<tr>
<td>Prereq.: 605 or 606, Math. 544 or 611.</td>
<td></td>
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<tr>
<td>Buckling of bars under axial and lateral loads; effect of curvature</td>
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<tr>
<td>and eccentricity; determination of critical loads by energy; tube and</td>
<td></td>
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<tr>
<td>beam buckling. Niederhoffer, Graff.</td>
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<tr>
<td>716 Elastic Energy Theory</td>
<td>U G 3</td>
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<tr>
<td>A. 3 cl.</td>
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<tr>
<td>Prereq.: 605 and one of: Civil Eng. 701, 711, Aero-Astro. E. 710.</td>
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<tr>
<td>Deformations and stress in frames, beams, bents, rings, arches, and</td>
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<tr>
<td>columns; redundant beams and frames; combined stress; shear deformations.</td>
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<tr>
<td>Clark, Graham.</td>
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<tr>
<td>717 Advanced Engineering Dynamics</td>
<td>U G 3</td>
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<tr>
<td>W. 3 cl.</td>
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<tr>
<td>Prereq.: 607 and Math. 544 or 611.</td>
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<tr>
<td>Three dimensional vector statics; kinematics and kinetics of particles</td>
<td></td>
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<tr>
<td>and rigid bodies; energy, momentum, stability; application of Lagrange's</td>
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<tr>
<td>equations to machinery, vehicles, balloons, gyroscope, West.</td>
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<tr>
<td>718 Theory of Dynamic Stability</td>
<td>U G 3</td>
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<tr>
<td>Sp. 3 cl.</td>
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<tr>
<td>Prereq.: 707.</td>
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<tr>
<td>Study of the criteria for dynamic stability. Methods of stabilizing</td>
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<tr>
<td>critical mechanical systems; applications to space mechanics,</td>
<td></td>
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<tr>
<td>structures, and vehicles. Niederhoffer.</td>
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<tr>
<td>725 Theory of Thin Elastic Plates</td>
<td>U G 3</td>
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<tr>
<td>A, Sp. 3 cl.</td>
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<tr>
<td>Prereq.: 605 and Math. 544 or 611.</td>
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<tr>
<td>Pure bending of rectangular plates; thermal stresses; equations for small</td>
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<tr>
<td>deflections for various edge conditions and shapes; large deflections;</td>
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<tr>
<td>approximate methods. Mahig.</td>
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<tr>
<td>727 Elements of Inertial Guidance</td>
<td>U G 3</td>
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<tr>
<td>Navigation</td>
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<td>Sp. 3 cl.</td>
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<tr>
<td>Prereq.: 717.</td>
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<tr>
<td>Moment of momentum of rigid bodies; perturbing torques in the angular</td>
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<tr>
<td>equations of motion of a rigid body; gyrodynamics; accelerometers,</td>
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<tr>
<td>inertial platforms and surface and subsurface navigation systems; control</td>
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<tr>
<td>systems dynamics; a survey of modern mathematical techniques in the</td>
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<tr>
<td>study of dynamical systems. China.</td>
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<tr>
<td>735 Elementary Theory of Continuous Media</td>
<td>U G 3</td>
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<tr>
<td>A. 3 cl.</td>
<td></td>
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<tr>
<td>Prereq.: 602, 607, Math. 544.</td>
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<tr>
<td>Stress, deformation, and conservation laws for a general continuum;</td>
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<tr>
<td>Constitutive equations. Formulation of problems of fluid dynamics,</td>
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<tr>
<td>plasticity and elasticity. Niederhoffer.</td>
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<tr>
<td>740 Applied Elasticity I</td>
<td>U G 3</td>
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<tr>
<td>A. 3 cl.</td>
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<tr>
<td>Prereq.: 605 or 606, and/or concurs. Math. 609.</td>
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<tr>
<td>Not open to students with credit for 813. Analysis of stress and strain;</td>
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<tr>
<td>laws of elasticity; torsion; plane stress and strain. Niederhoffer, Mahig.</td>
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<tr>
<td>741 Applied Elasticity II</td>
<td>U G 3</td>
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<tr>
<td>W. 3 cl.</td>
<td></td>
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<tr>
<td>Not open to students with credit for 814. A continuation of 740.</td>
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</table>
750 Methods of Engineering Analysis  U G 3
W. 3 cl.
609.

799 Special Problems in Advanced U G 2-5
Engineering Mechanics
Prereq.: 13 cr. hrs. of 600 level in Engr. Mech. 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.

a. Experimental Stress Analysis
b. Dynamics
c. Fluid Mechanics
e. Applied Elasticity
f. Strength of Materials
g. Vibrations
h. Plasticity
i. Plates and Shells
j. Continuous media

801 Advanced Theoretical Mechanics G 2-5
Prereq.: 505, 607, 610, and Math. 611 or equiv. and evidence of sufficient background in area of study chosen, and permission of chairman.
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.

a. Advanced Experimental Methods
b. Advanced Dynamics
c. Hydrodynamics and Fluid Mechanics
e. Applied Elasticity
f. Strength of Materials
g. Vibrations
h. Plasticity
i. Plates and Shells
j. Continuous Media.

807 Vibrations of Continuous Media G 3
W. 3 cl.
Prereq.: 707 and/or concur. Math. 609 or 636.
Equations of motions for strings, membranes, prismatic bars, and plates for various boundary conditions; approximate methods for complicated shapes; wave propagation in elastic media. Leissa.

808 Non-Linear Vibrations G 3
Sp. 3 cl.
Prereq.: 707 and Math. 607 or equiv.
Vibrations of damped and undamped systems with non-linear restoring forces; self-sustained oscillations; application of Hill’s equation to stability of non-linear oscillations. West.

810† Classical Hydrodynamics G 3
Sp. 3 cl.
Prereq.: 717, Math. 609, 623, 624 or equiv.
Basic equations and concepts of inviscid fluid flow, solutions to two and three dimensional problems; conformal transformations; approximate methods. Leissa.

817 * Analytical Dynamics G 3
Sp. 3 cl.
Prereq.: 717.
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. West.

820 * Theory of Elasticity G 3
W. 3 cl.
Prereq.: 613.
Plastic range stress-strain relations; elasto-plastic behavior of beams, plates; torsion of prismatic bars; plate strain; shear lines; limit analysis. Graham, Niedenfuhur.

824 Plates and Shallow Shells G 3
W. 3 cl.
Prereq.: 725.
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. Leissa.

825† Theory of Thin Elastic Shells G 3
A, Sp. 3 cl.
Prereq.: 725, 813.
Equation of deformation of an arbitrary shell; thermal effects; exact and approximate solution; Rayleigh’s bending theory; membranes; shells of variable thickness, orthotropic shells. Niedenfuhur.

827 Random Vibrations G 3
A. 3 cl.
Prereq.: 807.
Description of random processes; statistical properties of the response of mechanical systems; optimization of systems subjected to random inputs; instrumentation. West.

830 * Energy Principles in Mechanics G 3
A. 3 cl.
Prereq.: 605 or 606 or 716 and Math. 544.
Theoretical development of energy principles in mechanics; strain energy and complementary energy with related minimal principles; applications to problems in elasticity, dynamics, vibrations. Graham.

840 Advanced Elasticity I G 3
W. 3 cl.
Prereq.: 746.
Complex variable methods; anisotropic elasticity; three-dimensional elasticity; mixed boundary value problems; thermoelasticity. Leissa.

841 Advanced Elasticity II G 3
Sp. 3 cl.
Prereq.: 840.
Continuation of 840.

845 * Non-Linear Theory of Elasticity G 5
Sp. 5 cl.
Prereq.: 746 and/or concur Math. 722.
Finite displacements; finite strain; non-linear interaction of stress states. Niedenfuhur.

850† History of Mechanics G 3
A. 3 cl.
Prereq.: 10 cr. hrs. 700-800 level in Engr. Mech. and reading knowledge of French or German.
Evolution of concepts in engineering mechanics; impact of scientific thought; effect on engineering analysis and design; critical study of original literature. West.

Research for thesis or dissertation purposes only.

A-50
COURSES OF INSTRUCTION

ENGLISH

English

Office: 421 Denney Hall, 164 W. 17th Ave.

ASSOCIATE PROFESSOR KUHN (Chairman), PROFESSORS
ALTICK, I. CHARVAT, DEBBY (Emeritus),
ESTECH, FULLINGTON (Emeritus), HUGHES, LOGAN,
PERCIVAL (Emeritus), ROBBINS, PUTLEY, SWALLEY, and
WILSON; ASSOCIATE PROFESSORS SARBY, BUCKLE,
BRUCOE, MARKEL, MAURER, SHEED (Lakeside),
SNOW (Emeritus), STEVENS, VARANDANY, WEDBERG, and
WHEELER; ASSISTANT PROFESSORS BEIA, COX, CRAGG
(Emertius), DASHER, DETLIF, DUMBLE (Emeritus), ENGLAND,
GIBSON, GRIGSON, GUNTER, HABER, KABEALO, KANE,
MARESCA, MARTIN, MUSE, SWEETING, PARKS, PASSE,
SHAPIRO, P. SHAPIRO, VALES (Lakeside), and WOODSON.

400 Review of the Elements of Composition U 3

Su.
Three cr. hrs. will be added to graduation requirements.
This course is designed for students who are not ade-
quately prepared to undertake the work of Eng. 416.
Students may be assigned to the course because of un-
satisfactory performance in the placement test or because of
inability to maintain a satisfactory standard in Eng. 416.
This course may not be taken as a prerequisite with Eng.
416. An additional fee will be charged to cover the cost of
this review course.
A review of the elementary principles of written composition with
guided practice in writing. Robbins, Director.

FOR FOREIGN STUDENTS

(Con't not counted toward graduation)

406-407-408 English as a Foreign Language. A sequence of
courses designed to train foreign students in the use of written
and oral English, often taken in conjunction with Speech 405.
Assignment to both Speech and the appropriate English 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.
Course credit may not be counted toward graduation. Gunter, Director.

406 General English for Foreign Students U 5

Review of English structure for foreign students. Proceeds from
basic oral-aural patterns to their application in writing. Gunter,
Director.

407 Advanced English for Foreign Students U 5

Develops academic and social effectiveness in the use of advanced
patterns in written and spoken English. Gunter, Director.

408 Special Problems in English for

Attention is given to the special academic problems of foreign
students. Concentrated work on idiomatic structure and diction
in writing reports, themes, examinations, and essays. Gunter,
Director.

416 Composition and Reading U 3

Not open to students with credit for 401, 403, or 405.
Training in the fundamentals of expository writing, as illustrated
in the student's own writing and in the essays of professional
writers. Robbins, Director.

417 Composition and Reading U 3

Prereq.: 416 or 410.
Not open to students with credit for 401, 403, 411, 413, or 419.
Continued training in expository writing with emphasis on the
logical elements in exposition. Robbins, Director.

418 Composition and Reading U 3

Prereq.: 417 or 411.
Continued training in expository writing, approached specifically
through the study of imaginative literature. Robbins, Director.

419 Composition and Reading U 3

A. 3 cl.
Prereq.: Em credit for 416.
Not open to students with credit for 401, 402, 411, 413, 417, or 505.
Designed for proficiency students only, as a substitute for
417.
Training in expository writing, with emphasis on the logical
elements in exposition. Robbins, Director.

420 Composition and Reading U 3

W. 3 cl.
Prereq.: 419 or Em credit for 417.
Not open to students with credit for 412, 414, 418 or
505.
Designed for proficiency students only, as a substitute for
418.
Continued training in expository writing, approached specifically
through the study of imaginative literature. Robbins, Director.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 500

Unless otherwise indicated, the prerequisites for 500 courses are
English 401 and 430, or 418 or 413, or 420.

501† Readings in Recent Drama U 3

A, Sp.
Not open to students with credit for 670. Not for
credit on the Eng. major.
Wide reading in American and European plays since 1920.
Lecture and discussion.

502† Readings in Recent Prose Fiction U 3

W.
Not for credit on the Eng. major.
Wide reading with particular attention to the novel. Lecture and
discussion.

505 Informative Writing U 5

Prereq.: 3rd yr. standing and 401, 430, 412, or 418
or the equiv.
Not open to students with credit for 506.
Intensive advanced training in the art of informative writing.
Passe, Director.

506 Critical Writing U 5

Prereq.: 418 or equiv., 3rd yr. standing, English majors
only.
Not open to students with credit for 505.
Intensive practice in writing various kinds of analyses of literary
texts. Shapiro, Director.

507 Narrative Writing U 5

A, W.
Prereq.: Permission of instructor.
Guided practice in the writing of short fiction. Varnandany.

508 Verse Writing U 5

Sp.
Prereq.: Permission of instructor.
The techniques of verse writing. The students will write in various
forms and meters and study the works of established poets as
models. Parks.

A-90
510 Masterpieces of American Literature  U 5
Not open to students with credit for 511, 609, 610, 615.
A critical study of some major American writers chosen from
among the following: Poe, Hawthorne, Emerson, Thoreau, Mel-
ville, Whitman, Dickinson, Twain, James, Frost, Eliot, Faulkner
and Hemingway. Markels, Director.

519 Technical Writing  U 3
A, W, Sp.  2 cl., 1 hr. conf.
Prereq.: 3rd yr. standing in the Bachelor of Science
curriculum.
Training in practical writing for industry, business, and research,
with emphasis on the special requirements and techniques for
the professional report. Bichle, Director.

520 Introduction to Poetry  U 5
A course designed to help students to understand and appreciate
poetry through intensive study of a representative group of poems.
Wheeler, Director.

521 Introduction to Fiction  U 5
Intensive study of a number of short stories and novels to acquaint
the general student with some of the important themes and tech-
niques of fiction. Bres, Director.

529 The English Bible  U 5
A, Sp.
A study of the King James version of the Bible with respect to
literary questions, historical development, and religious concepts.

540 Masters of Modern Literature  U 5
An introduction to modern poetry, drama, and fiction through
the study of five or six authors: Shaw, O'Neill, Frost, Conrad,
Eliot, Robinson, Foster, Yeats, and Foster. Utley, Director.

550 Introduction to Shakespeare  U 5
Not open to students with credit for 555. Students majoring in English in the College of Arts and Sciences
should elect 676 instead of 550.
Intensive study of selected plays of Shakespeare designed to give
an understanding of drama as theatrical art and as an interpreta-
tion of fundamental human experience. Walley, Director.

555 Introduction to Drama  U 5
Sp.
Not open to students with credit for 550.
A critical analysis of selected dramatic masterpieces from Greek
antiquity to the present, designed to clarify the nature and major
achievements of western dramatic art. Walley.

563 Masterpieces of English Literature  U 5
Not open to students with credit for 560 and 562.
A continuation of 562, but may be taken separately.
Selections of prose and poetry will be drawn from works of major
British writers from 1675 to 1900. Kuhn and Webber, Directors.

564 Masterpieces of English Literature  U 5
Not open to students with credit for 560 or 563. A
continuation of 562, but may be taken separately.
Selections of prose and poetry will be drawn from works of major
British writers from 1675 to 1900. Kuhn and Webber, Directors.

ENGLISH

GENERAL PREREQUISITES FOR COURSES
NUMBERED 600

Unless otherwise indicated, the prerequisites for 600 courses are
English 418 and ten hours in literature, history, history of fine
arts, history or appreciation of music, anthropology or philosophy.

609 The American Renaissance in Literature  U G 5
Su, A.
The readings of this course do not duplicate those of
510.
An introduction to the major American writers of the mid-
nineteenth century: Poe, Hawthorne, Melville, Emerson, Thoreau,
Whitman. Markels, Charrott.

610 American Literature, 1835-1914  U G 5
W.
The readings of this course do not duplicate those in
511.
Studies in fiction and poetry emphasizing such major figures as
Twain, Howells, James, Dickinson, Robinson, Crane, Dreiser,
and Willa Cather, Charrott.

614 Twentieth Century British Writers  U G 5
A.  5 cl.
A study of the development of British literature from the end of
the nineteenth century to the present, with emphasis on the
major poets and novelists. Bobb.

615 Twentieth Century American Writers  U G 5
Su, A.
A study of the development of American literature after World
War I, with emphasis on the major poets and novelists. Grisbey,
Muste.

616 A Writer's Approach to Fiction  U G 5
W.
Prereq.: 507 or equvo. or permission of instructor.
The writing and analysis of fiction. Although the emphasis is
upon student writing, there will be reading and discussion of the
works of contemporary writers.

620 Folklore  U G 5
Sp.
A critical examination of some of the outstanding English and
American folk songs and international folk tales. Lectures and
class discussions will be supplemented by recordings. Utley.

621 History of Literary Criticism  U G 5
W.
Intensive study of the basic texts in literary criticism from Plato
to T. S. Eliot. Wheeler.

635 English Usage  U G 5
Prereq.: The general prerequisites for 600 courses as
listed above, or four 505 or 509.
Usage and stylistic variety in written and spoken English, for
student interested in writing and teaching. Gutter, Adams,
Kubasho.

626 Structure of English  U G 5
W.
An investigation of the linguistic structure of modern English.
Stevens.

627 History of the English Language  U G 5
A.
Prereq.: the general prerequisites for 600 courses as
listed above, or four 505 or 509.
A study of the historical development of the English language
and the internal and external influences which have determined
its characteristics. Gutter.

A-91
635 The Age of Wit and Satire U G 5
A.
The skeptical mind of the Early Enlightenment as shown in lyric and satiric verse, essays, and drama, from Dryden to Pope. Mauzer.

636 Literature of the Eighteenth Century U G 5
Su, W.
The ideas and artistry of the Age of Reason as reflected in the work of major figures: Swift, Pope, Fielding, Sterne, Boswell, Johnson, Blake, Goldsm. Moreau.

640 Nineteenth Century Prose U G 5
A.
Selections from the principal romantic and Victorian non-fictional prose writers, read both as literary art and as documents of contemporary thought. Bradley.

641 Romantic Poetry U G 5
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. Kuhn, Martin.

642 Victorian Poetry U G 5
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. Bradley.

643† The Writing Laboratory U G 5
Sp. 3 cl., conf. Prereq.: Permission of instructor.
Detailed analysis in conference and class discussion of work presented by students. Six novels are discussed as types in modern writing.

648† Playwriting U G 5
A. Prereq. or concour.: One of the following, 676, 677, or 670.
Elementary laboratory course in playwriting. Methods of play analysis with attention to dramatic technique. An historical consideration of the major forms of drama.

653 Introduction to Chaucer U G 5
Su, Sp.
Not open to students with credit for 753.
A close study of Troilus and Criseyde and The Canterbury Tales as introduction to the artist and his period. Detlef, Stevens.

654 Introduction to Medieval Literature U G 5
A.
The study of masterpieces from the Middle Ages, chosen for their values in interpreting medieval culture as well as for their independent literary worth. Estrich.

656 The Nineteenth Century English Novel U G 5
Su, W.
Readings in a group of major novelists, such as Austen, Dickens, Thackeray, and others, with special emphasis upon social and humanistic values. Logan, Shiptro.

670 Modern Drama U G 5
Sp.
An historical and critical examination of the major developments, personalities, and achievements in the drama of Europe and America since the advent of Ibsen.

671 Early Seventeenth Century Literature U G 5
Su, W.
A study of the lyric modes of Jonson and Donne, the principal achievements in English literary prose, and the works of John Milton, Robins, Webber.

674 The English Renaissance U G 5
Su, Sp.
A study of Tudos prose and poetry as they exemplify literary art and as they reflect the creative and inquiring temper of the age. O’Kelly.

676 Shakespeare U G 5
W.
A critical consideration of the art, personality, and achievement of Shakespeare in the light of Renaissance and modern significance. Welley.

677 English Drama: Medieval and Renaissance U G 5
A.
Prereq.: 550 or 555 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. Welley.

678 English Drama: Restoration and Eighteenth Century U G 5
Sp.
Prereq.: 550 or 555 or equiv. A study of English drama from 1660 to 1800: Restoration heroic drama and wit comedy, eighteenth century sentimental drama, the comedy of Goldsmith and Sheridan. Wilson.

689 Literary and Cultural Heritage of the Middle East U G 5
Sp. 5 cl.
An introduction to Assyro-Babylonian, Arabic, and Persian literature in their historical and cultural settings. Verandzen.

690 Senior Seminar and Tutorial U 5
Prereq.: Engl. majors in their last qtr. Not open to students with credit for 565.
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. Grigsby, Director.

GENERAL PREREQUISITES FOR COURSES NUMBERED 700.
Except for 705, 706, 707, all 700 courses are designed primarily for graduate students. They are open also to seniors who have credit for ten hours of literature courses on the 600 level. Permission of the English Department Graduate Committee Chairman is necessary for registration in them.

701 Minor Problems in English U G 1-5
Prereq.: Senior standing and permission of the Department Graduate Committee.
With approval of participating faculty member and Departmental Graduate Committee, students may register for individual directed study under this number for work not normally offered in courses.

702 Principles and Methods of Linguistic Analysis U G 3
Su.
Prereq.: Permission of Director.
The study of the principal methods of the analysis of the English language.
703 Structural Analysis of English Expository Prose
A.
Prereq.: Permission of the Director.

704 Principles and Methods of Literary Analysis
Su.
Prereq.: Permission of Director.
Principles and methods of the study of English poetry, drama, and prose fiction. Maurey.

705 Honors Course
U G 3-10
A.
Prereq.: 4th yr. standing; the record of A in at least half of his English courses and an average of 85 in all of his courses; the permission of the professor under whose supervision the work is to be completed. Open only to candidates for distinction in English, who have in their junior year completed with high grades a program approved by the Committee on Honors.
A program of reading arranged for each student, with individual conferences, reports, and honors thesis. Bradley, Director.

706 Honors Course
U G 3-10
W.
See Prereq. for 705.

707 Honors Course
U G 3-10
Sp.
See Prereq. for 705.
A continuation of 706.

708 Studies in the American Renaissance
U G 5
A.
Prereq.: 609 or equiv.
An intensive study of several authors drawn from the following list: Cooper, Poe, Hawthorne, Melville, Emerson, Thoreau, Whittman, Woodrow.

709 Studies in American Literature, 1865-1914
U G 5
Su, W.
Prereq.: 610 or equiv.
An intensive study of several major authors of the period, including Twain and James. Markels, Brucoll.

710 Studies in Critical Theory
U G 5
A.
A review of theory and practice in some of the principal forms of literary analysis. Wheeler.

715 Studies in English or American Literature
Prereq.: Permission of the Chairman of the Department Graduate Committee.
Under this number, the Department occasionally offers an intensive course on some phase of English or American literature.

717 The Writing of Fiction
Sp.
Prereq.: Submission of a manuscript to the instructor before enrollment. 507 and 616 are recommended.
A course for those who have already demonstrated some proficiency in the writing of fiction.

727 Twentieth Century Poetry
U G 5
A.
Prereq.: Acquaintance with the major poets studied in 615 or 614 is assumed.
An intensive study of a representative body of modern poetry, with emphasis on several major poets of England and America.

728 Studies in Twentieth Century Fiction
U G 5
Su, Sp.
Prereq.: Some acquaintance with modern continental novelists is recommended.
Tendencies in modern fiction as seen in the works of such major figures as Proust, Joyce, Mann, D. H. Lawrence, Virginia Woolf, Hemingway, and Faulkner. Beid, Munte.

735 Dryden
U G 5
Sp.
A detailed study of the poems, plays, and essays of John Dryden, as exemplifying the principles and practices of the Early Enlightenment. Wilson.

736 * Pope
U G 5
A.
Pope's poems considered formally and as representative documents of his age. Marcacc.

737 * Swift
U G 5
Sp.
An intensive critical study of Swift's work and its relation to the intellectual and political movements of the Age of Reason.

738 Studies in the Eighteenth Century
U G 5
Su, W.
Intensive work in an important aspect of eighteenth century literature or thought. Kuhn, Marcacc.

742 Studies in Victorian Poetry
U G 5
W.
The artistic values of the poetry, its place in the romantic tradition, its reflection of the contemporary intellectual and social milieu. Topic varies each year. Alcock.

744 * Studies in Nineteenth Century Prose
U G 5
A.
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. Bradley.

745 Studies in Romantic Poetry and Poetics
Su, Sp.
Literary romantiicism, as represented by one or more of the poets (Blake, Coleridge, Wordsworth, Byron, Shelley, Keats), in relation to contemporary intellectual and political movements. Topic varies year to year. Topic for 1963-64: Wordsworth. Logan.

746 * Introduction to Middle English Language and Literature
Sp.
A study, with some cultural background, of important Middle English writings, in their original form.

747 * Studies in Early English Literature
U G 5
Su.
Prereq.: 751, 746, or 653 or equiv.
749 Intro. to Old English Language and Literature

G 5
A. 5 cl.
The reading of Old English prose with special attention to the language and its cultural backgrounds. Stevens.

750 Masters' Thesis

G 1-5

751 Old English Poetry

UG 5
A.
Prereq.: 749 or equiv.
A critical reading of the major Old English poems, form, content, and style. Stevens.

754 Beowulf

UG 5
Sp.
Prereq.: 751 or equiv.
A close study of the text of Beowulf and its background. Estrich.

755 Linguistics and English

UG 5
W.
An advanced approach to linguistics, language and culture, phonetics, the history and structure of English, and the teaching of English language and literature. Gumper.

756 Linguistics and English

UG 5
Sp.
Prereq.: 755.
Continuation of 755.

757 Studies in Chaucer

G 5
W. 5 cl.

771 Studies in Renaissance and Early Seventeenth Century Poetry

UG 5
W.
A close study of significant verse of late Sixteenth and early Seventeenth centuries. Babb.

772 Studies in Renaissance Prose

UG 5
Su, Sp.
The evolution of literary prose from Moore to Milton as seen in representative works which are related critically to rhetorical theory and significant cultural forces. Webber.

773 Spenser

UG 5
Su, W.
A study of Spenser's poetry, its literary significance and its relation to foreign, classical, and native English poetic traditions. O'Reilly.

775 Milton

UG 5
Sp.
A critical study of the poetry and prose of John Milton, viewed against his social and literary background. Robbins.

776 Shakespeare

G 5
A. 5 cl.
An intensive consideration of selected problems in the scholarly study of Shakespeare.

835 Studies in Eighteenth Century Literature

G 5
Sp.
Problems in the literature and ideas of the Age of Reason.

836 Studies in Eighteenth Century Literature

Su.
Prereq.: 835.
Continuation of 835.

837 Research in the Restoration Period

G 5
A.
Individual research in Restoration literature, Dryden to Pope; oral and written reports. Wilson.

838 Research in the Restoration Period

W.
Prereq.: 837.
Continuation of 837.

842 Studies in Nineteenth Century Literature

G 5
A.
Reading and research in the literary production of the century and its intellectual and social backgrounds. Topic varies from year to year. Altick.

843 Studies in Nineteenth Century Literature

G 5
Su, W.
Prereq.: 842.
Continuation of 842. Altick, Logan.

852 Studies in the Medieval Period

G 5
Sp.

853 Studies in the Medieval Period

G 5
Su.
Prereq.: 852.
Continuation of 852.

854 Research in Chaucer

G 5
A. 5 cl.
Individual research in various aspects of medieval literature, with Chaucer as center. Topic for 1984-85: Chaucer and the Literature of Italy. Utley.

855 Research in Chaucer

G 5
W. 5 cl.
A continuation of 854.

865 Studies in American Literature and Cultural History

W.
Individual research in problems in American literature. Charvat.

866 Studies in American Literature and Cultural History

G 5
Su.
Prereq.: 865.
Continuation of 865. Charvat.

875 Studies in the Age of Shakespeare

G 5
A.
Exploration of the problems, materials, and methods relevant to a scholarly study of Shakespeare's work and cultural environment, culminating in individual research. Walley.
876* Studies in the Age of Shakespeare
Sp.  G 5
Prereq.: 875.
Continuation of 875, Walley.

877* The English Renaissance
W. 5 cl.  G 5
Reading and research in non-dramatic literature of the English Renaissance. Topics may vary from year to year. Hughesy.

878* The English Renaissance
Sp. 5 cl.  G 5
A continuation of 877. Hughesy.

880 Bibliography and Method
A, Sp.  G 3
A course for the advanced graduate student in the methods and tools of literary research. Altich.

881† Textual Criticism and Editing
A.  G 5
Prereq.: 880.
Evaluation of literary editorial methods, past and present; training in skills requisite to the textual critic and scholarly editor; practice in textual editing. Hughesy.

950 Research in English
Research for dissertation purposes only.

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**Entomology**

PROFESSORS: IWHARTON (Chairman), IBORROR, IRIGS, CUTHRIGHT (Emeritus), IDAVISON, DELONG (Emeritus), IHOLTDSWORTH, KNULL, NULL, (Emeritus), C. B. NEISWANDER (Emeritus), IR. B. NEISWANDER, PETERSON (Emeritus), IRIGS, IRONHUBER, ISLEMSAN, STEPHEN, and IVENARD; ASSOCIATE PROFESSORS: IRBUTT, DUNHAM (Emeritus), IFISK, KNULE, IPULIVKA, ISHABALOUGH, ITRELLPHORN, ITWARE, and IWVIETH; ASSISTANT PROFESSORS: IPSTYTHE, GUTHRIE, STILL, IFREE, and IVALENTINE; INSTRUCTORS: BLAIR, JOHNSTON, LION; and ASSISTANTS.

For related courses see Biology.

550 General Entomology    U 5
A, W, Sp. 3 cl., 2 2-hr. lab.  Prereq.: Zool. 400 or Biol. 402 or equiv.
The biology and habits of insects, the use of insects in scientific research, and the interrelations of beneficial and harmful species with man. Tripleshorn, Valentine.

551 Economic Entomology   U 5
A, W, Sp. 5 cl.  Prereq.: Zool. 400 or Biol. 402 or equiv.
A basic course dealing with the economic aspects, analyzing and solving of common insect problems. Davidson, Holdsworth.

566 Horticultural Entomology   U 3
Sp. 3 cl.  Prereq.: 551.
A detailed study of insects and mites attacking horticultural crops. Davidson.

600 Insect Physiology     U G 5
The general physiology of insects and other arthropods. The laboratory will stress the use of insects to demonstrate fundamental physiological processes. Fisk.

608 Biology of the Honey Bee    U G 3
Su. 3 cl.  Prereq.: 550 or 551, Zool. 400 or Biol. 402 and 10 additional cr. hrs. of Biol. Sc.
The behavior, social organization, morphology, physiology, reproduction, disease, and genetics of the honey bee studied from a comparative and evolutionary viewpoint. Rothenbuhler.

640 Advanced Economic Entomology   U G 5
A. 3 cl., 2 2-hr. labs.  Prereq.: 20 cr. hrs. Biol. Sc., 551 or equiv. recommended.
The principles of insect control. Field and laboratory studies will be made of major insect control problems. Davidson.

650† Entomology for Biology Majors   U G 5
Su. 3 cl., 2 2-hr. labs.  Prereq.: Zool. 404 or equiv. and 10 additional cr. hrs. of Biol. Sc.
Not open to students with credit for 550.
The biology, morphology, metamorphosis and habits of insects. Methods of collecting, preserving, culturing and identifying the more important families. Staff.

651 External Morphology of Insects   U G 5
A. 2 cl., 6 hrs. lab.  Prereq.: 10 cr. hrs. of Zool. and 10 cr. hrs. of Entom.
A study of the comparative external morphology of insects with special emphasis on evolutionary trends and on taxonomic applications of morphology. Borror.

653 Principles of Insect Toxology    U G 5
W. 3 cl., 2 2-hr. labs.  Prereq.: 550 or 551 and 15 additional cr. hrs. of Biol. Sc. and 1 cr. Org. Chem.
Deals with the physical-chemical properties and physiological action of insecticides, miticides, and adjuvants. Methods of securing, evaluating, and presenting toxicological data are stressed. Warr.

655 Medical Entomology          U G 3 or 5
Sp. 3 cl., or 3 cl. and 2 2-hr. labs.  Prereq.: Zool. 404 and 10 additional cr. hrs. in Microbiol. or Entom. or Parasitology.
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.

670 Field Entomology       U G 4
Su (1st Term), 3 all day classes.  Prereq.: 550 or equiv. and 15 additional cr. hrs. of Biol. Sc.
Given only at the Frank Theodore Stone Laboratory.
This course deals primarily with collecting, identification and field methods. Field trips are made to various islands of Lake Erie and the mainland.

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A-95
COURSES OF INSTRUCTION

ENTOMOLOGY

671* Aquatic Entomology U G 4
Su. Prereq.: 467 or equiv. and 15 additional cr. hrs. of Biol. Sc.
Goes only at the Franz Theodore Stone Laboratory.
A course designed for teaching in the preparation of biology or research on aquatic resources. Taxonomy and ecology of aquatic larvae are studied.

701 Special Problems U G 2-5
Individual work in the field of the chosen problem. Permission of instructor.
c. Insects causing or transmitting diseases of animals. Holdsworth, Davidson, Vander.
d. Insects causing or transmitting diseases of plants. Briggs, Davidson, Holdsworth.
e. Insect control. Davidson, Ware, Holdsworth.
g. Insect morphology. Borer, Fisk.
h. Insect physiology and toxicology. Fisk, Shambaugh, Ware.
i. Insect taxonomy. Borer, Davidson, Triplehorn, Valentine.
j. Laboratory technique and rearing methods. Fisk.
k. Insect behavior. Fisk, Holdsworth, Rothenberg.
l. Field and Experiment Station Problems. Davidson, Forrhe, Niemczyn, Polivka, Rings, Shambaugh, Stearns, Tweet, Ware.
.n. Insect pathology and biological control. Briggs.

705* Systematic Entomology U G 5
W. 2 cr., 6 lab. hr.
Prereq.: 651.
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. Borer.

706† Systematic Entomology U G 5
W. 2 cr., 6 lab. hrs.
Prereq.: 651.
Continuation of 705, covering the Diptera, Lepidoptera, and Hymenoptera. Borer.

712* Immature Insects U G 5
A. 1 cr., 4 2-hr. lab.
Prereq.: 705 and 706 or equiv.
A survey of immature stages of insects with emphasis on the anatomy and taxonomy of holometabolous larvae. Valentine.

801 Special Problems G 2-5
Prereq.: Permission of instructor.
Individual work in the field of the chosen problem. See topics under 701.

814 Biological Control G 5
W. 3 cr., 2 2-hr. labs.
Prereq.: Permission of instructor.

816* Research Methods: Living Insects G 5
Sp. 3 cr., 2 2-hr. labs.
Prereq.: Permission of instructor.
Deals with current field and laboratory research methods of trapping, sampling, handling, and rearing insects; conducting life history studies; and measuring environmental factors. Fisk.

817‡ Internal Morphology of Insects G 5
Sp. 2 cr., 3 2-hr. labs.
Prereq.: 651.
Deals with the internal structures of insects, including anatomy, function, histology, embryology, and metamorphosis. Laboratory includes preparation of permanent microscopic slides of insect tissues. Fisk.

850 Advanced Insect Physiology G 5
W. 3 cr., 2 2-hr. labs.
Prereq.: 600 or equiv. and 20 additional cr. hrs. of Biol. Sc. including Agr. Biochem. 610 and 611 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.

86 Interdepartmental Seminar in Polar and Alpine Studies Sp.
(See under Interdepartmental Seminars)

97 Interdepartmental Seminar in Natural Resources A. W. Sp.
(See under Interdepartmental Seminars.)

900 Seminar G 1 or 2
(See Zoology 900 for listing of seminars in the Department of Zoology and Entomology)

950 Research in Entomology G Arr.
Research for thesis and dissertation purposes only.

Fine Arts

Office: 146 Fine Arts Bldg., 111 West 17th Avenue.
PROFESSORS: HUSMAN (Director), FANNING (Emeritus), FREY (Emeritus), HOPKINS (Emeritus), ROBINSON (Emeritus), IBANKIN, IBOGATY, ICSURI, IR. GATRELL, IKBAN, IKBING, IKBK FIELD, ILUDEN, ISERVINO, ISEMANN, and IWOOD; VISITING PROFESSOR LINDINGER; ASSOCIATE PROFESSORS IBLACK, ICHAPEL, IECKER, IFRAY, IRILEY, ITRELL, IHEDWEIT, IHEBREW, IJONES, IKRAM, IPATTON, and IZIMMER; ASSISTANT PROFESSORS IBaughman, IBERENDEN, IClifford, IFITZER, IGREAVES, IHALL, IHEGERTY, IHEDWIN, IHOLREW, IXITTS, IRUSHER, IMELNIAK, IMITCHELL, IRUBRIGHT, ISCARTW, ITPLATE, IWALLSCHLAGER, and IYVINE; INSTRUCTORS IBIGEEN, ICHAPEL, IFRZPATRICK, IHORN, ILIEND-THARD, ISSANDERG, ISMITH, ITUMBO, ILALDEN, and IWEKLE.

The courses in Fine Arts may be grouped as follows:
Art Education 459, 548, 549, 559, 570, 600, 799.
Ceramics 484, 490, 491, 587, 591, 592, 593, 594, 595.

A-96
Sculpture: 461, 534, 565, 728, 729.
Special Problems: 681, 682, 683.
Studio-Humanities: 401, 430.

400 Field Experience U 0
Prereq.: Six weeks full-time work experience or the equiv. in Medical Illustration, Product Design, Space, and Enclosure Design, or Visual Communication Design.
Permission of instructor.
Field experience in the various professional design fields.

401 Introduction to Fine Art Activities U 3
Su, A, W, Sp. 1 cl., 4 1-hr. lab.
Prereq.: Not open to candidates for the degree B.S. and B.F.A. in Ed. with Fine Arts as a major, nor to students with credit for 402 or 430.
An investigation of visual form, its perception, development, and use. Hodlin and Stagg.

402 Drawing U 3
A. 6 hr. lab.
Prereq.: Arch. 2nd yr. standing.
Visual fundamentals as expressed through drawing. Emphasis upon configuration and visual relationships.

406 Form Organization U 3
A. Sp.; 3 2-hr. lab.
Prereq.: Dent. 1st yr. standing or Arch. 2nd yr. standing.
Drawing and sculpture, with emphasis on visual organization. Black, Kogut, Friley, Sherman.

407 Water Color U 3
Sp. 3 2-hr. lab.
Prereq.: 402 or 403.
Not open to majors in Fine Arts.
Painting from still life, models, and landscape. Lectures, laboratory work, and criticism.

411 Drawing from Life U 3
W. 6 lab. hrs.
Prereq.: Arch. 2nd yr. standing and 402.
Drawing from the human figure, study of gesture and planar relationships in two and three dimensional space.

411 Drawing and Fine Arts Orientation U 5
Su, A, W, Sp. 5 2-hr. lab. plus 1 cl. in A, Qtr.
Introduction to studio activity. Laboratory experience, with emphasis on drawing and design. Lectures and discussion about fields of specialization in fine arts.

421 Drawing U 5
Su, A, W, Sp. 5 2-hr. lab.
Prereq.: 421 or permission of instructor.
The use of various drawing media with continuation of the underlying principles as utilized in 421. Laboratory and field problems.

430 Fundamentals of Art U 5
Su, A, W, Sp. 5 2-hr. lab.
Prereq.: Not open to majors in Fine Arts or to students with credit for 439.
An introduction to art through studio experience, exploring two-dimensional and three-dimensional media, analysis of form, and modes of expression.

431 Elementary Design U 5
Su, A, W, Sp. 5 2-hr. lab.
Prereq.: 402 or 421.
An introductory course in design, with special attention given to the fundamentals of visual organization and the inventive use of art materials.

432 Intermediate Design U 5
Su, A, W, Sp. 5 3-hr. lab.
Prereq.: 430 or 431.
Three-dimensional design with special emphasis upon the inventive use of various hand tools, materials and techniques.

459 Orientation of Art Education U 3
Sp. 3 cl.
Prereq.: 2nd yr. standing.
Historical introduction to the art education program, with attention to the orientation and professional preparation of an art teacher.

461 Sculpture U 5
Su, A, W, Sp. 5 3-hr. lab.
Prereq.: 421.
Not open to students with credit for 411.
An introduction to the principles of sculpture, emphasizing basic forming processes and materials. Black, Freeman, Wenzke.

484 Introduction to Ceramic Art U 3
An introduction to pottery making. Laboratory practice in building pottery by hand, with short lectures giving a broad survey of the ceramic arts.

490 Elementary Ceramic Art U 5
An introduction to the art phases of the ceramic field. Laboratory practice in the hand forming process.

491 Ceramic Art Laboratory U 5
Su, A, W, Sp. 15 lab. hrs.
Prereq.: 484 or 490.
Introduction to more-involved forming processes such as the potter's wheel, mold and mold making.

494 Introduction to Art U 3
Su, A, W, Sp. 3 cl.
Not open to juniors, seniors or students with credit for 497.
A study of meaning of visual form and imagery in architecture, sculpture, and painting. Patton.

497 Historic Styles in Art U 3
Su, A, W, Sp. 3 cl.
Not open to juniors, seniors, Fine Art majors, or students with credit for 494.
An introduction to the principal artistic styles of the Western world.

500 Painting U 5
Su, A, W, Sp. 5 2-hr. lab.
Prereq.: 423, 431.
Not open to students with credit for 427.
Emphasis on the use of color, drawing, and design in the development of a personal idiom of expression. opaque media. Laboratory and field problems.

501 History of Western Art I U 3
A, W, Sp. 3 cl.
Prereq.: 3rd yr. standing or 494 or 497.
A survey of Ancient and Medieval Art.
### Courses of Instruction

**Fine Arts**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>U/Class</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>502</td>
<td>History of Western Art II</td>
<td>U 3</td>
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<tr>
<td></td>
<td>Su, A, W, Sp. 3 cr.</td>
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<td>3rd yr. standing or 404 or 407, A survey of Renaissance and Baroque Art.</td>
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<tr>
<td>503</td>
<td>History of Western Art III</td>
<td>U 3</td>
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<td></td>
<td>Su, A, W, Sp. 3 cr.</td>
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<td></td>
<td>3rd yr. standing or 494 or 497, A survey of the art of the Modern period.</td>
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<tr>
<td>505</td>
<td>Life Drawing</td>
<td>U 5</td>
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<td></td>
<td>Su, A, W, Sp. 5 3-hr. lab.</td>
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<td>423, Drawing from the human figure, using a variety of media. Discussion of drawing as related to important historical styles. Laboratory problems and field trips.</td>
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<tr>
<td>509</td>
<td>History of Oriental Art</td>
<td>U 3</td>
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<td></td>
<td>Su, Sp. 3 cr.</td>
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<td>A survey of Far Eastern Art: India, China, and Japan. Kaplan.</td>
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<tr>
<td>526</td>
<td>Introduction to Printmaking</td>
<td>U 5</td>
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<td></td>
<td>Sp. 5 2-hr. lab.</td>
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<td>432 and 433, The basic tools, methods, and materials of printmaking. Study and examination of original prints. Charlton.</td>
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<tr>
<td>527</td>
<td>Water Color Painting</td>
<td>U 5</td>
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<td>Su, Sp. 5 3-hr. lab.</td>
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<td>427 or 432 and 500, Special emphasis on water color's unique capacities for personal expression. Problems in landscape, still life, and the figure.</td>
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<tr>
<td>528</td>
<td>Oil Painting</td>
<td>U 5</td>
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<td>Su, A, W, Sp. 5 3-hr. lab.</td>
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<td>500, Painting for still life, with the object of developing the color sense and acquiring directness of presentation. Problems in the organization and execution of pictures.</td>
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<tr>
<td>530</td>
<td>Orientation to Environmental Design and Planning</td>
<td>U 3</td>
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<tr>
<td></td>
<td>Sp. 3 cr.</td>
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<td></td>
<td>A survey of design history, theory, and practice for all majors in the Product Design, Space and Enclosure Design, and Visual Communication Design curricula.</td>
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<tr>
<td>534</td>
<td>Sculpture Design Materials</td>
<td>U 5</td>
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<td></td>
<td>A, W, Sp. 5 2-hr. lab.</td>
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<td>430 or 431, Study of three-dimensional form through the use of power and hand tools.</td>
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<tr>
<td>548</td>
<td>Art Education Laboratory</td>
<td>U 5</td>
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<td></td>
<td>W. 5 3-hr. lab.</td>
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<td>450, Laboratory problems with a variety of design materials, with attention to the nature of different media and their educational potential. Mitchell.</td>
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<tr>
<td>549</td>
<td>Art Education Laboratory</td>
<td>U 3</td>
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<tr>
<td></td>
<td>Sp. 7 lab. hrs.</td>
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<td>548, Laboratory analysis of children's developmental characteristics in their art work in relation to the elementary school curriculum; participation in an art program for children.</td>
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<td>554</td>
<td>Visual Communication Design</td>
<td>U 5</td>
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<td></td>
<td>A. 5 2-hr. lab.</td>
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<td>554, Not open to students with credit for 651, 652, or 653. Development of knowledge and skills in the application of color, lettering, typography, illustration, graphic technology to diverse two and three-dimensional graphic communication problems. Waltherlager, Zimmer.</td>
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<tr>
<td>555</td>
<td>Visual Communication Design</td>
<td>U 5</td>
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<td>W. 5 2-hr. lab.</td>
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<td>555, Continuation of 554.</td>
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<tr>
<td>556</td>
<td>Visual Communication Design</td>
<td>U 5</td>
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<td></td>
<td>Sp. 5 2-hr. lab.</td>
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<td>555, Continuation of 555.</td>
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<tr>
<td>558</td>
<td>Lettering</td>
<td>U 3</td>
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<td></td>
<td>A, W, Sp. 1 cr., 3 3-hr. lab.</td>
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<td>427, The principles of lettering and its application to advertising design.</td>
</tr>
<tr>
<td>562</td>
<td>Intermediate Sculpture</td>
<td>U 5</td>
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<td></td>
<td>Su, A, W, Sp. 5 3-hr. lab.</td>
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<td>461, 505, 534, Aspects of the human form studied in relation to the materials of sculpture. Experimentation in a choice of materials: clay, wax, cement, plaster, metal. Black, Freeman, Wendum.</td>
</tr>
<tr>
<td>569I</td>
<td>Art for Elementary Teachers</td>
<td>U 5</td>
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<td></td>
<td>Su, A, W, Sp. 5 2-hr. lab.</td>
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<td>500, Laboratory experiences with two-dimensional and three-dimensional materials toward understanding the visual arts as background for teaching in the elementary schools.</td>
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<tr>
<td>570</td>
<td>Art for Elementary Teachers</td>
<td>U 3</td>
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<tr>
<td></td>
<td>Su, A, W, Sp. 3 2-hr. lab.</td>
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<td>450 or 599, Problems of teaching in terms of personal knowledge about art, insight into children's art work, and understanding of elementary school curriculum. Barnek, Mitchell, Ecker.</td>
</tr>
<tr>
<td>572</td>
<td>Elements of Weaving</td>
<td>U 5</td>
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<td></td>
<td>A, W, Sp. 5 2-hr. lab.</td>
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<td>431, An introduction to the creative and functional aspects of hand-waving. Experience in the construction, warping, threading, and the manipulation of both standard and modern design techniques. Baughman.</td>
</tr>
<tr>
<td>573</td>
<td>Weaving</td>
<td>U 3</td>
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<td></td>
<td>A, W, Sp. 3 2-hr. lab.</td>
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<td>431, The use of weaving materials and equipment, with an emphasis on creative design of function fabric. Baughman.</td>
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<tr>
<td>576</td>
<td>Space and Enclosure Design</td>
<td>U 5</td>
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<td></td>
<td>Sp. 1 cr., 5 3-hr. lab.</td>
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<td>507, Not open to students with credit for 602, A study of form and order concepts in environmental space and enclosure problems. Developmental studies in full architectural scale. Krumm, Wallischlaeger.</td>
</tr>
<tr>
<td>577</td>
<td>Fundamentals of Design</td>
<td>U 3</td>
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<tr>
<td></td>
<td>A. 3 2-hr. lab.</td>
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<td></td>
<td>402 or 430 or permission of instructor, The application of principles of design in the decorative arts. Study of textiles, home furnishings, and other phases of contemporary design. Baughman.</td>
</tr>
</tbody>
</table>

A-98
582 Product and Environmental Design  U  5
A. 5 2-hr. lab.
Prereq.: 530, 558.
Basic principles and theories of three-dimensional design as applied to products and enclosures.

583 Product and Environmental Design  U  5
W. 5 2-hr. lab.
Prereq.: 582.
Basic principles and theories of three-dimensional design as applied to products and enclosures.

584 Product and Environmental Design  U  5
Sp. 5 2-hr. lab.
Prereq.: 582.
Basic principles and theories of three-dimensional design as applied to products and enclosures.

585 History of American Art  U  3
A. 3 cl.
A study of architecture, painting, and sculpture in America during the eighteenth, nineteenth, and twentieth centuries. Belkoff.

587 Ceramic Laboratory  U  3
Su, A, W, Sp. 9 lab. hrs.
Prereq.: 484, 490.
Specific problems in the ceramic art field dealing with form, and processes such as the potter's wheel.

590 Advanced Ceramic Laboratory  U  5
W. 15 lab. hrs.
Prereq.: 484 or 490.
Laboratory practice in designing ceramic wares, with emphasis on the use of the potter's wheel.

591* Ceramic History  U  5
W. 5 cl.
A survey in the historical classification of Ceramic Art, emphasizing impulses and influences, with a comparative study of results achieved and means of achievement. Atherton.

592 Advanced Ceramic Laboratory  U  5
Sp. 15 lab. hrs.
Prereq.: 590 or permission of instructor.

593* Ceramic Composition  U  5
A. 5 cl.

594* Ceramic Composition  U  5
W. 2 cl., 4 2-hr. lab.
Prereq.: 484 or 490 and 593.
Laboratory practice in development of the aesthetic aspects of ceramic glazes and bodies; methods of presenting their fired composition and correction of faults. Littlefield.

595* Ceramic Composition  U  5
Sp. 2 cl., 4 2-hr. lab.
Prereq.: 594.
Laboratory study and development of individual projects leading to creation of ceramic compositions of aesthetic merit. Further studies in texture and color. Littlefield.

600 Theory of Art Education  U  G  4
A. 9 hr. lab.
Prereq.: 549 and Ed. 514, 555.
Problems of art education in the public schools; observation in the public schools. Barker, Ecker.

603 Interior Environment I  U  5
A. 1 cl., 11 lab. hrs.
Prereq.: 503, 576.

604 Interior Environment II  U  5
W. 1 cl., 11 lab. hrs.
Prereq.: 603.

605 Development of Interior Design I  U  3
A. 3 cl.
Prereq.: 501, 502, 503 or Hist. 401, 402 or equiv.
A survey of European interiors from 1300 to 1850, followed by a study of French design from Louis XIII through the Empire period.

606 Development of Interior Design II  U  3
W. 3 cl.
Prereq.: 605.
A study of the Tudor, Jacobean, Caroline, Georgian, and Regency Periods—considering the aesthetic, political, and economic implication. Krumm.

607 Development of Interior Design III  U  3
Sp. 3 cl.
Prereq.: 606.
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. Krumm.

608 Product Design—Models  U  5
A. 5 2-hr. lab.
Prereq.: 507.

609 Advanced Product Design—Mass Production  U  5
W. 5 2-hr. lab.
Prereq.: 608.

610 Product Design—Furniture  U  5
Sp. 5 2-hr. lab.
Prereq.: 508.
Independent research and developmental work in furniture and related environmental products. Analysis, planning, design, and prototype development up to production phase. Kitts, Wood.

625 Advanced Life Drawing  U  5
Su, A, W, Sp. 5 3-hr. lab.
Prereq.: 505.
Advanced problems in drawing from life and figure composition.

626 The Art of India and Indonesia  U  G  5
A. 5 cl.
A cultural art history of India in terms of monuments, people, and religious philosophies. Kaplan.

627 The Art of China  U  G  5
W. 5 cl.
A cultural art history of China in terms of monuments, people, and ideas. Kaplan.

A-99
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>UG</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>628</td>
<td>The Art of Japan</td>
<td>U</td>
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<td>Sp. 3 cl.</td>
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<td></td>
<td>A cultural art history of Japan in terms of monuments, people, and beliefs. Kaplan.</td>
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<td>629</td>
<td>Contemporary Art</td>
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<td>A. Sp. 3 cl.</td>
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<tr>
<td></td>
<td>Twentieth Century European Art. A study of the major achievements in painting, sculpture, and architecture since 1900.</td>
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<tr>
<td>630</td>
<td>Advanced Water Color Painting</td>
<td>U</td>
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<td></td>
<td>Su, Sp. 5 3-hr. lab.</td>
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<td></td>
<td>Prereq.: 505, 527.</td>
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<td></td>
<td>Painting from still life, models, and landscapes. Special problems in organization and development of pictures.</td>
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<tr>
<td>632</td>
<td>Early Christian and Byzantine Art</td>
<td>U</td>
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<td></td>
<td>A. 3 cl.</td>
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<td></td>
<td>Not open to students with credit for 673.</td>
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<td></td>
<td>The Christian art of the Mediterranean region to the eighth century and the art of the Byzantine Empire to the fifteenth century. Ludden.</td>
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<tr>
<td>633</td>
<td>Romanesque and Gothic Art</td>
<td>U</td>
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<td></td>
<td>W. 3 cl.</td>
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<td></td>
<td>Not open to students with credit for 673.</td>
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<td></td>
<td>The art of Western Europe from the Carolingian period to the fourteenth century. Ludden.</td>
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<td>635</td>
<td>Advanced Visual Communication</td>
<td>U</td>
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<td></td>
<td>A. 5 2-hr. lab.</td>
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<td></td>
<td>Prereq.: 507 and 556.</td>
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<td></td>
<td>Explorations coordinating graphic media, technology, and techniques in advanced two-dimensional and three-dimensional graphic problems. Research and development projects. Wallechaegar, Zimmer.</td>
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<tr>
<td>636</td>
<td>Advanced Visual Communication</td>
<td>U</td>
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<td></td>
<td>W. 5 2-hr. lab.</td>
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<td>Prereq.: 635.</td>
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<td>Continuation of 635.</td>
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<td>637</td>
<td>Advanced Visual Communication</td>
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<td></td>
<td>Sp. 5 2-hr. lab.</td>
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<td>Prereq.: 636.</td>
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<td></td>
<td>Continuation of 636.</td>
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<td>643</td>
<td>Graphic Processes</td>
<td>U</td>
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<td></td>
<td>W. 5 3-hr. lab.</td>
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<tr>
<td></td>
<td>Prereq.: 500. Graduate students must have 15 cr. hrs. in drawing and painting.</td>
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<td></td>
<td>Lithography and serigraphy explored by students as part of their professional experience in print-making. Cretelli.</td>
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<tr>
<td>644</td>
<td>Advanced Water Color Painting</td>
<td>U</td>
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<td>Sp. 5 3-hr. lab.</td>
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<td>Prereq.: 527.</td>
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<td></td>
<td>Further practice in the water color medium, with emphasis on the critical capacity of the student. Laboratory problems and field trips.</td>
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<td>654</td>
<td>Renaissance Arts in Italy</td>
<td>U</td>
<td>5</td>
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<tr>
<td></td>
<td>Su. A. 5 cl.</td>
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<td></td>
<td>A study of architecture, sculpture, and painting in Italy during the fifteenth and sixteenth centuries, with emphasis upon works by major artists in Florence, Rome, and Venice. Melnikas.</td>
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<td>660</td>
<td>Advanced Oil Painting</td>
<td>U</td>
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<td>Su, A, W. Sp. 5 3-hr. lab.</td>
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<td>Prereq.: 505, 528.</td>
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<td></td>
<td>Painting in oil from still life and the costume model. Advanced problems in composition.</td>
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<td>661</td>
<td>Special Problems</td>
<td>U</td>
<td>2-5</td>
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<td>Su, A.</td>
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<td>Prereq.: Formation of instructor.</td>
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<td>Repeatable to a maximum of 45 cr. hrs.</td>
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<td></td>
<td>Advanced study for students in specialized programs. Hausman and Staff.</td>
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<td></td>
<td>A. History</td>
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<td>B. Visual Communication Design</td>
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<td>C. Ceramics</td>
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<td>D. Design</td>
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<td>E. Art Education</td>
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<td>F. Graphic Arts</td>
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<td>H. Weaving</td>
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<td>I. Space and Enclosure Design</td>
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<td>J. Drawing</td>
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<td>K. Medical Art</td>
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<td>L. Oil and Water Color Painting</td>
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<td>M. Sculpture</td>
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<tr>
<td>662</td>
<td>Special Problems</td>
<td>U</td>
<td>2-5</td>
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<td>W. Prereq.: 661.</td>
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<td>Continuation of 661.</td>
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<td>663</td>
<td>Special Problems</td>
<td>U</td>
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<td>Sp. Prereq.: 662.</td>
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<td>Repeatable to a maximum of 45 cr. hrs.</td>
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<td>Continuation of 662.</td>
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<td>669</td>
<td>Twentieth Century American Art</td>
<td>U</td>
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<td>W. 3 cl.</td>
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<td>Prereq.: 503 or 555.</td>
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<td></td>
<td>A study of significant developments in twentieth century American architecture, painting, and sculpture. Baigell.</td>
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<td>670</td>
<td>The Art of Ancient Egypt and the Near East</td>
<td>U</td>
<td>5</td>
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<td></td>
<td>W. 5 cl.</td>
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<td>The specialized study of the art and archaeology of the valleys of the Nile and Tigris Euphrates in ancient times. Rubright.</td>
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<td>671</td>
<td>Ancient Greek and Roman Art</td>
<td>U</td>
<td>5</td>
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<td></td>
<td>Sp. 5 cl.</td>
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<td></td>
<td>The development of Greek and Roman art from Minioan to late Roman times; the contribution of archaeology to the knowledge of Greek and Roman art. Rubright.</td>
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<td>675</td>
<td>Latin-American Art</td>
<td>U</td>
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<td></td>
<td>Su. W. 3 cl.</td>
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<td>A survey of the Pre-Columbian, Colonial, and Modern periods in Hispanic America and Brazil. Baigell.</td>
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<td>678</td>
<td>Nineteenth Century European Art</td>
<td>U</td>
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<td></td>
<td>Su. W. 5 cl.</td>
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<td></td>
<td>A study of European art from NeoClassicism through Post Impressionism. Emphasizing the study of the works of the major painters. Paton.</td>
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<td>679</td>
<td>Primitive Art</td>
<td>U</td>
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<td></td>
<td>W. 5 cl.</td>
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<td></td>
<td>Prereq.: Two basic courses in the history of Art, or two basic courses in Anthrop., or permission of instructor.</td>
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<td>The art of various ethnic groups from prehistoric times to the present. Kaplan.</td>
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</tbody>
</table>
684 Northern Renaissance Arts U G 5
Sp. 5 cl.
The art of the Netherlands, France, Germany, and England from 1400 to 1600—with emphasis on Jan van Eyck, Rogier van der Weyden, Fouquet, Durer, Holbein, Bosch and Breughel. Ludden.

685 Museum Problems U G 3
A.
A seminar—with practical exercises and field trips—concerning the organization, functions, and objectives of museums of art. An introduction to professional work in museums.

686 Art of the Seventeenth Century in Europe U G 5
W. 5 cl.
Baroque Art in Italy, France, and the Lowlands—with emphasis on the major artists. Berendsen.

687 Comprehensive Drawing U G 5
A. 5 3-hr. lab.
Prereq.: 505.
Exploration of the structure and interrelationships of visual form in drawing, painting, and sculpture. The principal historical modes of drawing will be examined.

688 Graphic Processes U G 5
A. 5 3-hr. lab.
Prereq.: 500. Graduate students must have 15 cr. hrs. in drawing and painting.
Woodcuts, etchings, and engravings explored by students as means for individual expression. Chafetz.

689 Greek Archaeology U G 5
A. 5 cl.
Minoan-Mycenaean civilization as revealed by archaeology. Classical Greek sites with emphasis on the arts and social, economic, religious data provided by the archaeological material. Subbright.

701 Minor Problems G 1-5
Su. A.
Repeatable to a maximum of 15 cr. hrs.
Hausman and staff.
A. History
C. Ceramics
D. Design
E. Art Education
G. Graphic Arts
P. Painting
S. Sculpture

702 Minor Problems G 1-5
W.
Prereq.: 701.
Repeatable to a maximum of 15 cr. hrs.
Continuation of 701.

703 Minor Problems G 1-5
Sp.
Prereq.: 702.
Repeatable to a maximum of 15 cr. hrs.
Continuation of 702.

704 Spanish Art U G 3
W. 3 cl.
Not open to students with credit for 673.
A selective study of the architecture, sculpture, painting, and minor arts of Spain.

705 Perception-Art Form Seminar G 2
A. 2 cl.
Seminar utilizing the Ames Visual Demonstration Center as a basis for discussion of perception and aesthetic form. Sherman.

708 Italian High Baroque Art U G 3
Sp. 3 cl.
Study of painting, sculpture, architecture, and theatrical aspects of Italian High Baroque Art with emphasis upon Rome as a center. Berendsen.

710 Art Education in the Elementary Schools G 5
Su. A.
Not open to students with credit for 713.
The role of the Art Supervisor for curriculum development and instruction in the elementary school program. Barkan, Hausman.

714 Art Education in the Secondary Schools G 5
Su (1st term). A.
The role of the Arts Supervisor for curriculum development and instruction in secondary school programs. Barkan, Hausman.

715 Minor Seminar for the Practicing Art Teacher G 3-5
Su. A.
Curriculum problems in teaching the visual arts. Studio work in related arts; theoretical considerations. Barkan, Ecker.

718 Research Problems in Art Education G 3-5
Sp.
Problems of art education at the elementary, secondary, and college level. Individual student problems will be initiated in light of current educational needs. Barkan, Ecker, Hausman.

720 Research Methods G 3
A.
Investigation of source materials and bibliography of the fine arts. History of Art Staff.

721 Art Theory and Criticism G 3
W.
Investigations of theories of Art and their applications. Ludden.

722 Ceramic Design Techniques G 3-5
A.
Personal development in the techniques and processes of the ceramic designer with emphasis upon quality as evidenced in form, color, and decoration. Bogaty.

723 Ceramic Design Techniques G 3-5
Sp.
Prereq.: 722.
Continuation of 722.

724 Painting G 3-5
A.
The painter's development as a creative artist, the relation of theory and practice. Individual and group criticism on work in progress. Lectures and field trips. Gatrell, King, Sherman, Curi.

725 Painting G 3-5
W.
Prereq.: 724.
Continuation of 724.
COURSES OF INSTRUCTION
FINES ARTS

726 Mural Painting
Sp.
Studies in wall decoration for specific architectural setting. Presentation sketches and fullscale execution. Traditional and contemporary media.

727 Mural Painting
Su.
Prereq.: 726.
Continuation of 726.

728 Advanced Sculpture
UG 3-5
A. 9-15 lab. hrs.
Prereq.: 562, plus 10 hrs. enrollment in 6615, and 6625, or 6635.
Advanced sculptural projects with the choice of a wide range of techniques and materials—welding, casting, wood and metal construction, wood and stone carving, etc. Block, Freeman, Thompson, Wenkic.

729 Advanced Sculpture
UG 3-5
W. 9-15 lab. hrs.
Prereq.: 728.
Continuation of 728.

730 Renaissance Painting in Tuscany
UG 5
W. 5 cl.
Prereq.: 654 or permission of instructor.
Painting tradition in Florence and Siena (from Duccio and Giotto to Michelangelo and Mantegna); emphasis on how paintings of major Tuscan artists reflect cultural trends. Melfi, Ludden.

799 Art Workshop for Elementary Teachers
UG 4
Su (3rd term).
Prereq.: Elem. Ed. 4th yr. standing.
Full time of student for first three weeks of second term. Not open to students with credit for 620.
Laboratory experiences with a media toward understanding the visual arts; study of children's art expression; problems of teaching the arts in the elementary school program.

801 Research Problems
SG 3-5
Su, A.
Repeatable to a maximum of 15 cr. hrs.
801C Ceramics
801D Design
801E Art Education
801G Graphic Art
801P Painting
801S Sculpture
Hausman and Staff.

802 Research Problems
SG 3-5
W.
Prereq.: 801.
Repeatable to a maximum of 15 cr. hrs.
Continuation of 801.

803 Research Problems
SG 3-5
Sp.
Prereq.: 802.
Repeatable to a maximum of 15 cr. hrs.
Continuation of 802.

804 Seminar in History and Criticism of Art
Repeatable to a maximum of 15 cr. hrs.
804A Oriental Art
Sp.
Kaplan.
804B Art Theory and Criticism
Sp.
Ludden.
804C Medieval and Northern Renaissance Art
W.
Ludden.
804D Modern Art
A.
Ludden.
804E American Art
W.
Paton.
804F Italian Renaissance
Sp.
Melnikas.

813 Problems in Ceramic Composition
SG 3-5
W.
Research in the development of special ceramic compositions pertinent to particular problems in ceramic design. Littlefield.

814 Problems in Ceramic Composition
SG 3-5
Sp.
813.
Continuation of 813.

815 Historical Materials and Processes
SG 3-5
W.
Original research in derivation and use of historical ceramic materials and processes with specific relation to the problems of the ceramic industrial designer or the practicing potter.

816 Historical Materials and Processes
SG 3-5
Sp.
Prereq.: 815.
Continuation of 815.

817 Painting
SG 3-5
W.
Emphasis on the principles of abstraction in pictorial organization. Attention to the relationship of subject matter and abstraction as related to contemporary and traditional approaches. Gatrell, King, Sherman.

818 Advanced Sculpture
A.
Advanced sculpture with a wide range of choice in media. Freeman.

819 Advanced Sculpture
W.
Prereq.: 818.
Continuation of 818.

820 Advanced Sculpture
Sp.
Prereq.: 819.
Continuation of 819.
Forestry


Professors: Howlett (Chairman), 1Alban, Beattie, ibrown, iChadwick, igould, iHartman, iHill, iJohnson, ikiplinger, and iLaurie, (Emeritus); Associate Professors: iGeisman, iKetchman, Marlowe, iMiller, and iFriesch; Assistant Professors: iDonoho and Touxe.

406 Forest Products
A. 3 1-hr. cl.
A study of the products made of wood and products derived from wood by chemical and other means—emphasis on wood as a construction material. Touxe.

408 Hardwood Dendrology
Sp. 2 cl., 1 2-hr. lab.
Prereq.: Bot. 401.
A study of the principal species of Angiosperms in the United States with emphasis on identification, range, and silvical characteristics. Touxe.

409 Coniferous Dendrology
A. 2 cl., 1 2-hr. lab. One Saturday field trip.
Prereq.: Bot. 401 and 402.
A study of the principal species of Gymno sperms in the United States with emphasis on identification, range, and silvical characteristics. Touxe.

410 Principles of Forestry
A. 3 cl., 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. Touxe.

502 Silvics
Sp. 3 cl.
Prereq.: Bot. 401-402.
The effect of site factors on forest vegetation and action of forest cover on the site. Characteristics of individual trees and forests stands. Touxe.

701 Minor Investigations
Prereq.: Permission of instructor.
Special problems in the field of pomology, vegetable gardening, floriculture, and ornamental horticulture, horticultural products or forestry.

French

Office: 116 Derby Hall, 154 North Oval Drive.

Professors: iBabcock (Chairman), iBulatkin, iDavidson, Demorest (Emeritus), Havens (Emeritus), moore (Emeritus), and iSchutz (Emeritus); Associate Professors: iCarleton, iMeiden, and iPelsmleur; Assistant Professors: Astier and Mitchell.

401 Elementary French
Su, A, W, Sp. 5 cl.
May not be taken concurrently with Spens. 401-402, Ital. 401-402. Not open to students who are not eligible to take Eng. 416. Credit in 401 will be counted toward graduation only if followed by successful completion of 402, or if taken after successful completion of the fourth regular university course in another foreign language.
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.

402 Elementary French
Su, A, W, Sp. 5 cl.
Prereq.: 401.
May not be taken concurrently with Spens. 401-402, Ital. 401-402.

403 Intermediate French
Su, A, W, Sp. 5 cl.
Prereq.: 402.
Course conducted in French.
Review of salient points of elementary grammar, attention to French idioms. Reading of short stories, plays, and novels.
COURSES OF INSTRUCTION

FRENCH

404 Intermediate French
Su, A, W, Sp. 3 cl.
Prereq.: 403.
Course conducted in French.

405 Reading of French
Su, A, W, Sp. 3 cl.
Prereq.: Graduate standing.
The fee for this course will be the same as that for a three hour credit course.
Designed primarily for students who have no formal preparation in French and who wish to acquire a reading knowledge.

410 Elementary French
Conversation and Composition
A, W, Sp. 5 cl.
Prereq.: 404.
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.

415 Elementary-Intermediate French for Selected Students
W. 5 cl.
Prereq.: Grade of "A" in 401 and permission of department.
Successful completion of 401-415-416 fulfills language requirements and satisfies prereq. for 500 courses.

416 Elementary-Intermediate French for Selected Students
Sp. 5 cl.
Prereq.: 415.
Successful completion of 401-415-416 fulfills language requirements and satisfies prereq. for 500 courses.

517 Introduction to Modern French Literature
Su, A, W, Sp. 5 cl.
Prereq.: 404.
Not open to students with credit for 417.
Rapid reading and discussion of French literary movements and masterpieces of the nineteenth century and their relation to modern France.

518 Review Grammar and Composition
A, W, Sp. 2 cl.
Prereq.: 410.
Review of French grammar; composition on assigned topics and practice in translation.

521 Intermediate French Conversation and Composition
A, Sp. 2 cl.
Prereq.: 410.
Vocabulary building, practice in speaking French, conversation and composition dealing with social and economic aspects of French life.

522 Intermediate French Conversation and Composition
W. 2 cl.
Prereq.: 410.
Vocabulary building, practice in speaking French, conversation and composition dealing with intellectual and artistic aspects of French life.

529 Masterpieces of French Literature: Middle Ages and Renaissance
Sp. 5 cl.
Prereq.: 517.
Mrs. Bulatkin.

530 Masterpieces of French Literature: Seventeenth and Eighteenth Centuries
W. 5 cl.
Prereq.: 517.

532 Elementary French Pronunciation
A, W, Sp. 5 cl.
Prereq.: 410.
Not open to students with credit for 532.
Formation of French sounds, rules of pronunciation and diction; lectures and practical exercises; use of phonetic symbols.

535† La civilisation française des origines à nos jours.
A. 5 cl.
Prereq.: 519 or 521 or 522.
Course conducted in French.
Major developments of French culture down to 1900. Carlot.

570 French Classics in Translation
Sp. 3 cl.
Not open to juniors, seniors, or French majors.
Reading, analysis and discussion of major French works in translation, beginning with the Song of Roland and continuing with authors such as Montaigne, Pascal, Molière, Voltaire, Rousseau, Mitchell.

603 * The Romantic Period in French Literature, 1500-1850
W. 5 cl.
Prereq.: 517 and either 529 or 530.
The development of romanticism and rise of realism in the first half of the nineteenth century in the novel, poetry, and drama. Carlot.

604† French Literary Currents, 1850-1914
W. 5 cl.
Prereq.: 517 and either 529 or 530.
Realism, naturalism, symbolism, and the movements of reaction in the novel and in literary criticism. Carlot.

616 French Literature of the Renaissance
A. 5 cl.
Prereq.: 517 and either 529 or 530.
Selections from Marot, Rabelais, the Pèlade and Montaigne as they reflect the age of humanism and illustrate the transition from medieval to modern forms and ideas.

617† French Classicism, 1600-1715
A. 5 cl.
Prereq.: 517 and either 529 or 530.
The formation of the classic spirit. The perfection of dramatic form and the seventeenth century portrait of man. Davidson.

618 French Literature of the Enlightenment
A. 5 cl.
Prereq.: 517 and either 529 or 530.
A study of the ideas of the eighteenth century in their relation to modern times. Special emphasis on Montesquieu, Voltaire, Diderot, and Rousseau. Davidson.
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Code</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>French Translating</td>
<td>U G 3</td>
<td>3 cl.</td>
<td>Prereq.: 528 or equivo.</td>
</tr>
<tr>
<td>Modern French Syntax</td>
<td>U G 5</td>
<td>5 cl.</td>
<td>Prereq.: 518.</td>
</tr>
<tr>
<td>Systematic review of French grammar with composition and other exercises, based on contemporary authors. Modern tendencies in syntactic analysis. Melden.</td>
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<tr>
<td>Contemporary French Drama</td>
<td>U G 3</td>
<td>3 cl.</td>
<td>Prereq.: 517 and either 529 or 530.</td>
</tr>
<tr>
<td>Plays of Lesueur, Romain, Claudel, Giraudoux, Cocteau, Montherlant, Anouilh, Satre, Camus and Ionesco. The different theatres and directors from Copeau to the present day. Astier.</td>
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<tr>
<td>La civilisation francaise contemporaine</td>
<td>U G 3</td>
<td>3 cl.</td>
<td>Prereq.: 518 and 521 or 522.</td>
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<tr>
<td>Course conducted in French.</td>
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<tr>
<td>Life, institutions, and culture of contemporary France. Carlut.</td>
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<tr>
<td>Advanced Spoken and Written French</td>
<td>U G 3</td>
<td>3 cl.</td>
<td>Prereq.: 521, 522 and 638 or equivo.</td>
</tr>
<tr>
<td>Intensive practice in speaking and writing French. Based on contemporary usage.</td>
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<tr>
<td>Explication de textes</td>
<td>U G 3</td>
<td>3 cl.</td>
<td>Prereq.: 517 and either 529 or 530.</td>
</tr>
<tr>
<td>Intensive linguistic and literary exploration of representative passages from modern French authors. Davidson.</td>
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</tr>
<tr>
<td>Contemporary French Literature</td>
<td>U G 5</td>
<td>3 cl.</td>
<td>Prereq.: 517 and either 529 or 530.</td>
</tr>
<tr>
<td>Twentieth century literary currents, and their significance, with special attention given to the novel. Proust, Gide, Malraux, Mauriac, Sermage, Saint-Exupéry, Camus, Sartre and others. Astier.</td>
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<tr>
<td>Advanced French Pronunciation and Phonostylistics</td>
<td>U G 3</td>
<td>3 cl.</td>
<td>Prereq.: 532 or permission of instructor.</td>
</tr>
<tr>
<td>Training in auditory and oral aspects of French pronunciation. Special emphasis on analysis of different types of spoken French.</td>
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<tr>
<td>French Literature</td>
<td>U G 3</td>
<td>3-5 cl.</td>
<td>Prereq.: 517 and either 529 or 530.</td>
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<tr>
<td>Repeatable to a maximum of 15 cr. hrs.</td>
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<tr>
<td>Modern French Poetry</td>
<td>U G 3</td>
<td>3 cl.</td>
<td>Prereq.: 517 and 529 or 530.</td>
</tr>
<tr>
<td>Source and processes of poetic creations as exemplified in selected works of French poets from Baudelaire to the present time. Astier.</td>
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<tr>
<td>Minor Problems in French</td>
<td>U G 1-5</td>
<td>1-5 cl.</td>
<td>Prereq.: Permission of instructor.</td>
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<tr>
<td>Honors Course in French</td>
<td>U 3-10</td>
<td></td>
<td>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 the department.</td>
</tr>
<tr>
<td>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.</td>
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<tr>
<td>Honors Courses in French</td>
<td>U 3-10</td>
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<td>Prereq.: same as 705.</td>
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<tr>
<td>Continuation of 705.</td>
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<tr>
<td>Honors Courses in French</td>
<td>U 3-10</td>
<td></td>
<td>Prereq.: same as 705.</td>
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<tr>
<td>Continuation of 706.</td>
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<tr>
<td>Topics and Problems in 17th Century French</td>
<td>G 3</td>
<td></td>
<td>Prereq.: 617 or permission of instructor.</td>
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<tr>
<td>Literature</td>
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<tr>
<td>Intensive exploration of a special topic or problem, with readings in literary works and in relevant criticism and scholarship. Davidson.</td>
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<tr>
<td>Topics and Problems in 18th Century French</td>
<td>G 3</td>
<td></td>
<td>Prereq.: 618 or permission of instructor.</td>
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<tr>
<td>Literature</td>
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<tr>
<td>Intensive exploration of a special topic or problem, with readings in literary works and in relevant criticism and scholarship. Davidson.</td>
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<tr>
<td>Topics and Problems in 19th Century French</td>
<td>G 3</td>
<td></td>
<td>Prereq.: 603 or 604 or permission of instructor.</td>
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<tr>
<td>Literature</td>
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<tr>
<td>Intensive exploration of special topics or problems with readings in literary works and in relevant criticism and scholarship. Carlut.</td>
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<tr>
<td>Topics and Problems in 20th Century French</td>
<td>G 3</td>
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<td>Prereq.: 640 or equiv.</td>
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<tr>
<td>Literature</td>
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<tr>
<td>Intensive study of a specific topic or problem, with readings of selected literary and critical works. Astier.</td>
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<tr>
<td>Topic for 1964-65: The Concept of “Literature engagée.”</td>
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</tbody>
</table>
COURSES OF INSTRUCTION

FRENCH

729 History of the French Language: Introduction
A. 3 cl.
Prereq.: M.A. Candidates in French; others by permission of instructor.
Basic concepts of historical linguistics; the major factors of change in the history of the French language from Roman times to the present. Bulatkin.

731 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. Davidson.

801 History of the French Language: Phonology
W. 3 cl.
Prereq.: Knowledge of Latin.
The evolution of sounds from Latin to Modern French.

802 History of the French Language: Morphology
Sp. 5 cl.
Prereq.: 801.
The evolution of grammatical forms from Latin to Modern French. Bulatkin.

803 Old Provençal
W. 3 cl.
Prereq.: 802 or Span. 806.
Origins of the troubadour lyric; its history, as to form and content, in the eleventh and twelfth centuries. Elements of phonology and morphology. Bulatkin.

804 Old Provençal
Sp. 3 cl.
Prereq.: 803.
Troubadour lyric in the thirteenth century. Increased attention to non-lyric genres, and to prose. Continuation of linguistics, with greater emphasis on semantic problems. Bulatkin.

805* Middle French Literature
A. 3 cl.
Prereq.: 813.

811 Seminar in French Literature
Su (3-3 cr. hrs.), A (3-5 cr. hrs.).
Prereq.: Permission of instructor.
Carlat.

812 Seminar in French Literature
Su (2-3 cr. hrs.), W (3-5 cr. hrs.).
Prereq.: Permission of instructor.

813 Old French Literature
A. 3 cl.
Lectures on main currents of Old French literature to 1300. Reading of the Chanson de Roland. Yvain of Chrétien de Troyes, Bréouls Tristan, representative lyrics. Bulatkin.

817 Seminar in French Literature
Sp.
Prereq.: Permission of instructor.
Davidson.

880 Bibliography and Method
Sp. 3 cl.
A course to acquaint graduate students with tools, problems, and methods of linguistic and literary research. Davidson.

950 Research in French Language or Literature
Research for thesis and dissertation purposes only.

Geodetic Science

Office: 239 Graduate School, 164 West 19th Avenue.
ASSOCIATE PROFESSOR J. OTELLE (Chairman); PROFESSORS H. BRANDENBERG, H. HESIKAEN, H. LAUER; ASSOCIATE PROFESSOR T. MUELLER; ASSISTANT PROFESSORS T. GHOSH and RAFF.

GENERAL PREREQUISITES FOR ALL 500 AND 600 COURSES
Prerequisites for all 500 and 600 courses include Mathematics 538 or 543, Physics 415 and 413 or 512 and 533 and Civil Engineering 506. Civil Engineering 506 may be waived for students who can demonstrate through previous experience a comprehensive understanding of the topics in this course.

511 Geodesy I
W. 2 cl., 1 3-hr. lab.
Not open to students with credit for 540 or 611.
The principles, purposes, and methods of geodesy. Geodetic instruments and observations.

521 Photogrammetry I
A. 2 cl., 1 3-hr. lab.
Not open to students with credit for 545 or 621.

612 Geodesy II
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 511 or 540 or 611.
Not open to students with credit for 640.
Techniques and formulas for horizontal survey on the sphere. Methods of horizontal and vertical survey.

617 Geodetic Astronomy
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 511 or 540 or 611, Astron. 611.
The determination of time, latitude, longitude, and azimuth from airborne observations. Application of eclipses and occultations in Geodesy.

622 Photogrammetry II
W. 2 cl., 1 3-hr. lab.
Prereq.: 511 or 540 or 611, 521 or 545 or 621; concern.
653.
Not open to students with credit for 645.
### GEOETIC SCIENCE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>623</td>
<td>Photogrammetry III</td>
<td>U G 3</td>
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<td></td>
<td>Sp. 2 cl., 1 3-hr. lab.</td>
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<td></td>
<td>Prereq.: 622 or 645.</td>
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<td></td>
<td>Not open to students with credit for 745.</td>
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<td>625</td>
<td>Photo Interpretation</td>
<td>U G 3</td>
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<td>W. 2 cl., 1 3-hr. lab.</td>
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<td></td>
<td>Prereq.: 521 or 545 or 621, Geol. 401 or 435, 451.</td>
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<td></td>
<td>Not open to students with credit for 655.</td>
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<td></td>
<td>The use of air photographs for material surveys, route and site locations, soil mapping, geologic mapping, urban planning and special studies.</td>
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<tr>
<td>631</td>
<td>Map Projections</td>
<td>U G 3</td>
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<td></td>
<td>A. 3 cl.</td>
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<td></td>
<td>Not open to students with credit for Geog. 612.</td>
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<tr>
<td></td>
<td>The description of the various map projections used for major map series.</td>
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<tr>
<td>653</td>
<td>Adjustment Computations I</td>
<td>U G 4</td>
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<td></td>
<td>W. 3 cl., 1 3-hr. lab.</td>
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<td></td>
<td>Prereq.: 611 or concur. 511.</td>
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<td></td>
<td>Not open to students with credit for 600.</td>
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<tr>
<td></td>
<td>The principles of the theory of errors and of adjustment computations.</td>
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<tr>
<td>654</td>
<td>Adjustment Computations II</td>
<td>U G 3</td>
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<td></td>
<td>Sp. 2 cl., 1 3-hr. lab.</td>
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<td>Prereq.: 653 or 660, concur. 612.</td>
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<td></td>
<td>Not open to students with credit for 780.</td>
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<td></td>
<td>Matrices in adjustment computations; adjustment of observed data with method of variation of parameters and of correlation; standard error of unknowns and functions.</td>
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<tr>
<td>666</td>
<td>Field Work in Geodesy</td>
<td>U G 5</td>
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<td></td>
<td>Su (1st term). 4 cl., 5 4-hr. lab.</td>
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<td></td>
<td>Prereq.: 612 or 640.</td>
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<td></td>
<td>Not open to students with credit for 602a.</td>
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<tr>
<td>687</td>
<td>Field Work in Geodetic Astronomy</td>
<td>U G 5</td>
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<td></td>
<td>Su (2nd term). 4 cl., 5 4-hr. lab.</td>
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<td>Prereq.: 617.</td>
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<tr>
<td>688</td>
<td>Field Work in Photogrammetry</td>
<td>U G 5</td>
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<td>Su (2nd term). 4 cl., 5 4-hr. lab.</td>
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<td></td>
<td>Prereq.: 612 or 640, 623 or 745.</td>
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<td></td>
<td>Not open to students with credit for 602b.</td>
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<tr>
<td>689</td>
<td>Field Work in Distance Measurements</td>
<td>U G 5</td>
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<td></td>
<td>Su (1st term). 4 cl., 5 4-hr. lab.</td>
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<td>Prereq.: 768.</td>
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</table>

**PREREQUISITES FOR ALL 700 COURSES**

Prerequisites for all courses in this group include Geodetic Science 522 or 645, 854 or 780, or permission of instructor, and at least five hours of Mathematics courses beyond Mathematics 545.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>711</td>
<td>Geodesy III</td>
<td>U G 3</td>
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<td></td>
<td>A. 2 cl., 1 3-hr. lab.</td>
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<td></td>
<td>Not open to students with credit for 740.</td>
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<tr>
<td></td>
<td>Computations concerned with the reference ellipsoid, including various latitudes, the geodetic curve, normal sections, the direct and inverse problem.</td>
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<tr>
<td>721</td>
<td>Aerial and Terrestrial Photography</td>
<td>U G 3</td>
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<td></td>
<td>W. 2 cl., 1 3-hr. lab.</td>
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<tr>
<td></td>
<td>Prereq.: 623 or 745.</td>
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<td></td>
<td>Not open to students with credit for 757.</td>
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<tr>
<td></td>
<td>Design, calibration, and testing of photogrammetric cameras. Physical characteristics, processing, and quality control of photogrammetry. Photogrammetric aircraft and auxiliary devices.</td>
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<tr>
<td>723</td>
<td>Stereophotogrammetry I</td>
<td>U G 4</td>
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<td></td>
<td>A. 3 cl., 1 3-hr. lab.</td>
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<td></td>
<td>Prereq.: 623 or 745 or permission of instructor.</td>
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<tr>
<td></td>
<td>Not open to students with credit for 864.</td>
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<td></td>
<td>Design and operation of first-order instruments; laboratory problems utilizing the Wild Autographic A-7.</td>
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<tr>
<td>725</td>
<td>Photogrammetry in Practice</td>
<td>U G 3</td>
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<td></td>
<td>A. 2 cl., 1 3-hr. lab.</td>
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<tr>
<td></td>
<td>Prereq.: 653 or 745.</td>
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<tr>
<td></td>
<td>Not open to students with credit for 756.</td>
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<tr>
<td></td>
<td>Organization and execution of photogrammetric projects. Consideration of accuracy and economy.</td>
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<tr>
<td>751</td>
<td>Physical Geodesy</td>
<td>U G 4</td>
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<td></td>
<td>W. 3 cl., 1 3-hr. lab.</td>
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<td></td>
<td>Prereq.: Geol. 735 and Geod. Sc. 711.</td>
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<tr>
<td></td>
<td>Not open to students with credit for 600.</td>
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<tr>
<td></td>
<td>Basic potential theory and the principles of applying gravimetry in Geodesy.</td>
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<tr>
<td>753</td>
<td>Advanced Adjustment Computations</td>
<td>U G 3</td>
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<tr>
<td></td>
<td>A. 2 cl., 1 3-hr. lab.</td>
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<tr>
<td></td>
<td>Not open to students with credit for 860.</td>
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<tr>
<td></td>
<td>Combination of observation equations and condition equations; quasirealities; error ellipsoids.</td>
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<tr>
<td>758</td>
<td>Electronic Surveying I</td>
<td>U G 3</td>
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<td></td>
<td>W. 3 cl.</td>
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<tr>
<td></td>
<td>Prereq.: 711 or 740.</td>
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<td></td>
<td>Not open to students with credit for 742.</td>
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<tr>
<td>759</td>
<td>Electronic Surveying II</td>
<td>U G 3</td>
<td></td>
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<tr>
<td></td>
<td>Sp. 2 cl., 1 3-hr. lab.</td>
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<td></td>
<td>Prereq.: 742 or 758.</td>
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<td></td>
<td>Not open to students with credit for 743.</td>
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<tr>
<td></td>
<td>Special problems, soil conductivity, curvature of ray path, propagation velocity of electromagnetic waves, maximum range. Reduction of spatial data onto the ellipsoid. Applications.</td>
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<tr>
<td>794</td>
<td>Special Studies in Geodetic Science</td>
<td>U G 3-9</td>
<td></td>
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<td>Prereq.: Permission of instructor.</td>
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<td></td>
<td>Repeatable.</td>
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<tr>
<td></td>
<td>Assigned reading, laboratory, or field work, under the guidance of a staff member, arranged to meet the requirements of individual students.</td>
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<tr>
<td>795</td>
<td>Seminar in Geodetic Science</td>
<td>U G 1-3</td>
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<td></td>
<td>Prereq.: Permission of instructor.</td>
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<td></td>
<td>Repeatable.</td>
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</tr>
</tbody>
</table>
COURSES OF INSTRUCTION

GEODETIC SCIENCE

GENERAL PREREQUISITES FOR COURSES

NUMBERED 800 AND 900

Geodetic Science 711 or 740 must be taken prior to or concurrent with any course numbered 800 or 900.

811 Advanced Geometric Geodesy
Sp. 2 cl., 1-3 hr. lab.
G 3
Not open to students with credit for 861.
Determination of the size and shape of the earth; effect of changes in size, shape and orientation of the reference ellipsoid; computation of super-long distances; spatial triangulation.

823 Stereophotogrammetry II
W. 3 cl., 1-3 hr. lab.
G 4
Prereq.: 723 or 864.
Not open to students with credit for 865.
Theory of errors in photogrammetry; laboratory problems utilizing the Wild Autograph A-7.

824 Aerial Triangulation
Sp. 2 cl., 1-3 hr. lab.
G 3
Prereq.: 823 or 865.
Not open to students with credit for 866.

825 Analytical Photogrammetry
Sp. 3 cl., 1-3 hr. lab.
G 4
Prereq.: 623 or 723.

831 Advanced Map Projections
W. 3 cl., 1-3 hr. lab.
G 4
Prereq.: 631 or Geog. 622.
Use of complex variables in map projections; projection from an ellipsoid of revolution; projections to projection transformations; state plane coordinate systems.

851 Advanced Physical Geodesy
Sp. 3 cl., 1-3 hr. lab.
G 4
Prereq.: 751, 733 or 842.
Not open to students with credit for 843.
Applications of gravimetry in geodesy, modern theories in physical geodesy, analysis of the gravity field of the earth; description of gravity field at high elevations.

855 Satellite Geodesy
A. 3 cl., 1-3 hr. lab.
G 4
Prereq.: 817.
Not open to students with credit for 862.
Geometric and dynamic applications of artificial satellites.

950 Research in Geodetic Science
G. Arr.
Research for thesis and dissertation purposes only.

A-108

Geography

Office: 136 Hagerty Hall, 1775 South College Road.

PROFESSORS T. JAFFE (Chairman), T. HOFFMAN, T. HUNKER, T. RANDALL, and S. VITTE; ASSOCIATE PROFESSORS N. KRINE, I. BROWN, K. SPAUEN, T. REESE; ASSISTANT PROFESSORS J. T. GATHERER and R. S. RINN.

401 Introduction to Geography
Su, A, W, Sp. 5 cl.
The elements of the natural environment, their characteristics, distribution, and significance in the human habitat.

403 Economic Geography
Su, A, W, Sp. 5 cl.
Prereq.: 401.
Not open to students with credit for 503 or 504.
Geography of the world's principal commodities; a survey of the economic activities of the major political areas in relation to their geographic conditions.

503 Fundamentals of Economic Geography
A, W, Sp. 3 cl.
Prereq.: 3rd yr. standing.
Not open to students with credit for 403 or 504.
Elements of the human habitat with particular emphasis on world resources. Geographical and economic factors in the development of the major industrial areas of the world.

504 World Regional Geography
Su, A, W, Sp. 5 cl.
Not open to students with credit for 403 or 503.
A comparative study of representative regions of the world. An examination of the cultural, social, economic, and political developements in relation to the geographical conditions.

505 Geography of the United States and Canada
Su, A, W, Sp. 3 cl.
Prereq.: 4th yr. standing in a Social Science or 401, 403.
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.

510 An Introduction to Cartography
A. 3 cl.
Cartographic techniques, map compilation, scales, generalization, symbolization, grid systems, reproduction, and map-making instruments and equipment.

603 Localization of Manufacturing Industries
W, Sp. 3 cl.
Prereq.: 4th or 5th yr. standing in Engineering or 401, 405, or Econ. 401-403, or 501-502.
The changing character and concentration of industrial districts. Representative industries in relation to labor supply, sources of raw material and power, transportation, and markets.

604 Conservation of Natural Resources
A. 3 cl.
Prereq.: 401, 405, or 15 cr. hrs. of allied subjects.
Economic and geographic appraisal of resource conservation in the United States. Regional and national planning for resource utilization.
605  Geography of Ohio         U G 3  
W.  3 cl.
Prereq: 401, 403, or 15 cr. hrs. of allied subjects.
An appraisal of geographic factors in the development of Ohio's natural resources, agriculture, manufacturing, and commerce. Historical development of the major economies.

611  Cartography and Map Interpretation  U G 3  
W.  3 cl.
Prereq: 401, 403, or 10 cr. hrs. of allied subjects.
Map projections and their uses for particular maps and the map series published by the United States government, by foreign countries, and by private map-producing organizations.

615  Climatology                  U G 4  
A.  4 cl.
Prereq: 15 cr. hrs. of natural or social science, including one of the following: 401, Physics 480, Bot. 402, or Agron, 501.
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.

620  Geography of Eastern Europe  U G 3  
Su, W.  3 cl.
Prereq: 4th yr. or grad. standing in a Social Science, or 401, 403.
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.

621  Geography of Western Europe  U G 3  
A.  3 cl.
Prereq: 4th yr. or grad. standing in a Social Science or 401, 403.
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.

622  Geography of the Soviet Union  U G 3  
Sp.  3 cl.
Prereq: 4th yr. or grad. standing in a Social Science or 401, 403.
The major regional divisions of the Soviet Union. The resource base in relation to the economic and political aims of the Soviet State.

624  Geography of Latin America  U G 3  
A, W.  3 cl.
Prereq: 4th yr. or grad. standing in a Social Science or 401, 403.
Geographic analysis of Middle and South America emphasizing the interrelationships of the resource base, cultural characteristics, and outside influences upon economic development.
A. A. Middle America
B. W. South America

625  Geography of the Far East  U G 3  
Sp.  3 cl.
Prereq: 4th yr. or grad. standing in a Social Science or 401, 403.
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.

626  Geography of the Middle East  U G 3  
Sp.  3 cl.
Prereq: 4th yr. or grad. standing in a Social Science or 401, 403.
The Middle East and its natural regions in relation to local and international problems. Physical and cultural patterns in relation to the current economics.

627  Geography of Africa         U G 3  
W.  3 cl.
Prereq: 4th yr. or grad. standing in a Social Science or 401, 403.

630  Geography of Transportation  U G 3  
W, W.  3 cl.
Prereq.: 401, 403, or Hist. 401-402.
A geographical analysis of the nature and distribution of rail, water, highway, pipeline, and air transport facilities and their importance in regional development.

631  The Historical Geography of    U G 3  
Commerce                    
A.  3 cl.
Prereq: 401, 403, or Hist. 401-402.
Geographic factors in commerce to 1900. Resources and production in the ancient and medieval world. Trade routes and the exchange of goods and ideas.

633  The Geography of Modern Commerce  U G 3  
A, Sp.  3 cl.
Prereq.: 4th yr. standing in Econ. or Pol. Sci. or 401, 403.
Basic factors in foreign and domestic commerce. Raw materials and other important commodities in international trade. The development of major trade areas and trade routes.

634  Urban Geography           U G 3  
W, Sp.  3 cl.
Prereq.: 4th yr. standing and 401, 403.
Origin and growth of cities. Structure and function of urban centers, their area expansion, and intertrade center relations, each examined in relation to city planning.

700  Field Work in Geography    U G 4  
Sp.  2 cl. Sat. lab.
Prereq.: 12 cr. hrs. in Geog.
The practice of field observation and geographic mapping.

701  Individual Studies in Geography  U G 3-5  
Prereq.: 18 cr. hrs. in Geog.
Repeatable with permission of instructor.
Individual study of a special problem or of a particular region.
COURSES OF INSTRUCTION

GEOGRAPHY

702 Individual Studies in Cartography U G 3-5
Prereq.: 15 cr. hrs. in Geog., or closely allied fields and permission of instructor.
Individual study of cartographic subjects: map compilation, map design, color separation, map reliability, analysis of source materials, toponymy, graphical symbolism, physiographic drawing, etc.
National Security Policy Studies
(See National Security Policy Studies 702, 703, 801.)

712 Political Geography U G 3
W. 3 cr.
Prereq.: 401, 403, or Pol. Sci. 615, or 10 cr. hrs. in Hist.
The geographical characteristics of nation states. The geographic factors in the evolution, structure, and function of states. The relation of geopolitics to political geography.

798 Group Studies in Geography U G 3
Prereq.: 18 cr. hrs. in Geog. and permission of instructor.
Repeatable by seniors to a maximum of 6 cr. hrs. and by grad. students to a maximum of 12 cr. hrs.
Group study of special topics in various fields of Geog.

802 Application of Quantitative Methods in Geography G 4
W, Sp. 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, simulations maps.
To be taken in sequence:
A. Applications I
B. Applications II

803 Seminars in Economic Geography G 3-5
Su, A, W, Sp. 2 cr.
Prereq.: Permission of instructor.
Readings and research in specific aspects of economic geography.
A. Location Theory
B. Transportation Theory
C. Resource Analysis
D. Special Topics

804 Seminars in Regional Geography G 3-5
Su, A, W, Sp. 2 cr.
Prereq.: Permission of instructor.
Geographical investigation of a selected area. The region under study will be announced.

805 Seminars in Political and Historical Geography G 3-5
Prereq.: Permission of instructor.
Readings and research in political and historical geography.

806 Seminars in Urban Geography G 3-5
Su, A, W, Sp. 2 cr.
Prereq.: Permission of instructor.
The development of theory in urban geography and its application to selected problems.
A. Theory of Urban Geography
B. Problems in Urban Geography

807 Seminars in Physical Geography G 3-5
Su, A, W, Sp. 2 cr.
Prereq.: Permission of instructor.
A. Problems in Climatology
B. Problems in Soils Geography
C. Special Problems

811 Development of Geographic Thought G 4
A. 3 cr.
Prereq.: Permission of instructor.
The evolution of concepts concerning the nature, scope, and methodology of geography; present focus and trends as reflected in current literature.

812 Cartography and Map Intelligence G 3-5
Sp.
Prereq.: 30 cr. hrs. in Geog. and closely allied fields.
Readings and research in cartography, graphics, and map intelligence.

850 Seminars in Geography G 3-5
Topics to be announced each quarter.

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

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

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

950 Research in Geography G Arr.
Research for thesis and dissertation purposes only.

Geology

Office: 107 Mendenhall Laboratory, 185 South Oval Drive.
PROFESSORS: PINCUS (Chairman), IBATES, CARMAN (Emeritus), TFULLER, LGOLDSWORTHY, LAMEY (Emeritus), RLACRUSE, LMORE, ISCHOFF, JSPIEKER (Research Professor), STEPHENSON, and STEWART (Emeritus); ASSOCIATE PROFESSORS: HULL, JFROST, JWEISS, and JWHITE; ASSISTANT PROFESSORS: JFURIE, JLEHR, JMIKAFER, and JSUMMERSON.

416 Introduction to Geology U 5
Su, A, W, Sp. 4 cr., 1 1-hr. lab., 1 half-day field trip.
Not open to students with credit for 401 or 451.
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. Sucer and Staff.

417 Physical Geology U 5
A, W, Sp. 4 cr., 1 2-hr. lab., 1 half-day field trip.
Prereq.: 416.
Not open to students with credit for 401 or 451.
Minerals and rocks and their origin; land forms and how they are produced; structural features of the earth's crust.
Historical Geology U 5
A. W., Sp. 4 cl., 1 2-hr. lab., 1 half-day field trip.
Prereq.: 416 or 451. Not open to students with credit for 452.
The history of the earth and its inhabitants through geologic time.

Study of Geologic Maps U 3
A. 3 2-hr. lab.
Prereq.: 417, 418.
Geologic structures as interpreted from geologic maps and aerial photographs. Summerson.

Invertebrate Paleontology U 5
A. 5 cl.
Prereq.: 418.
A systematic survey of groups of the invertebrate animals significant in the geologic record. La Rocque, Sweet.

The Common Minerals and Rocks U 3
W. 3 2-hr. labs.
Prereq.: 417 and Chem. 411.
Not open to Geol. majors or students with credit for 525.
A study of the common minerals and rocks, their associations, occurrences, identifying properties, and origin. Moore.

The Common Rocks U 3
Sp. 3 2-hr. lab.
Prereq.: 401 or 451 or 418 and Mineral. 511, 512.
Not open to students with credit for 534.
A study of the common rocks, their associations and occurrences, and elementary concepts regarding their origin. Moore.

Geology of Water Resources U 3
W. 3 cl., 1 half-day field trip.
Prereq.: 401 or 451 or 416.
Not open to students with credit for 433.
A study of the geology and hydrology of surface and subsurface waters, with application to conservation programs. Lehr.

The Common Mineral Deposits U 3
A. 3 3-hr. lab.
Prereq.: 525.
Not open to graduate credit to Geol. majors.
A study of the components of the common mineral deposits, their associations and relations; elementary concepts regarding origin of mineral deposits. Faure.

Geomorphology U 5
A. 4 cl., 1 2-hr. lab., field trips.
Prereq.: 417 or permission of instructor.
Not open for graduate credit to Geol. majors.
Detailed study of processes which shape the land surface and the forms produced. These are inspected on topographic maps and aerial photographs and in the area near Columbus. Goldthwait.

Structural Geology U 5
W. 4 cl., 1 2-hr. lab.
Prereq.: 505 and Math. 439.
Not open for graduate credit to Geol. majors.

Economic Geology, Metals U 5
W. 5 cl.
Prereq.: 526 or 600.
A study of the characteristics and origin of metallic mineral deposits. Faure.

Economic Geology: Petroleum U 5
Sp. 3 cl., 2 2-hr. lab.
Prereq.: Senior standing in Petr. E. or 602, 618, and 619.
A study of the principles of petroleum geology. Bates.

Petrology U 5
A. 4 cl., 1 2-hr. lab.
Prereq.: Geol. and Mineral. 512.
The origin, occurrence, association, chemical relationships, and distribution of rocks; laboratory study of rocks. Shultz.

Geomorphology of Eastern United States U 5
W. 5 cl.
Prereq.: 601, 602 recommended.
Geomorphology of the United States east of the Great Plains, using structure and stratigraphy of the physiographic provinces as background. White.

Geomorphology of Western United States U 5
W. 5 cl.
Prereq.: 601, 602 recommended.
Geomorphology of the United States west of the Central Lowlands, using structure and stratigraphy of the physiographic provinces as background. White.

Glacial Geology U 5
Sp. 5 cl., field trips.
Prereq.: 601.
The features produced by glaciers, present or past, with special references to features produced in Ohio. Goldthwait.

Geologic Surveying U 3
Sp. 1 cl., 2 3-hr. lab.
Prereq.: 505, and Math. 417 or 422.
Techniques used in field mapping; field practice in the use of instruments; use of aerial photographs. Moore.

Paleozoic Stratigraphy U 3
W. 3 cl.
Prereq.: 530.
Not open for graduate credit to Geol. majors.
The principles of stratigraphy and related historical geology, developed by study of selected American and European Paleozoic examples. Weiss.

Mesozoic and Cenozoic Stratigraphy U 3
S. 3 cl.
Prereq.: 520.
Not open for graduate credit to Geol. majors.
The principles of stratigraphy and related historical geology, developed by study of selected American and European Mesozoic and Cenozoic examples. Staff.

Vertebrate Paleontology U 3
W. 3 2-hr. lab.
Prereq.: 4th yr. standing in Zool. or Anth. or 530 and Zool. 401.
A study of the phylogenetic development of the fossil vertebrates throughout geologic time. The evolution of the vertebrate skeleton and various paleoecologic relationships. Stephens.

MicroPaleontology U 3
Sp. 3 2-hr. lab.
Prereq.: 520.
A study of fossil microorganisms, especially the foraminifers, ostracodes and conodonts; structure, habits, taxonomic relationships, and phylogenetic development; preparation of faunas and their use in stratigraphic correlation. Sweet.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>624</td>
<td>Advanced Invertebrate Paleontology U G 3</td>
<td>A. 3</td>
<td>2-3 hr. lab.</td>
<td>Laboratory study of fossil fauna, including paleontological techniques and procedures. La Roque.</td>
</tr>
<tr>
<td>625I*</td>
<td>Paleobotany</td>
<td>U G 3</td>
<td>2 cl. 3-4 hr. let. and demonstration.</td>
<td>Terrestrial importance of plants, history of the plant kingdom, and evolution of major groups. Laboratory demonstration of plant fossils, their preservation, and methods of preparation. Schoepf.</td>
</tr>
<tr>
<td>627A</td>
<td>Field Geology U 6</td>
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<td>Su (1st term). Requires full time of student.</td>
<td>Concentrated training in the basic essentials of field observation and mapping. The work is done in central Utah, with headquarters in Ephraim. Spiroch.</td>
</tr>
<tr>
<td>629</td>
<td>Geologic Report U 3</td>
<td></td>
<td>A. 2 cl. conf.</td>
<td>Not open for graduate credit to Geol. majors.</td>
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<tr>
<td>630</td>
<td>Field Geology for Science Teachers G 3</td>
<td>W. 5</td>
<td>During recess between W. and Sp. pre-trip meeting and post-trip report.</td>
<td>Application of geological principles in the field. Interpretation of earth features observable on a traverse crossing the Appalachian Mountain system. Bates.</td>
</tr>
<tr>
<td>632</td>
<td>Field Work in Earth Science U G 5</td>
<td>Su. 1</td>
<td>(1st term). Requires full time of student for 5 weeks.</td>
<td>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.</td>
</tr>
<tr>
<td>634I*</td>
<td>Fundamentals of Geophysics U G 3</td>
<td>A. 3</td>
<td>401 or 451 or 416 and Physics 412 or 413 or 532 or 533.</td>
<td>Analytical treatment of the methods of gravimetry, seismology, terrestrial electricity, terrestrial heat and geomagnetism. The structure, composition and history of the Earth. Bull.</td>
</tr>
<tr>
<td>635A</td>
<td>Exploration Geophysics, Principles U G 3</td>
<td>Sp. 3</td>
<td>401 or 451 or 416 and Physics 412 or 413 or 532 or 533.</td>
<td>Principles and techniques of exploration geophysics, with emphasis on gravimetric, geomagnetic, seismic, electrical, and radioactivity surveys. Bull.</td>
</tr>
<tr>
<td>636I*</td>
<td>Engineering Geology U G 5</td>
<td>W. 5</td>
<td>4th yr. standing in Civil E., Min. E. or Pet. E. or 603 or concur. 663.</td>
<td>Principles and techniques of geology in support of engineering.</td>
</tr>
<tr>
<td>637</td>
<td>Hydrogeology U G 5</td>
<td></td>
<td>2 cl. 2 1/2 day field trips.</td>
<td>Geologic and hydrologic factors controlling the occurrence and behavior of ground water and surface water. Lehr.</td>
</tr>
<tr>
<td>701</td>
<td>Special Problems U G 1-5</td>
<td>Su, A, W, Sp.</td>
<td>Permission of instructor.</td>
<td>Special problems in any branch of geology for which the student has the proper qualifications.</td>
</tr>
<tr>
<td>705I</td>
<td>Coal Geology U G 3</td>
<td></td>
<td>2 cl. 2 hr. let. and demonstration.</td>
<td>Origin, occurrence, and variations in carbonaceous deposits; geology and economic application of coal; analytic and resources data. Schoepf.</td>
</tr>
<tr>
<td>706</td>
<td>Glaciology U G 4</td>
<td></td>
<td>2-3 hr. cl.</td>
<td>Types of glaciers, their feeding mass budget, climatic relations, motion, and existing structures. Bull.</td>
</tr>
<tr>
<td>709I</td>
<td>Economic Geology: The Industrial U G 3 Minerals</td>
<td>A. 3</td>
<td>525 or 600.</td>
<td>Not open to students with credit for 608.</td>
</tr>
<tr>
<td>712</td>
<td>Microscopic Sedimentary Petrology U G 3</td>
<td></td>
<td>3 hr. lab.</td>
<td>Lectures on the petrology of sedimentary rocks, together with specimen study, particularly by microscopic methods. Weisz.</td>
</tr>
<tr>
<td>713I</td>
<td>Sedimentary Petrography I U G 3</td>
<td>W. 2</td>
<td>3 hr. lab.</td>
<td>The theory and application of various techniques in the laboratory study of sediments and sedimentary rocks, chiefly by non-microscopic methods. Sumner.</td>
</tr>
</tbody>
</table>
714* Sedimentary Petrography II
A. 3 hr. lab.
Prereq.: Mineral. 621.
Laboratory preparation and microscopic examination of heavy and light mineral fractions, rock fragments, and insoluble residues of sediments and sedimentary rocks, and the interpretation of results. Moore.

720 Topics in Oceanography and Marine Geology
Sp. 3 cl.
Prereq.: Senior standing in Geol. or permission of instructor.
Repeatable to a maximum of 8 cr. hrs.
Lectures and seminars on the origin, development, and structure of ocean basins and their contents, and on contemporary oceanic processes of geological significance. Staff and visiting lecturers.

725 Analysis of Structural Problems
A. 3-3 hr. lab.
Prereq.: 602, 618 and 619 and Math. 430 or 440.
Solution of structural problems by stereographic projection and other methods; structural interpretation of isopach, paleogeologic, facies, and other maps. Solution of areal and resource problems. Fiscus.

735 Geophysics, Gravimetry
A. 3 cl.
Prereq.: 4th yr. standing in Geol. and Math. 440 or 536 and Physics 412 or 413 or 532 or 533; or 4th yr. standing in Geol. or Physics and 402 or 451 or 453; or 4th yr. standing in Civil E., Min. E., or Petr. E.
Analytical treatment of concepts and methods of gravimetry; introductory theory of the gravitational potential; geological interpretation of gravity data. Fiscus.

736* Advanced Geophysics
A. 3 cl.
Prereq.: 634 or 635A or permission of instructor.
A study of selected topics and problems in geophysics. Bull.

740* Introduction to Isotope Geology
Sp. 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. Faree.

812 Principles of Sedimentation and Stratigraphy
W. 3 cl.
Prereq.: 601, 618, 619, and 609 recommended.
The origin, constitution, and relationships of stratified rocks; an approach to the outstanding problems of stratigraphy; processes of sedimentation and their results; interpretation, correlation. Staff.

815* Metamorphism
Sp. 4 cl.
Prereq.: 609.
A study of the processes of metamorphism, with a critical analysis of the rock types produced. Shults.

820* Precambrian Geology
Sp. 4 cl.
Prereq.: 602, 609, 618, and 619.
A study of the principles of Precambrian geology, and the Precambrian geology of important areas. Faree.

821* Paleozoic Geology
W. 3 cl.
Prereq.: 602, 618, and 619.
A study of the Paleozoic systems of the United States, subdivision, faunal sequences, and correlation with homotaxial deposits abroad. Staff.

822* Mesozoic and Cenozoic Geology
Sp. 3 cl.
Prereq.: 602, 618, and 619.
A study of the outstanding Mesozoic and Cenozoic sections of the world, with emphasis on principles of nomenclature, subdivision, correlation, and interpretation. Staff.

823* Quaternary Geology
W. 3 cl.
Prereq.: 613.
Chronology of Pleistocene glacial and interglacial events throughout the world; the use of animal and plant remains, soils, and radiocarbon in determining this chronology. Goldthwait.

825* Advanced Structural Geology
A. 3 cl.
Prereq.: 602, 609, 618, or 619, and Physics 411 or 531.
Recognition and interpretation of geological structures; application of theoretical analysis, field observation, and experimental methods to selected problems. Fiscus.

827* Advanced Geomorphology
W. 3 cl.
Prereq.: 601.
A seminar devoted to current and classical problems in geomorphology, such as, the origin of submarine canyons or sediments. Goldthwait.

851 Seminar in the History of Geology
W. 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. LaBecque.

855 Seminar in Paleocology
W. 3 cl.
Prereq.: 624.
A study of the principles of paleocology with illustrations from the literature and selected faunas. LaBecque.

896 Interdepartmental Seminar in Polar and Alpine Studies
Sp.
(See under Interdepartmental Seminars.)

950 Research in Geology
G Arr.
Research for thesis and dissertation purposes only.

Problems in the Teaching of Earth Science
(See Education 606)
(Offered in cooperation with the Department of Education)
German

Office: 213 Derby Hall, 154 North Oval Drive.

PROFESSORS: F. UNZ (Chairman), F. FLEIDHHAUER, MAHR (Emeritus), and I. SEDIN; ASSOCIATE PROFESSORS: H. BEK-KEE, GROEKE, HOFFMAN, and WITTKOWSKI; ASSIST-
ANT PROFESSORS: EISSE, GOODMAN, GOTTWALD, and MAUCHER.

PLACEMENT AND PROFICIENCY EXAMINATIONS

Students with two years of high school German register for German 403, 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. Cornell Arts College section.

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.

401 Elementary German

Su, A, W, Sp. 5 cl.

Credit in 401 will be counted toward graduation only if followed by successful completion of 402, or if taken after successful completion of the fourth regular University Course in another foreign language.

402 Elementary German

Su, A, W, Sp. 5 cl.

Prereq.: 401 or equiv.

403 Intermediate German

Su, A, W, Sp. 5 cl.

Prereq.: 402 or equiv.

Reading of narrative prose; oral and written practice; grammar review.

404 Intermediate German

Su, A, W, Sp. 5 cl.

Prereq.: 403, 420, or 412.

Reading of narrative prose; oral and written practice; vocabulary building.

409 Elementary German Conversation

A, W, Sp. 2 cl.

Prereq.: 402, grade of A in 401. No audit.

412 Intensive German

Su. Enrollment limited to 20 students.

Prereq.: Permission of chairman.

Students with no prior credit in German must register for 15 cr. hrs. Students with credit for 401 or 402 may register for 5 or 10 cr. hrs., although the course must be completed. Register before May 11.

Elementary and intermediate German for students desiring compre-
hsive knowledge of German in shortest possible time. Students
will devote their entire time to this course.

417 Elementary-Intermediate German for Selected Students

W. 5 cl.

Prereq.: Grade of A in 401.

418 Elementary-Intermediate German for Selected Students

Sp. 5 cl.

Prereq.: 417.

Successful completion of the sequence 401-417-418 ful-
fills language requirements and provides eligibility for 500 courses.

Continuation of 417.

420 Intermediate Scientific German

Sp. 5 cl.

Prereq.: 402.

Not open to students with credit for 403.

Reading of narrative prose; oral and written practice; introductory readings in scientific German.

421 Intermediate Scientific German

A. 5 cl.

Prereq.: 420, 403, or 412.

Not open to students with credit for 404.

Readings in scientific German.

499 Basic German for Graduate Students

Su, A, W, Sp. 5 cl.

Prereq.: Grad. standing.

The fee for this course will be the same as that for a
free credit hour course. No audit.

The fundamentals of German grammar, as required for the reading of German texts in the sciences and humanities.

501 Rapid Reading for Graduate Students

Su, A, W, Sp. 3 cl.

Prereq.: Grad. standing, 499 or equiv.

The fee for this course will be the same as that for a
three credit hour course. No audit.

An accelerated course designed to develop reading ability. Systematic study of practical problems encountered in interpreting and translating technical German.

503 Intermediate German Conversation

Su, A, W, Sp. 3 cl.

Prereq.: 404 and 409 or equiv. with a minimum grade of C.

503 may be taken concur. with 504. No audit.

Practice in spoken everyday idiomatic German, based on texts and periodicals concerning German life today.

504 German Composition


Prereq.: 404 and 409 or equiv. with a minimum grade of C.

504 may be taken concur. with 503. No audit.

Practice in simple writing with some conversation.

571 * German Civilization I

A. 3 cl.

Taught in English.

The cultural heritage of the German people from the beginning to about 1500. Institutions, phases of civilization, interrelation-
ship of social and literary history. Cuna.

572 * German Civilization II

W. 3 cl.

Taught in English.

German civilization from Luther to the Age of Goethe. Cultural trends, social changes, historical development to the end of the Holy Roman Empire. Cuna.
575 Introduction to German Literature; German Literature of the Classical Period
A. 5 cl.
Prereq.: 404, 418, or equiv.
Students with special aptitude are advised to register also in 503, 504.
Readings from Goethe and Schiller.

576 Introduction to German Literature; German Literature of the Nineteenth Century
W. 5 cl.
Prereq.: 404, 418, or equiv.
Students with special aptitude are advised to register also in 503, 504.
Readings from Keller and Meyer.

577 Introduction to German Literature; Modern German Literature
Sp. 5 cl.
Prereq.: 404, 418, or equiv.
Students with special aptitude are advised to register also in 503, 504.
Readings from representative authors such as Mann, Schnitzler, Duerrenmatt.

590 German Literature in Translation from Goethe to Thomas Mann
A. W. 3 cl.
Not for credit on a major in German.
Social and intellectual forces in Germany as reflected in German literature from the Age of Enlightenment to the present. Masterpieces from Goethe to Thomas Mann. Hoffmann, Seidlin.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600 AND 700
Unless otherwise indicated, the prerequisites for 600 and 700 courses are ten hours of 500 courses in the department. Exception may be allowed by instructors for students with special qualifications.

617 Survey of German Literature
U G 3
Sp. 3 cl.
A historical survey of German literature from the earliest times to the Baroque. Bekker.

630 Proseminar
U G 1 or 3
Su. 3 cl. 3 cr. hrs.
Su. (first term). 3 cl. 1 cr. hr.
Hoffmann.

656# Introduction to the Historical Study of German
U G 3
Sp. 3 cl.
Survey of the history of the German language with an outline of the Germanic languages. Relations between German and English (phonology, words and meanings). Groeske.

661 The German "Novelle"
A. 3 cl.
Reading and analysis of masterpieces of the 19th and 20th centuries: Kleist, Eichendorff, Stifter, Keller, Thomas Mann, Seidlin.

662 The German Drama
W. 3 cl.
Reading and analysis of masterpieces of the 19th and 20th centuries: Schiller, Kleist, Grillparzer, Hebbel, Brecht, Wittkowksi.

685 Advanced Conversation and Composition
W. 3 cl.

691 Practical German Pronunciation
Sp. 2 cl.

701 Minor Problems
UG 2-10
Prereq.: Permission of chairman.
Repeatable.
Investigation of minor problems in the various fields of German literature and philosophy. Cuns, Fleischhauer, Hoffmann, Seidlin, Wittkowski.

705 Introduction to the Study of Language
Sp. 3 cl.
Elements of linguistics with emphasis on the historical study of languages and on romance; the position of Germanic in the Indo-European family of languages. Groeske.

721 German Literature of the Eighteenth Century
A. 3 cl.
Prereq.: Grad. standing, or 4th yr. standing with 9 cr. hrs. in German at the 600 level and permission of department chairman.
The literature of the Enlightenment and Storm and Stress; Lessing, Klopstock, Wieland, young Goethe and Schiller. Cuns.

722 German Classical Literature
UG 3
W. 3 cl.
Prereq.: Grad. standing, or 4th yr. standing with 9 cr. hrs. in German at the 600 level and permission of department chairman.
Achievement of Goethe's and Schiller's major works. Their significance for modern times. Seidlin.

723 Goethe's Faust
UG 3
Sp. 3 cl.
Prereq.: Grad. standing, or 4th yr. standing with 9 cr. hrs. in German at the 600 level and permission of department chairman.
History of the Faust legend from the sixteenth century to Goethe. Reading and discussion of the play. Wittkowski.

724 German Romanticism
UG 3
A. 3 cl.
Prereq.: Grad. standing, or 4th yr. standing with 9 cr. hrs. in German at the 600 level and permission of department chairman.

735 German Literature of the Nineteenth Century
UG 3
W. 3 cl.
Prereq.: Grad. standing, or 4th yr. standing with 9 cr. hrs. in German at the 600 level and permission of department chairman.
Literary forces and trends from Goethe's death to the founding of the German Reich (Grillparzer, Buechner, Hebbel, Raimund, Mariro, Stifter, Keller, Meyer). Wittkowski.

726 Contemporary German Literature
UG 3
Sp. 3 cl.
Prereq.: Grad. standing, or 4th yr. standing with 9 cr. hrs. in German at the 600 level and permission of department chairman.
Main currents of German thought and literature from Nietzsche to the present; Hauptmann, Schnitzler, Mann, Rilke, George, Hofmannsthal, Kafka, Brecht, Hoffmann.

A-115
COURSES OF INSTRUCTION

GERMAN

801 * Middle High German
A. 4 cl.

805 * Old High German
W. 3 cl.

810 * Gothic
Sp. 3 cl.

821†* History of German Literature until 1700
A. 3 cl.
Prereq.: Graduate standing.
Readings from the earliest period to the end of the 17th century.
Bekker.

822†* History of German Literature until 1700
W. 3 cl.
Prereq.: Grad. standing.
Continuation of 821.
Bekker.

823†* History of German Literature until 1700
Sp. 3 cl.
Prereq.: Grad. standing.
Continuation of 822.
Bekker.

860 Seminar in German Literature
Selected topics from German Literature after 1600; problems of methods and interpretation.
Cuns, Behker, Hoffmann, Seidlin, Witkowski.

870 Seminar in German Linguistics
A, W. 2 cl.
Selected topics from medieval literature, word history, stylistics, and psychology of language.
Fleischhauer, Groenter.

950 Research in German
Research for thesis and dissertation purposes only.

Greek

Office: 217 Derby Hall, 154 North Oval Drive.

PROFESSORS: I. TITCHENER (Chairman), J. ABBOTT, and
J. FORBES, ASSOCIATE PROFESSORS: W. R. JONES,
H. E. L. JENKYN, and L. LENARDON, ASSISTANT PROFESSORS
BRUNNER, BOLSINGER, LAZATTI, and T. M. MORFORD.

See also Classical Languages and Literatures.

401 Elementary Greek
U 5
A. 5 cl.
Credit in 401 will count toward graduation only if followed by successful completion of 402, or if taken after successful completion of the fourth regular University course in another foreign language.

Grammar and practice in translation of the Greek idiom. Lazzatti.

402 Elementary Greek
U 5
W. 5 cl.
Prereq.: 401.
Continuation of grammar and selected reading. Lazzatti.

403 Intermediate Greek
U 5
Sp. 5 cl.
Prereq.: 402.
Reading in the easier dialogues; the personalities of Socrates and Plato and their work. Lazzatti.

415 Intensive Introduction to Greek
U 15
Su. 10 cl. and 10 or more hrs. of supervised study.
Full time of student rec'd.
Prereq.: Permission of chairman.
Not open to students with credit for 401, 402, 403.

Intensive drill in forms, syntax, vocabulary, and idiom, leading to an ability to translate the dialogues of Plato by the end of the quarter.

504 Homer
U 5
A. 5 cl.
Prereq.: 402.
Reading in the Iliad and Odyssey; the epic of Greece. Lazzatti.

506 New Testament Greek
U 3
W. 3 cl.
Prereq.: 403.

603† Greek Orators
UG 3
A. 3 cl.
Prereq.: 401, 402, 403, 504.
The theory and practice of the grand and the plain style in oratory; Demosthenes and Lysias. Morford.

604 * Herodotus
UG 3
A. 3 cl.
Prereq.: 401, 402, 403, 504.
Reading and discussion; assessment of the nature of Herodotus' contribution to literature and history. Morford.

606† Sophocles
UG 3
W. 3 cl.
Prereq.: 401, 402, 403, 504.
The tragedies of Sophocles with Aristotle's analytic criticism. Lenardon.

Graduate School Course

Office: 164 West 15th Avenue.

701 College Teaching
G 2
A, W. 2 cl.
Prereq.: Permission of director of course.

Designed to acquaint prospective college teachers with the major problems involved in college teaching.

A-116
607 * Euripides  
U G 3  
W. 3 cl.  
Prereq.: 401, 402, 403, 504.  
Tragedies of various types by the last Greek tragedian. Morford.  

608† Thucydidies  
U G 3  
Sp. 3 cl.  
Prereq.: One Greek 600 level course.  
Assessment of Thucydides' contributions to literature and history. Leonard.  

609 * Plato  
U G 3  
Sp. 3 cl.  
Prereq.: One Greek 600 level course.  
Readings from the longer Dialogues. Leonard, Morford.  

631 Private Reading and Minor Problems  
U G 1-6  
W. 3 cl.  
Prereq.: 504. Repeattable.  
Passages for private reading and topics for investigation will be suggested to meet the needs of the individual students. Leinikas, Lazzatti, Brunner.  

670 Structure of the Greek Language  
U G 3  
W. 3 cl.  
Prereq.: 604 or permission of instructor.  
An investigation of the linguistic structure of Classical Greek. Leinikas.  

700 Advanced Reading  
G 1-6  
Prereq.: 2 yrs. of 631 or 6 cr. hrs. in 631. Repeattable.  
Leonard, Leinikas.  

705 * History of Greek Literature  
A  
Prereq.: 10 cr. hrs. of 631 or equiv.  
Repeattable for graduate credit.  
Lectures and assigned reading on the development of Greek literature; required and suggested passages for translation in each author studied. Forbes.  

706 * History of Greek Literature  
W.  
Prereq.: 10 cr. hrs. of 631 or equiv.  
Repeattable for graduate credit.  
Continuation of 705.  

707 * History of Greek Literature  
Sp.  
Prereq.: 10 cr. hrs. of 631 or equiv.  
Repeattable for graduate credit.  
Continuation of 706.  

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**Greek**  

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**Health Education**  

**Office:** (Men) 124 Physical Education Bldg., 337 West 17th Ave.  
(Women) 317 Fomon Hall, 1760 Neil Avenue.  

**Professors:** ALLENBAUGH, BEYER, and BUSHMAN and ROBERTSEFFER; ASSISTANT PROFESSOR FOGLE; ASSISTANT PROFESSORS NOLTE and SOLLEDER; INSTRUCTORS BOCK, CARRABILL, HURILL and Staff.  

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400 Hygiene  
Su, A, W, Sp. 1 cl., 1 lab. hr.  
Designed to influence knowledge, attitudes, and behavior related to individual health. Solleder, Coordinator.  

473 First Aid  
Su, A, W, Sp. 2 cl., 12 lab.  
A consideration of first aid practices to the injured. Completion leads to Red Cross certificates in first aid. Staff.  

510 Hygiene  
A, W, Sp. 5 cl.  
Not open to students with credit for 410.  
Designed to establish a basis for positive health and efficiency through a consideration of various conditions and factors which affect health. Cushman, Beyrer, Nolte.  

609 Health Education for Elementary Teachers  
Su, A, W, Sp. 3 cl.  
Not open to undergraduate or graduate minors or majors in Phys. Ed. or Health Ed.  

610 Health Education for Secondary Teachers  
Su, A, W, Sp. 3 cl.  
Not open to students preparing for secondary school teaching in 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. Cushman, Beyrer, Solleder, Nolte, Carroll.  

641 Personal Health Problems  
U G 3  
Su. A. 3 cl.  
An advanced course in personal health problems. Extensive reading and reporting in selected health areas. Cushman.  

644 The Teaching of Health  
U G 4  
Su, Sp. 5 cl.  
Prereq.: 410 or 510 or equiv.  

645 Organizational Relationships in School Health Education  
W, Sp. 3 cl.  
Prereq.: 692.  
The relation of the school health program to the total community health program. Official and non-official health agencies are studied. Beyrer, Nolte, Fogle.  

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A-117
COURSES OF INSTRUCTION

HEALTH EDUCATION

692 School Health Services U G 3
Su, A, W. 3 cl.
Prereq.: 410 or 510 or equiv.
Consideration of healthful school living and health services, including health appraisal, counseling, educational adjustments, communicable diseases, and emergency programs. Cushman.

701 Minor Problems in Health Education U G 1-4
Prereq.: 4th yr. or grad. standing and permission of advisor.
Investigation of selected professional problems.

705 Current Progress in Disease Control U G 2
Sp. 2 cl.
Prereq.: 4th yr. or 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.

799 School Health Education Workshop U G 4
Su. 3 wk. workshop.
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
A team approach to school health education with emphasis on instruction, health services, environment, methods, materials, resources, evaluation, interrelationships, and others. Individual and group study. Fogle.

801 Seminar in School Health Education G 2
A. 2 cl.
Baymer.

820 Problems in School Health Education G 3
Advanced problems in school health education. Individual or group participation.

820J Curriculum in Health Education A.
Note.

820K Survey of Research in Health Education W.
Baymer.

820L Evaluation in Health Education Su.
Cushman.

950 Research in Health Education G Arr.
Research for thesis and dissertation purposes only.

History

Office: 108 University Hall, 216 North Oval Drive.
PROFESSORS: GRIMM (Chairman), BRENNER, MCLOUGHLIN, DORFMAN, IDALISI, DULLER, FISHER, HILL (Emeritus), McGUIRE, MORLEY, MOURIER, NOIRAT, ROGERS (Emeritus), SMITH, WEINBRGER, and WOODRUFF (Emeritus); ASSOCIATE PROFESSORS: ROBERTS, RULE, TETAPASSE, and VOGT; ASSISTANT PROFESSORS: BRYANT THOMAS, CURRAN, GIEFFER, HARE (Emeritus), LAR- MOOR, MANNING (Lakeside), and SOULE (Lakeside).

401 History of Western Civilization U 5
(1500 to 1815)
A, W, Sp. 5 cl.
Either 401 or 402 may be taken independently.
Not open to students with credit in 421.
Renaissance, Reformation; Spanish culture; Elizabethan England; French classicism, and early modern natural science; national monarchies, absolutism, and mercantilism; the Enlightenment; the French Revolution; Napoleon.

402 History of Western Civilization U 5
(1815 to the Present)
A, W, Sp. 5 cl.
Either 401 or 402 may be taken independently.
Not open to students with credit in 422 or 423.
Continuation of 401. Restoration; reaction; democracy; economic and political radicalism; Romanticism; nationalism; imperialism; World War I; post-war Europe.

403 History of the United States U 5
(1763 to the Civil War)
Su, A, W, Sp. 5 cl.
Not open to students with credit in 421 or 422 or 504.
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.

404 History of the United States U 5
(1865 to the Present)
Su, A, W, Sp. 5 cl.
Not open to students with credit in 422 or 423 or 504.
A continuation of 403. The two provide a legal sequence but either may be taken independently as an elective.

421 The Western World in Modern Times U 5
Su, A, W, Sp. 5 cl.
Not open to students with credit in 401 or 403 or 504.
From the beginning of modern times through the first third of the nineteenth century. A course in the history of modern Europe and the United States. Emphasis is placed on the history of the United States in a world setting. Major themes include the development of representative government and democracy, the rise of capitalism, the role of organized religion, and the impact of scientific development.

422 The Western World in Modern Times U 5
Su, A, W, Sp. 5 cl.
Not open to students with credit in 402 or 403 or 404 or 504.
Continuation of 421. The nineteenth century.

423 The Western World in Modern Times U 5
Su, A, W, Sp. 5 cl.
Not open to students with credit in 402 or 404, or 504.
Continuation of 422. The twentieth century.
American Civilization U 5
Sp. 5 cl.
Not open to students with either an entrance unit in American history or with credit for 403 or 404 or 421 or 422 or 423.
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 and Staff.

Great Figures in British History U 3
W. 3 cl.
British history since 1485 as illustrated in the lives of notable figures. Roberts.

Great Figures in Greek and Roman Antiquity U 3
W. 3 cl.
A biographical approach to Antiquity through an examination of the lives of eight prominent men. Readings in ancient and modern biographies. McDonald.

Great Figures of Modern Europe U 3
Su. 3 cl.
A study of modern European history through an examination of the lives and times of great figures. Rule.

Great Figures in American History U 3
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. Staff.

Great Figures of the Middle Ages U 3
W. 3 cl.
A study of medieval European history through an examination of the lives and times of great figures. Pogue.

Russian Civilization U 5
W. 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.

Recent History of the United States U 3
(1898-1928)
Su, A, W, Sp. 3 cl.
The impact of modern industrialism upon American imperialism, society, government, and foreign policy. "Leisure" and government regulation, the Progressive movement, and the first World War. Staff.

Recent History of the United States U 3
(since 1928)
Su, A, W, Sp. 3 cl.
Continuation of Hist. 227, but may be taken separately. Prosperity and depression, the New Deal, the United States in international affairs, the Second World War.

Contemporary Europe U 5
(1914 to the Present)
A, W. 5 cl.
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. Dorssen, Larmour.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 600 AND 700
Unless otherwise indicated the prerequisites for 600 and 700 courses are four quarter courses in the social science field, of which at least two must be in history.

The Renaissance U G 3
Su, W. 3 cl.
The literary, artistic, and intellectual achievements primarily of the Renaissance Italy against the economic, political, and social developments in western Europe. Pogue, Grimm.

The Reformation U G 5
Sp. 5 cl.
The rise and growth of Protestantism and the Catholic reformation of the sixteenth century against the economic, political, and social developments in western Europe. Grimm.

The History of England from Its Beginning to 1688 U G 5
Su. 5 cl.
A study of the religious, political, economic, and intellectual development of the English people from the earliest times to the Glorious Revolution. Roberts.

History of England (since 1688) U G 5
W. 5 cl.
The course of political, social, and intellectual change, of industrial and commercial growth of Hanoverian, Victorian, and Edwardian England. Potter.

Constitutional History of England (to 1485) U G 3
W. 3 cl.
The development of royal administration; the rise of common law and central courts, the origins and growth of representative and constitutional government to 1485. Pogue.

Constitutional History of England (since 1485) U G 3
Sp. 3 cl.
Prereq.: 611 or permission of instructor.
The Tudor system, the struggle between king and parliament, cabinet government, electoral reform, and the law of the modern constitution. Roberts.

Europe 1660-1789 U G 5
A. 5 cl.
A study of the rise of the absolute state, the changing diplomatic alignments, and the enlightenment. Rule.

American Military Policy U G 3
Sp. 3 cl.
The development of American military policy, 1763 to the present, in relation to its political, economic, and social implications. Coles.

Medieval Civilization U G 5
Su. A. 5 cl.
The decline of the Roman Empire; the rise of Christianity; analysis of feudalism and marianism; the Great Economic Revival, and the origins of Western Society. Pogue.

Europe 1815-1914 U G 5
A. 5 cl.
Nationalism, the democratic movement, economic growth, imperialism, and cultural advance from the Congress of Vienna to World War I. Ragan.

Africa and the Western World in the Nineteenth and Twentieth Centuries U G 5
W. 5 cl.
Economic penetration, the conflict of cultures, political developments, and social advances. Ragan.

Asia, the Pacific Basin, and the Western World in the Nineteenth and Twentieth Centuries U G 5
Sp. 5 cl.
The rise and decline of colonialism and contemporary problems. Ragan.
624 The French Revolution and Napoleon U G 5
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. Fisher.

625 France since 1815 U G 5
Sp. 5 cl.
The social and economic evolution of France, 1815-1870; the evolution of French politics and social classes, 1870-1914; the problems of France between two wars; the Fourth Republic. Larmour.

626 The Rise of Islam and the Spread of Muslim Civilization U G 3
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. Fisher.

627 The Rise and Fall of the Ottoman Empire U G 3
W. 3 cl.
A study of the significance of the Middle East with respect to Europe from the thirteenth century to World War I. Fisher.

628 The Middle East since 1914 U G 3
Sp. 3 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. Fisher.

629 Modern Germany U G 5
(1815 to the Present)
W. 5 cl.
Political, social, economic, and cultural developments; the national and liberal movements; unification; Empire; Weimar Republic; Nazi Regime; present-day Germany. Dorpaten.

630 European Diplomacy, 1871-1939 U G 3
W. 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. Fisher.

631* Constitutional History of the United States U G 5
W. 5 cl.
Problems involved in the constitutional growth and development of the United States from the struggle for independence to the present.

632 The Slavery Controversy in the United States A. 2 cl.
The social system of the Old South; the various aspects of the controversy; secession and the impact of war. Simms.

634 Reconstruction and the New South U G 3
(1865 to the Present)
W. 3 cl.
The controversy over reconstruction; the social and economic re-adjustments in Southern States during and after reconstruction. Simms.

635† American Foreign Policy to the Close of the Civil War U G 3
W. 3 cl.
Emphasis on these topics: the revolution, neutral rights, the Monroe Doctrine, the War with Mexico, the Civil War. Coles.

636 American Foreign Policy since the Civil War U G 5
W. 5 cl.
Emphasis on these topics: overseas expansion, U. S. relations with Latin America, the Far East, and with Europe since 1914. Steff.

639 The Influence of Immigrant Groups upon United States History U G 5
W. 5 cl.
The share of different immigrant groups in the building of the nation, from the colonial period to the present. Weissenburger.

641 The Westward Movement since 1783 U G 5
Sp. 5 cl.
The westward spread of settlement and the influence of the westward movement on American development. Young.

642 Social and Economic History of the United States, 1815-1865 U G 5
Su, A. 5 cl.
The development of economic institutions and their relation to economic growth and to movements for social and political reform. Young.

643† Political Parties in the United States U G 5
Sp. 5 cl.
The origin and growth of national parties and the history of party struggles with emphasis upon presidential elections.

644 The American Colonies U G 5
A. 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.

645 Latin America U G 3
A. 3 cl.
The Mayan, Aztec, and Inca Empires; the Spanish and Portuguese conquest; and the development of Hispanic civilization in the New World. TePaske.

646 Latin America U G 5
W. 5 cl.
The development of the South American republics from the Wars of Independence to the present with special emphasis upon Argentina and Brazil. TePaske.

648 The American Revolution and the New Nation, 1763-1825 U G 5
Su, W. 5 cl.
A continuation of 644 but may be taken separately. Primary emphasis is on social, intellectual, and economic factors. Coles.

649† Greek Civilization U G 3
Su., W. 3 cl.
The Hellenistic Age: A study of Greek institutions from Alexander the Great to the Roman conquest. Readings in the sources in translation. McDonald.

650 Roman Civilization U G 3
A. 3 cl.
A study of the Early Roman Empire, beginning with the Augustan Age and ending with Marcus Aurelius. Readings in the sources in translation. McDonald.

653† The Ancient History of the Near East U G 3
Sp. 3 cl.
The ancient history of Egypt, Babylonia, Assyria, and adjacent cultures. Readings in the sources in translation. McDonald.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>655</td>
<td>Greek History</td>
<td>U G 5</td>
<td>A history of Greece from the early Minoan period to the age of Demosthenes and Philipp of Macedon. Readings in the Greek historians in translation. McDonald.</td>
</tr>
<tr>
<td>656</td>
<td>Roman History</td>
<td>U G 5</td>
<td>A history of Rome from the early Bronze Age to the fall of the Roman Republic. Readings in the Roman historians in translation. McDonald.</td>
</tr>
<tr>
<td>668</td>
<td>The Emergence of Modern America, 1865-1898</td>
<td>U G 5</td>
<td>An intensive study of the political, social, and cultural transformation of the United States in the late nineteenth century. Weisbenburger.</td>
</tr>
<tr>
<td>674</td>
<td>History of American Science Since Darwin</td>
<td>U G 3</td>
<td>The Darwinian Period in America; positivism and pragmatism; The rise of twentieth-century science; American scientific leadership; role of the scientist in twentieth-century America. Burnham.</td>
</tr>
<tr>
<td>675</td>
<td>History of Russia (to 1801)</td>
<td>U G 3</td>
<td>A survey of the origins of the Russian state to the end of the eighteenth century. Curran.</td>
</tr>
<tr>
<td>677</td>
<td>Soviet Russia</td>
<td>U G 3</td>
<td>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.</td>
</tr>
<tr>
<td>678</td>
<td>Modern Poland</td>
<td>U G 3</td>
<td>While several background lectures deal with the partitions of Poland and the revolutions of the nineteenth century, emphasis is placed on the period since 1918. Morley.</td>
</tr>
<tr>
<td>679</td>
<td>Latin America</td>
<td>U G 5</td>
<td>The development of Mexico, Central America, and the Caribbean from the Wars of Independence to the present with special emphasis upon Mexico since 1910. TePaske.</td>
</tr>
<tr>
<td>681</td>
<td>Russian Intellectual History</td>
<td>U 5</td>
<td>A survey of the main currents of Russian social, political, economic and philosophical thought in the nineteenth century. Liberalism, Conservatism and Socialism.</td>
</tr>
<tr>
<td>686</td>
<td>Contemporary England</td>
<td>U G 3</td>
<td>A study of Britain since 1860 with special emphasis on the rise of the Labour party and the development of the social welfare state. Poirier.</td>
</tr>
<tr>
<td>687</td>
<td>The Age of Liberalism</td>
<td>U G 5</td>
<td>The main currents of European thought accompanying the transition from seventeenth century mercantilism to nineteenth century liberalism, social and cultural criticism of the industrial order. Poirier.</td>
</tr>
<tr>
<td>693</td>
<td>Major Influences in the History of Western Civilization</td>
<td>U 3</td>
<td>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.</td>
</tr>
<tr>
<td>694</td>
<td>History of the Far East to 1800</td>
<td>U G 5</td>
<td>The development of the civilizations of China, Korea, and Japan from the earliest time to the beginning of large-scale Western influence. Grieder.</td>
</tr>
<tr>
<td>695</td>
<td>History of the Far East since 1800</td>
<td>U G 5</td>
<td>The transformation of China, Korea, and Japan in modern times under the impact of the West. Grieder.</td>
</tr>
<tr>
<td>696</td>
<td>American Social Thought and Reform, 1890-1929</td>
<td>U G 5</td>
<td>Philosophy and institutions of social reform in the United States in the late nineteenth and early twentieth century. Bremner.</td>
</tr>
<tr>
<td>697</td>
<td>American Social Thought and Reform since 1929</td>
<td>U G 3</td>
<td>A historical examination of trends in American social thought and criticism since the Great Depression. Bremner.</td>
</tr>
<tr>
<td>698</td>
<td>History of Modern China</td>
<td>U G 5</td>
<td>A study of China's response to the problems generated by contact with the West, emphasizing the rise of nationalism and communism in the twentieth century. Political, social and intellectual history. Grieder.</td>
</tr>
<tr>
<td>700</td>
<td>Minor Problems in History</td>
<td>U G 1-3</td>
<td>Individual study in some field of historical development, designed to allow the student to work upon a problem in which he is particularly interested.</td>
</tr>
<tr>
<td>705</td>
<td>Honors Course</td>
<td>U 3-5</td>
<td>For qualified students. Prereq.: permission of instructor. 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.</td>
</tr>
<tr>
<td>706</td>
<td>Honors Course</td>
<td>U 3-5</td>
<td>For qualified students. W. See prereq. for 705.</td>
</tr>
</tbody>
</table>
| 707        | Honors Course                                    | U 3-5   | For qualified students. Sp. See prereq. for 705.
Recent History of the United States (1898-1928) G 5
Su, A. 5 cl.

Recent History of the United States G 5
(since 1928)
W, Sp. 5 cl.
Continuation of Hist. 737, but may be taken separately. Prosperity and depression, the New Deal, the United States in international affairs, and the Second World War. Burnham, Staff.

Studies in Russian History U G 3
W. 2 cl.
Prereq.: 6 cr. hrs. of Russian hist. or permission of instructor.
An intensive study of problems in selected periods of Russian history. Morley.
Topics:
A. Catherine the Great through the Crimean War, 1762-1855.
B. Alexander II through the Bolshevik Revolution, 1855-1917.

Studies in European History: 1815-1914 G 3
W. 1 cl.
Open only to graduate 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 the Present G 3
A, Sp. 1 cl.
Prereq.: Grad. standing or 4th yr. majors in Hist. with permission of instructor.
Political, social, and economic developments: World Wars I and II; Socialism, Nazism; present-day Europe. Emphasis on methods of historical research and documentary analysis. Dorpaten.

Seminar in European History G 3
A. 1 cl.
Prereq. or concur.: 812B.
Research topic to be announced. Grimm.

Seminar in European History Sp. 1 cl.
Prereq. or concur.: 812B.
Research topic to be announced. Dorpaten.

Seminar in European History G 3
W. 1 cl.
Prereq. or concur.: 812B.

Introduction to Historical Research in American History A. 3 cl.
Prereq.: 1st qtr. Master's degree candidates in American Hist.
A practice course dealing with the problems involved in the preparation of the Master's thesis. Weisenburger.
Home Economics

Office: 520 Campbell Hall, 1787 Neil Ave.


The courses in Home Economics may be grouped as follows:


General Courses—400, 599.

+00 Home Economics Survey U 1

A. 1 hr. and 1 hr. lab.
Prereq.: 1st and 2nd qtr. standing in Home Ec. only.

+40 Elements of Nutrition U 5

A, Sp. 5 cl.
Not open to students majoring in Home Ec.
Prereq.: 10 hrs. Chem.

305 Textiles U 5

A, W, Sp. 4 cl., 1 2-hr. lab.
Prereq.: 10 hrs. Chem.
Study of the physical and chemical properties of textiles and their components as they relate to care, performance and consumer satisfaction. Tapscott.

506 Household Equipment: Introduction U 5

Su, A, 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. Board.

507 Needle Crafts U 2

W. 2 2-hr. lab.
Prereq.: Major standing in Oc. Ther., or permission of instructor.
Not open to majors in Home Ec.
Application of principles of design. Opportunity to work in a variety of needle crafts.

508 Clothing: Fashion and the Ready-to-Wear Market U 5

Sp. 5 cl.
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.

510 Housing U 3

A, W, Sp. 3 cl.
Prereq.: 562 or 10 cr. hrs. social science.
Not open to students with credit for 450.
Housing as it affects family living and in turn affected by family needs, social and economic trends and the physical environment. Everhart, Newark.

512 Home Furnishings: Principles U 3

A, W, Sp. 2 cl., 1 2-hr. lab.
Prereq.: Fine Arts 430 or 421 or permission of instructor. 510 and 505 or concur. is recommended.
Application of art principles to furnishing a home with consideration of aesthetic, economics and social factors affecting choice. Everhart.

513 Home Furnishings: Laboratory U 3

W. 2 2-hr. cl., 1 2-hr. lab.
Prereq.: 512 or permission of instructor.
Continuation of 512; emphasis on economic factors, trends, materials, construction and finishes. Some experience in reconditioning and other techniques. Everhart.

514 Clothing: Elementary Construction U 3

A. 2 3-hr. lab.
Prereq.: Major standing in Oc. Ther., or permission of instructor.
Problems of elementary garment construction.

5181 Elements of Homemaking U 3

A. 3 cl.
Prereq.: 3rd yr. standing.
Not open to majors in Home Ec.
Principles of home management and use of family resources in relation to family well-being. Newark.

530 Costume Design U 3

A, W, Sp. 3 cl., 1 2-hr. lab.
Prereq.: Fine Arts 430 or equiv.
A critical study of aesthetic principles in relation to costume. Meacham.

531 Clothing: Design Analysis U 5

A, W, Sp. 2 cl., 3 2-hr. lab.
Prereq.: 530; passing placement test or prior registration in Techniques Studio required.
Not open to students with credit for 431.
Adaptation of standard patterns to individual proportions, flat pattern designing, and application of principles of design and construction in making garments. Goldsberry.

A-123
541 Principles and Methods of Teaching Applied to Home Economics
A, W, Sp. 3 cl., ½ day arr.
Prereq.: Admission to Home Ec., Teaching Curriculum, and 25 cr. hrs. in Home Ec.
Consideration of curriculum methods of teaching, management, and other problems of the home economics teacher.

542 Supervised Home Economics Teaching
A, W, Sp. Full time for one qtr. for 15 cr. hrs.
not open to students with credit for 543.
40 cr. hrs. in Home Ec., including 541, accumulative point hr. ratio of 2.85 to be attained two qtrs. prior to registration for 542, permission of instructor. For reservation, student must report to Room 314, Campbell Hall.
Students registering for 10 cr. hrs. will spend full time for ½ qtr. teaching and will be reqd. to register for 543 for occupational certification. For vocational certification, students must do their teaching in a vocational center and live in the community.
Registration with the Teacher Placement Service of the College of Education.
Guided participation in the responsibilities and activities of the Home Economics teacher in the regular day school and extended school program.

543 School-Community Problems of the Home Economics Teachers
Su. 3 cl. arr. hrs. for observation and participation.
Prereq.: 541.
Not open to students with 15 cr. hrs. for 542.
Responsibilities and activities of the home economics teacher in the extended school program. Emphasis on adult education, home experience, related home economics activities: Divs.

545 Introduction to Educational Principles for Home Economics
Sp. 1 1-hr. cl., 1 2-hr. cl., field experience.
Prereq.: 3rd yr. standing.
Principles of education for students whose professional work will require knowledge of techniques for teaching others in non-school situations. Wood.

548 Fundamentals of Nutrition
A, W, Sp. 5 cl.
Prereq.: Chem. 407 and 408 or equiv.
Not open to students with credit for 440.
Basic information in the science of nutrition as applied to man. Herr.

549 Food
A, W, Sp. 2 cl., 3 2-hr. lab.
Prereq.: 10 cr. hrs. Chem.
Not open to students with credit for 441.
Application of chemical and physical principles to food preparation and use. Green.

550 Foods: Meal Management
A, W, Sp. 2 cl., 2 3-hr. lab.
Prereq.: 549.
Nutritional, aesthetic, and social aspects of planning, purchasing, preparing, and serving food to family groups at different income levels. Wertmeberger.

552 Nutrition: Recent Developments
A, Sp. 3 cl.

555 Food in Different Cultures
Su. A, 3 cl.
Prereq.: 10 cr. hrs. of social science. 548 or equiv. recommended.
Food practices of selected peoples of the world with consideration of the existing social, cultural, and economic conditions.

559 Home Management: The Family and the Market
Su, A, W, 3 cl.
Prereq.: 3rd yr. standing and Econ. 406 or 506 or equiv.
The market from the family point of view and its relation to home management practices. Newark.

560 Home Management
A, W, Sp. 5 cl.
Prereq.: 3rd yr. standing and Econ. 406 or 506 or equiv.
Management process of utilizing specific resources for family's well-being. Newark, Lloyd.

561 Introduction to Child Development
A, W, Sp. 3 cl., 2 morning hrs. arr. for nursery school observation.
Prereq.: Psychol. 401, 548 or equiv. recommended.
Study of the nature, nurture and development of children with emphasis on the preschool years. Heye, Hendrickson, Dickerson.

562 Family Development
A, W, Sp. 5 cl.
Prereq.: 10 cr. hrs. of social science.
Not open to students with credit for 405.
The dynamics of family interaction at each stage of the life cycle. Emphasis on developmental tasks, socio-economic and cultural influences and other family differences. Hillman, Taylor.

563 Child Development
Prereq.: Psychol. 401.
Not open to students with credit for 561.
Developmental patterns of children with emphasis on physical, social, and emotional maturation, especially during the formative years. Environmental influences and appropriate guidance. Heye.

570 Introduction to Food Service Management
Sp. 1 2-hr. cl.
Prereq.: 549.
Orientation to the field of food service management. Harger.

571 * Menu Planning for Food-Serving Establishments
W. 3 cl.
Prereq.: 548 or permission of instructor.
549 or concurs. recommended.
Principles and practices of menu planning for school, industrial, and commercial food units. Menus planned for each type of institution. Harger.

580 Household Equipment: The Home Economist in Business
Sp. 3 cl., 2 3-hr. lab.
Prereq.: 550, 10 cr. hrs. of household equipment, 5 cr. hrs. Speech, or permission of instructor.
Evaluation and development of the individual's qualifications to meet professional requirements of a home economist in businesses related to household equipment. Bloom.
585 Field Work in Home Economics
U 3, 5, 10, or 15
Su, A. W. Sp.
Prereq.: Permission of instructor.
Student participation in work of community agencies, county extension programs or business concerns to which home economics is related. Bloom, Hege, Millican, Warfield, Wood.
Credit limited to 5 hrs. except in qtrs. indicated below.

585A Foods 3 or 5
585B Nutrition 3 or 5
585C Textiles 3 or 5
585D Clothing 10
A. 10 cr. hrs.
585F Household Equipment 3 or 5
585G Home Management 3 or 5
585H Institution Management 3 or 5
585I Teaching 3 or 5
585J Family and Child Development 3 or 5
585L Home Economics Extension 15
W. Sp.
Not open to students with credit for 681.

599 Home Economics as a Profession U 2
A. W. 2 cl.
The nature and status of home economics as a field study and as a profession. Scott.

601 Clothing U G 3
Su, W, Sp. 2 3-hr. lab.
Prereq.: 531 or equiv.
Application of principles of tailoring in the construction of a suit or coat. Millican.

604 Clothing: Advanced Design Analysis U G 5
A, W, Sp. 2 cl., 3 2-hr. lab.
Prereq.: 531 or equiv.
Creative interpretation of dress design terminating in finished garments developed through the media of flat pattern and draping. Meacham, Millican.

610 Nutrition U G 5
W. 5 cl.
Prereq.: 546, Physiol. 422 or 507, and Agr. Bio. 610 or 621, or equiv.
Modern concepts of normal nutrition. Green.

612 Nutrition: Diet Therapy U G 3
Sp. 3 cl., other hrs. arr.
Prereq.: 610 or equiv. or permission of instructor.
Modern concepts of clinical nutrition and abnormalities treated by modification of diet. Prudent.

615 Experimental Work in Food Preparation U G 5
Su, A, Sp. 2 cl., 3 3-hr. lab.
Prereq.: 550 Agr. Bio. 610 or 620, or equiv.
Application of experimental methods to problems involved in preparation of foods. Prudent.

616 Nutrition of Infants and Children U G 3
Su. 3 cl.
Needs of children for good nutrition from the embryonic stage through adolescence. Prudent.

619 Household Equipment U G 3
W. 2 cl., 1 2-hr. lab.
Prereq.: 506, 512 or concur.
Application to home situations of the recent development in lighting with emphasis on selection, care, and use of home lighting equipment. Everhart.

622 Household Equipment: Performance U G 5
Testing
W. 2 cl., 3 2-hr. lab.
Prereq.: 506, 550 or equiv., 5 cr. hrs. of Microbiol. and 10 additional cr. hrs. of natural science.
Experienced problems on the performance of the major types of household equipment used in preparation of food. Bloom.

623 Household Equipment: Performance U G 5
Testing
A. 2 cl., 3 2-hr. lab.
Prereq.: 4th yr. standing in Home Ec. or permission of instructor and 505, 506, or equiv.
Experience in the techniques and reporting of experimental investigations dealing with household equipment used in laundering and other cleaning processes. Bloom.

627 Home Management U 4
Su, A, W, Sp. 5 cl., lab. hrs. arr.
Prereq.: Senior standing.
Report to Room 201, 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. Lloyd, Newkirk.

628 Selection of Furnishings for the Home U G 3
A. 2 cl., 1 2-hr. lab. Field trips arr.
Prereq.: 512, Econ. 403 or 406, 502 or 506 or equiv.
Consumer problems in the selection of home furnishings. Everhart.

630 Selection of Food and Equipment U G 5
For Institutions A. 5 cl.
Prereq.: 570, and Econ. 403 or 502 or 406 or 506 or equiv. or permission of instructor.
Principles and standards for selection of food, equipment, and furnishings in institution food service, arrangement and layout. Harger, Wood.

631 Quantity Food Production and Service U G 5
A. W. 1 2-hr. cl., 8 hrs. lab.
Prereq.: 570, 630 or concur.
Individual experience in application of food preparation principles to quantity production; use and care of large equipment; standardized formulas and costs; service to the public. Harger, Wood.

632 Institution Organization and Management U G 5
Sp. 3 cl., 6 hrs. lab. arr.
Prereq.: 650, 631 and Bus. Org. or permission of instructor.
Principles of business organization and management and principles of learning applied to the management of food service operations; supervised experience in meal management. Harger, Wood.

633 School Lunchroom Management U G 3
Su. 3 cl., 1 hr. arr.
Prereq.: 551 or 610, 570, or equiv., and permission of instructor.
A general course on management problems in a school lunch program. Wood.

HOME ECONOMICS
634 Sanitation for Food Serving Establishments
   Sp. 1 hr. 1 1/2 hr. cl.
   Prereq.: Microbiol. 607 or equiv.
   Application of principles involved in sanitary food handling. Practical problems concerned with protection of health and with prevention of food spoilage and contamination. Wood.

640 Food and Nutrition Seminar
   Sp. 2 cl.
   Prereq.: 4th yr. standing.
   Reports based on current research, recent summaries and articles which give perspective in food and nutrition.

662 Child Development
   W. 3 cl., 2 1/2 hr. observation periods.
   Prereq.: 561, or equiv.
   Growth and development of children from six through adolescence with emphasis on development patterns and individual differences. Hendrickson.

663 Infant Guidance and Care
   A. 2 cl., 1 1/2 hr. lab. arr.
   Prereq.: 548, 561, and Microbiol. 509, or equiv.
   Pattern of development during infancy and the second year of life, and responsibilities of adults for providing a home environment favoring optimum development. Hege, Hendrickson.

664 Nursery School Activities
   Su. A. W., Sp. 3 cl.
   Prereq.: 561 or 563 and 665 or concour.
   Not open to students with credit for 661.
   Application of principles of development to program planning. Modification of activities for age level, ability, experience, group and individual needs. Hege, Christy, Hendrickson.

665 Nursery School Practicum
   Su. A. W., Sp. 1 cont. hr., 2 1/2 hr. lab.
   Prereq.: 561 and 664 or concour.
   Not open to students with credit for 661.
   Repeatable to a maximum of 8 cr. hrs.
   Participation in the nursery school as a student teacher applying theory covered in 664. Christy, Hendrickson.

666 Seminar in Child Development
   W. 1 cl.
   Prereq.: 561, 563, 664 or permission of instructor.
   Review, interpretation, and evaluation of current literature and research in defined areas, with emphasis on recommended professional standards in group care of children. Staff.

670 Clothing: Fashion
   W. 3 cl.
   Prereq.: 5 cr. hrs. Fine Arts and 10 cr. hrs. social science.
   Fashion as a social force—its influence on production, distribution and consumption of textiles and clothing. Gilmore.

671 * Textiles
   W. 1 cl., 2 1/2 hr. lab.
   Prereq.: 505 or equiv. and 10 cr. hrs. natural science.
   Experience in planning and conducting textile tests and in evaluating resulting data. Development, present status, and importance of textile testing. Tappan.

672 Textiles: Historic
   Su. W. 3 cl.
   Prereq.: 505, 5 cr. hrs. Fine Arts, and 10 cr. hrs. social science.

673 Textiles: Recent Developments
   Sp. 3 cl.
   Prereq.: 4th yr. standing in Home Ec. and 505 or equiv.
   Recent developments and research. Discussion and reports based on individual assignments. Tapscott.

680 Textiles and Clothing Seminar
   Sp. 2 cl.
   Prereq.: 4th yr. and major standing in textiles and clothing.
   Special reports and readings in textiles and clothing which contribute to professional effectiveness and promote integration of information among specialists in the two fields.

681 Home Economics Extension Methods
   Sp. 4 cl., 1 1/2 hr. lab.
   Prereq.: Agr. Ed. 506 or permission of instructor and admission to Home Ec. Education Curriculum.
   Home Economics extension methods, relationship of extension education to other educational movements, resources of state, county, and community. Worfield.

701 Special Problems in Home Economics
   Su. A. W., Sp. 1 cont. or more.
   Prereq.: Graduate or senior standing, 6 cr. hrs. in the area of Home Ec. in which the problem is taken, cumulative point hr. average of 2.7 or above, and permission of instructor.
   Problems in various phases of home economics chosen for individual study.

701A Food

701B Nutrition and dietetics

701C Textiles

701D Clothing

701E Home Furnishing

701F Household Equipment

701G Home Management

701H Institution Management, equipment, and food buying

701I Teaching home economics

701J Family and Child Development

702 Supervision of Home Economics
   Su. 3 cl.
   Prereq.: 741 or permission of instructor.
   For experienced teachers of home economics who are interested in supervising student teachers in working with home economics teachers in service.

705 Research Methods in Nutrition
   A. 3 cl.
   Organization, methods, analysis of data and reporting projects in nutrition research. Prudent.

715I Introductory Food Research
   Sp. 1 cl., 2 1/2 hr. lab.
   Prereq.: 615, Agr. Bio. 610 or equiv.
   Individual investigations in food preparation, processing in the home and food storage carried out in laboratory, analyzed and reported. Prudent.
<table>
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<tr>
<td>719</td>
<td>Home Management Development and Theory</td>
<td>3</td>
<td>A. 3 cl.</td>
<td>Prereq.: 560 or permission of instructor. Historical development and present trends in home management with emphasis on theory and practices. Newark, Deacon, Malloch.</td>
</tr>
<tr>
<td>720</td>
<td>Home Management: Activity Analysis</td>
<td>3</td>
<td>Sp. 2 cl.</td>
<td>Prereq.: Grad. standing in Home Ec., 10 cr. hrs. in home management or household equipment, and permission of instructor. Advanced study in application of work principles to design of appliances, work space areas, and methods of work in the home. Malloch.</td>
</tr>
<tr>
<td>721</td>
<td>Family Economic Resources and Functions</td>
<td>3</td>
<td>Su, W. 3 cl.</td>
<td>Prereq.: Econ. 655 or equivo. and permission of instructor. Principles, major problems and trends in the economics of the family. Newark, Deacon.</td>
</tr>
<tr>
<td>731</td>
<td>Food Cost Analysis for Institutions</td>
<td>3</td>
<td>A. 2 2-hr. cl.</td>
<td>Prereq.: 632, Acc. 405 or Acc. 510 or equivo. Records used in large quantity foods service and house units and their use in budgeting and food cost control. Harger.</td>
</tr>
<tr>
<td>735†</td>
<td>Recent Developments in Food and Nutrition Research</td>
<td>3</td>
<td>Su. 3 cl.</td>
<td>Prereq.: Agr. Bio. 610 or 830, or equivo, or permission of instructor. Brief survey of recent research. Prudent.</td>
</tr>
<tr>
<td>740</td>
<td>Home Economics in American Education</td>
<td>2</td>
<td>Su, A. 2 cl.</td>
<td>Prereq.: 641 or equivo, 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.</td>
</tr>
<tr>
<td>741</td>
<td>The Teaching of Home Economics</td>
<td>3</td>
<td>A. 3 cl.</td>
<td>Prereq.: 740 or equivo, and permission of instructor. Home economics in integrated, core, experimental and other special types of programs.</td>
</tr>
<tr>
<td>750</td>
<td>Research Methods in Home Economics</td>
<td>3</td>
<td>A. 3 cl.</td>
<td>Prereq.: Master's degree students 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.</td>
</tr>
<tr>
<td>761</td>
<td>The Family: The Early Years</td>
<td>3</td>
<td>Su, W. 2 1 1/4-hr. cl.</td>
<td>Prereq.: Psychol. 670, Soc. 676 or equivo., graduate standing or permission of instructor. Relationships and adjustments in family living with emphasis on the early and expanding stages of the family life cycle. Hillman.</td>
</tr>
<tr>
<td>762</td>
<td>Administration of Day Care Centers</td>
<td>3</td>
<td>A. 3 cl.</td>
<td>Prereq.: 664, 665 or equivo. Program planning to meet developmental level and needs of young children. Minimum and recommended standards. Heyes.</td>
</tr>
<tr>
<td>771†</td>
<td>Textiles: Analysis</td>
<td>5</td>
<td>W. 1 cl., 2 4-hr. lab.</td>
<td>Prereq.: 671 or equivo., and 20 cr. hrs. Chem. Application of chemical techniques to the quantitative and qualitative analysis of textile materials, including analysis of fiber content, and non-fibrous materials. Lipinskiy.</td>
</tr>
<tr>
<td>799</td>
<td>Home Economics Workshop</td>
<td>4</td>
<td>Su. Fulltime for 3 weeks.</td>
<td>Prereq.: Graduate standing in Home Ec. or a closely related field and permission of instructor. Repeatable to a maximum of 12 cr. hrs. Workshops in the following phases:</td>
</tr>
<tr>
<td>799A†</td>
<td>Foods</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>799B†</td>
<td>Nutrition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>799C†</td>
<td>Textiles</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>799D†</td>
<td>Clothing</td>
<td></td>
<td></td>
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<tr>
<td>799E†</td>
<td>Home Furnishing</td>
<td></td>
<td></td>
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<tr>
<td>799F†</td>
<td>Household Equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>799G†</td>
<td>Home Management</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>799H†</td>
<td>Institution Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>799I†</td>
<td>Home Economics Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>799J†</td>
<td>Family and Child Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>801</td>
<td>Seminar in Textiles and Clothing</td>
<td>3 or 5</td>
<td>Su, A, Sp. 2-3 cl.</td>
<td>Prereq.: Grad. standing in Home Ec. and permission of instructor. Repeatable. (Topics for 1964-65 listed in 235A Campbell Hall) Gilmore</td>
</tr>
<tr>
<td>810</td>
<td>Seminar in Foods and Nutrition</td>
<td>3 or 5</td>
<td>Su, W.</td>
<td>Prereq.: Grad. standing in Home Ec. and permission of instructor. Repeatable. (Topics for 1964-65 listed in 235B Campbell Hall) Prudent, Vitican, Wilson, Green.</td>
</tr>
<tr>
<td>821†</td>
<td>Seminar in Housing and Equipment</td>
<td>3 or 5</td>
<td>A, W, Sp. 1-3 cl.</td>
<td>Prereq.: Grad. standing in Home Ec. and permission of instructor. Repeatable. (Topics for 1964-65 listed in 168B Campbell Hall) Graduate Staff.</td>
</tr>
</tbody>
</table>
### COURSES OF INSTRUCTION
#### HOME ECONOMICS

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Credits</th>
<th>Type</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>830</td>
<td>Trends in Food Service Management</td>
<td>G 3 or 5</td>
<td>G</td>
<td>Prereq.: Permission of instructor. Interpretation of principles and current research in relation to management of food service organizations at the policy-making level. Harper, Wood.</td>
</tr>
<tr>
<td>831†</td>
<td>Seminar in Institution Management</td>
<td>G 3 or 5</td>
<td>G</td>
<td>Prereq.: Grad. standing in Home Ec. and permission of instructor. Repeatable. (Topics for 1964-65 listed in 2628 Campbell Hall) Wood.</td>
</tr>
<tr>
<td>840</td>
<td>Home Economics in Higher Education</td>
<td>G 3</td>
<td>G</td>
<td>W. 3 cl. Prereq.: 740 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.</td>
</tr>
<tr>
<td>841</td>
<td>Seminar in Home Economics Education</td>
<td>G 3 or 5</td>
<td>G</td>
<td>Prereq.: Grad. standing in Home Ec. and permission of instructor. Repeatable. (Topics for 1964-65 listed in 347B Campbell Hall).</td>
</tr>
<tr>
<td>851</td>
<td>Seminar in Family and Child Development</td>
<td>G 3 or 5</td>
<td>G</td>
<td>Prereq.: Grad. standing in Home Ec. and permission of instructor. Repeatable. (Topics for 1964-65 listed in 347B Campbell Hall), Hillman, Teys, Hendrickson.</td>
</tr>
<tr>
<td>898</td>
<td>Interdepartmental Seminar in Nutrition and Food Technology</td>
<td>G 1</td>
<td>G</td>
<td>(See under Interdepartmental Seminars.)</td>
</tr>
<tr>
<td>899</td>
<td>Interdepartmental Seminar</td>
<td>G 1-5</td>
<td>G</td>
<td>(See under Interdepartmental Seminars.)</td>
</tr>
<tr>
<td>950</td>
<td>Research in Home Economics</td>
<td>G Arr.</td>
<td>G</td>
<td>(See under Interdepartmental Seminars.) Research for thesis or dissertation purposes only.</td>
</tr>
</tbody>
</table>

#### Horticulture

**Office:** Department of Horticulture and Forestry, 118 Horticulture and Forestry Building, 1887 Nell Ave.

**PROFESSORS:** HOWLEY (Chairman), TALBAN, BEATTIE, BROWN, CHADWICK, GOULD, THARTMAN, HILL, JOHNSON, KIPLINGER, and LAURIE (Emeritus). ASSOCIATE PROFESSORS: KIBMAN, KRETZMAN, MARLOWE, MILLER, and REISCH. ASSISTANT PROFESSORS: IDONOHO and TOUSE.

**402 General Horticulture**

A, W, Sp. 5 cl.

Principles and practices underlying production and use of tree fruits, small fruits, vegetables, flowers, and ornamental plants, essential for the individual’s use in everyday life. Alban, Hartman, Geisman, Hill.

**403 Fundamentals of Horticulture**

A, Sp. 5 cl.

A study of plant materials used in the horticultural industry emphasizing the development of ornamental plants and the environment. Hartman.

**404 Home Gardening, Herbaceous Plants, Floral Design and Lawns**

U 3

Su. 2 cl., 1 2-hr. lab. Not open to students majoring in Floriculture and Ornamental Horticulture or to students with credit for 406. Lawns, house plants and floral design; selection, planting, maintenance and use of herbaceous perennials, annuals and bulbs in the home garden.

**407 Appreciation of Ornamental Plants**

U 2

A. 2 cl. Not open to students majoring in Floriculture and Ornamental Horticulture.

Value of ornamental plants to the individual and community including culture, identification, and use in planting design. Reisch.

**423 Principles of Food Preservation**

U 3


**440 Elementary Plant Propagation**

U 5

Sp. 4 cl., 1 2-hr. lab. Prereq. or concur.: 403 and Bot 402. The principles and practices involved in the commercial propagation of forest crops, garden flowers, trees, shrubs, evergreens, small and tree fruits, and vegetables. Miller.

**503 Principles and Practices of Pomology**

U 5

A. 4 cl., 2-hr. lab. Prereq.: 403.

Fundamentals of apple and pear production, including status of the industry, varieties, fruiting habits, soil management and fertilizers, pollination, fruit setting, propagation, pruning, and spraying. Hartman.

**504 Principles and Practices of Pomology**

U 5

W. 4 cl., 2-hr. lab. Prereq.: 403.

A study of the stone and small fruit industry including the accepted cultural practices and the fundamental principles upon which these practices are based. Hill.
522 Principles of Vegetable and Potato U 5
Production
W. 4 cl., 2-hr. lab.
Prereq.: 402.
Practices and principles involved in the production and utilisation of vegetables and potatoes, with emphasis on environmental and cultural factors which influence growing and handling of these crops. Alban.

524 Canning, Freezing, and Dehydration U 5
W. 3 cl., 2 2-hr. lab.
Fundamentals essential to commercial processing and utilization of fruits, vegetables, and related products. Sampling methods and physical quality evaluation techniques are studied. Gould.

526 Vegetable Forcing U 5
W. 3 cl., 4 lab. hr.
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.

542 Principles and Practices of Floriculture U 5
A. 4 cl., 1 3-hr. lab.
Prereq.: 440 and Bot. 402.
Principles and practices of greenhouse operation including construction, heating, cooling, light, photoperiodism, temperature, humidity, ventilation, moisture, soils, fertilizer deficiencies and excesses, diseases, and insects. Kiplinger.

544 Garden Management U 5
Sp. 3 cl., 2 2-hr. lab.
Prereq.: 403 or permission of instructor.
The identification, culture and landscape use of bulbs, annuals, herbaceous perennials, and garden roses. Identification of lawn grasses and turf management are also covered. Miller.

550 Ornamental Plants U 5
A. 3 cl., 2 2-hr. lab.
Prereq.: 403 and Bot. 402 or permission of instructor.
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. Chadwick, Reich.

551 Ornamental Plants U 5
W. 3 cl., 2 2-hr. lab.
Prereq.: 403 and Bot. 402 or permission of instructor.
A detailed study of narrowleaf and broadleaf evergreens; their identification, growth habits, culture, adaptation to environmental conditions, uses, combinations, and management in landscape plantings. Reich.

552 Ornamental Plants U 5
Sp. 3 cl., 2 2-hr. lab.
Prereq.: 550 and 551.
A detailed study of several outstanding genera of woody ornamental plants and the use of deciduous and evergreen plants in simple landscape designs. Reich.

570 Nursery Industry Experience U 2
Prereq.: Major standing in Ornamental Horticulture, Agr. Ind. curruc; or 1st yr. standing in Hort but without credit toward graduation.
Ten weeks of planned and supervised practical experience in an approved nursery, including completion of a special problem with a written report. Chadwick, Reich.

601 Horticultural Plant Breeding U G 3
W. 2 cl., 1 2-hr. lab.
Prereq.: 503 or 522 or 542.
Plant breeding methods and genetic principles applied to horticultural plant improvement, including fundamentals of seed production, variety evaluation, certification, and maintenance. W. N. Brown.

609 The Post-Harvest Physiology of U G 3
Horticultural Crops
A. 2 cl., 2 lab. hrs.
Prereq.: 503, 504, 522 or 542; Bot. 606, or permission of instructor.
The basic principles of post-harvest physiology, handling, and storage of fruits, vegetables, ornamentals, and flowers are stressed along with operational techniques of modern storage. Kretzchman.

610 Weed Control in Horticultural Crops U 3
Sp. 3 cl.
a study of ecological, environmental, and cultural factors which influence weed development in horticultural crops and a review of principles of chemical and mechanical weed control. Alban.

622 Commercial Vegetable Crops U 5
Sp. 4 cl., 1 2-hr. lab.
Prereq.: 522.
The culture of the principal vegetable crops, including history, plant characteristics, physiology, propagation, climatic and edaphic adaptations, and specialized production technology. W. N. Brown.

624 Specialty Products, including U 5
Picking and Fermentation
A. 3 cl., 2 2-hr. lab.
The technology and commercial manufacture of jams, jellies, preserves, syrups, pickles, sauerkraut, beverages, prepared dinners, soups, condiments, dressings and dry pack items. Gelberman.

629 Food Products Examination U 5
W. 3 cl., 2 2-hr. lab.
Prereq.: 423.
Food laws, regulations, grade standards, and the technical control of processed foods. Interpretation of laboratory analysis for control of product quality. Gould.

631 Commercial Management and U 5
Practices with Horticultural Products
Su. 1 cl., 2 4-hr. lab.
Prereq.: 534.
Technology and commercial processing of the major fruits and vegetables. Emphasis on grade relationships, yield and unit operation. Field trips to commercial processing plants. Gould.

643 Principles and Practices in U 5
Floriculture
W. 4 cl., 1 3-hr. lab.
Prereq.: 542 and Bot. 605 and/or concur. 606.
Not open to students with credit for 545.
Physiological principles and environmental factors in production of azalea, begonia, bulb, chrysanthemums, cyclamen, geraniums, hydrangeas, poinsettias, roses, saintpaulias, and other pot flowers and foliage plants. Kiplinger.

645 Principles and Practices in U 5
Floriculture
Sp. 4 cl., 1 3-hr. lab.
Prereq.: 542 and Bot. 605 and 606 or concur.
Not open to students with credit for 543.
Physiological principles and environmental factors in production of asteis, carnations, chrysanthemums, orchids, roses, snapdragons and other cut flower crops. Production costs of crops are analyzed. Kiplinger.

650 Principles and Practices of Nursery U 5
and Garden Store Management
Sp. 4 cl., 1 3-hr. lab.
Prereq.: 440, 550, 551 and Bot. 605.
Fundamental principles and practices involved in site selection, layout, soils, fertilization, transplanting, pruning, pest control, digging, storage, grading, packaging, inventory control, merchandising and garden store management. Chadwick.
651  Florist's Crops
Sp. 3 cr., 9 9-hr. lab.
F 5

Prereq.: 542 and Econ. 406 or 506.
Not open to students with credit for 546.
Fundamental of floral design; flower shop management; principles and practices in handling, packaging and selling florists' crops and supplies through wholesale and retail outlets. Reich, Kiplinger.

683  Arboriculture
A. 4 cr., 1 3-hr. lab.
Prereq.: 550 and Bot. 606.
Study of environmental factors affecting plant growth and the planting, fertilization, pruning, cabling, and pest control practices involved in commercial arboriculture, city forestry, and park maintenance. Chadwick, Reese.

701  Minor Investigations
U 2-5
Prereq.: Permission of instructor.
Special problems in the fields of pomology, vegetable gardening, horticulture and ornamental horticulture, horticultural products or forestry.

705  Seminar in the Historical Literature of Horticulure
A. 3 cr.
Prereq.: 503 or 622 or 643 or 683 or permission of instructor.
History and literature of horticulture from prehistoric times to the present. Trends and events during the 20th Century receive particular emphasis. Houleult.

710  Theories and Techniques Employed in the Horticulural Processing Industry
Repeatable by undergraduates to a maximum of 6 cr. hrs.
b. A. Processing Methodology. Gould
c. W. Packaging Materials and Methodology. Geisman

712  Experimental Horticulture
W. 2 cr., 2 2-hr. lab.
Prereq.: Grad. standing and Bot. 605 and 606 or equiv.
Effect of stresses and deficiencies of micro-nutrients upon growth and fruiting of horticultural plants, including the techniques for detecting and correcting such conditions. Hill.

713  Advanced Plant Propagation
W. 4 cr., 1 2-hr. lab.
Prereq.: 440 and 550 or equiv., and Bot. 605.
A study of the basic anatomical and physiological principles involved in the propagation of horticultural plants by cuttings, grafts, buds, and seeds. Chadwick.

804  Horticultural Seminar
G 1
A, W.

810  Advanced Studies in Horticultural Science
Prereq.: Permission of instructor.
b. W. Morphological and anatomical studies of vegetative plant parts as influenced by environment. Hartman
c. A. Post-harvest physiology of horticultural crops and plants.
d. A. Advanced vegetable physiology. Alban
e. W. Advanced horticultural crop breeding. Brown

f. A. Fruit and vegetable processing and specialty products. Gould, Geisman
g. Sp. Quality control in fruit and vegetable processing. Gould
h. A. Advanced physiological studies with horticultural crops. Kiplinger

811  Advanced Plant Nutrition
G 5
A. 3 cr., 4 lab. hrs.
Prereq.: Bot. 606 or equiv.
Not open to students with credit for 711.
Effect of major nutrient elements upon the development of horticultural plants. Physiological and biochemical changes occurring within plants and means of diagnosing deficiencies and excesses. Houleult.

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

898  Interdepartmental Seminar in Natural and Food Technology
Sp.
(See under Interdepartmental Seminars.)

950  Research in Horticulture and Forestry
C Arr.
Research for thesis or dissertation purposes only.

Industrial Engineering

Office: 125 Industrial Engineering Bldg., 190 West 19th Ave.
PROFESSORS: BAKER (Chairman), CARSON, EDMONDSON (Emeritus), HEICZK, MOORE, MORRIS, and PEPPER; ASSOCIATE PROFESSORS: BISHOP, BOWLAND, and ROCKWELL; ASSISTANT PROFESSORS: BROWN, GIFFIN, HOUER, KIBBEY, MILLER, and ROO; and INSTRUCTORS.

404  Foundry Practice
A. 3 cr., 4 lab. hrs.
Prereq.: Second yr. standing or permission of chairman.
Not open to students in the College of Engineering. Safety glasses must be worn in laboratory. Laboratory practice in bench, floor, and machine molding, casting of grey iron and non-ferrous alloys with emphasis on non-ferrous technology.

420  Machine Shop Practice
A. 2 cr., 4 lab. hrs.
Prereq.: Eng. Dr. 400 or equiv. Educ. Second yr. standing or permission of chairman.
Not open to students in the 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 teachers at the secondary level.

Courses E. 404, 420, 519, 521, and Weld E. 415 require the use of safety glasses; however, each student needs only one pair for all courses. In the event that the student must have prescription lenses, he shall obtain his safety glasses during the
INDUSTRIAL ENGINEERING

706 Industrial Quality Control
W, Sp. 3 cl.
Prereq.: 602, Math. 547.
The application of probability theory, statistics, and control theory to problems in product inspection and process control. Economic evaluation of quality control techniques. Root.

708 Design of Production Systems
A, Sp. 3 cl., 4 lab. hrs.
Prereq.: 663, 664 concur.
Integration of the methods and analytical techniques of industrial engineering into the design of a complete production system.

709 Production Engineering
W, Sp. 3 cl., 4 lab. hrs.
Prereq.: 521, 663.
Not open to graduate credit for majors.
Fundamentals of production tools and correlating with design and specifications of the product. Rikhej.

714 Time and Motion Study
Sp.
Prereq.: 3rd yr. standing.
Not open to majors in Indus. E.
Not open to students with credit for 663, 664.
Principles, aims, methods, and applications of time and motion study including job analysis, job standardization, formula construction, job evaluation and wage evaluation. Baker.

715 Principles of Industrial Engineering
A, W. 4 cl.
Prereq.: Prof. Div. 3rd yr. standing, Math. 546.
Not open to majors in Indus. E.
A survey of the industrial engineering phase of manufacturing with emphasis on principles and problem solving methods. Root.

761 Engineering Economy
W, Sp. 3 cl.
Prereq.: 602 or 502, and Math. 547.
Not open for graduate credit to majors in Indus. E.

764 Production Programming
A, Sp. 3 cl.
Prereq.: 761.
Mathematical formulation and solution of problems of scheduling, inventory control, logistics, etc. The course covers various linear models. Bishop.

771 Safety Engineering
A, W. 3 cl.
Prereq.: 619 and 6 additional cr. hrs. in other laboratory courses covering safety engineering.
The nature, causes, and costs of industrial accidents and occupational diseases. Methods of accident prevention, physical, supervisory, and educational. Ohio laws, regulations, and aids.

798 Advanced Studies in Industrial Engineering
Prereq.: 5th yr. standing and permission of instructor.
Repeatable to a maximum of 24 cr. hrs.
The student must register for specific classes in areas as indicated below, and may register for more than one at a time.

A-131
798A Job Evaluation
798B Organized Labor and Industrial Methodology
798C Industrial Applications for Statistics
798D Quality Control
798E Engineering Economy
798F Production Planning and Control
798G Contemporary Problems in Plant Layout and Design
798H Materials Handling
798I Time Standards and Estimates
798J Human Factors in System Design
798K Organization of Industrial Engineering Functions
798L Production Engineering
798M Industrial Safety Problems

799 Special Problems in Industrial Engineering U G 1-6
Prereq.: 5th yr. standing and permission of instructor.
This course is intended to give the advanced student an opportunity to pursue special studies not offered in fixed curricula.

801 Seminar in Industrial Engineering A G 2
W.
802 Seminar in Industrial Engineering G 2
W.
803 Seminar in Industrial Engineering Sp.
811 Methods Engineering G 3-12
Prereq.: 663 and 664.
Advanced work in one or more special phases of time study, motion study, job evaluation, wage analysis and payment systems, speed and effort rating. The viewpoint of union problems arising from labor-management relationships. Baker.

812 Advanced Systems Design W.
Prereq.: 798J.
Advanced work in the analysis and design of man-machine systems. Houckland.

821 Problems in Production Engineering G 3-12
Prereq.: 709.
Advanced work in one or more special phases of Production Engineering involving problems in production design, equipment planning, tool design, quality and quantity control. Kadep.

828 Advanced Studies in Plant Design and Materials Handling G 3-12
Prereq.: 708.
Advanced work in one or more special phases of plant design and materials handling. Miller.

840 Operations Research G 3
Prereq.: 706 and 701, or equiv.
Advanced work on the methodology and techniques of Operations Research.

842 Operations Research I G 3
A.
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 Operations Research II G 3
W.
Prereq.: 842.
The position of the model in Operations Research and the study of the important techniques and formal approaches to research problems.

844 Operations Research III G 3
Sp.
Prereq.: 843.
Consideration of topics in Operations Research including research methodology in the various sciences, and the conduct of actual Operations Research investigations.

851 Personnel Research in Engineering Industries G 3-12
Prereq.: 603, 664.
Advanced work in one of the several phases of personnel management in engineering industries. Baker.

861 Research in Decision Processes G 3-12
Prereq.: 761 and 764.
Advanced work in decision theory and processes including criterion research, decision making under uncertainty and in conflict situations, and gaming techniques. Morris.

862 Decision Theory G 3
A, Sp.
Prereq.: 706, 761, and permission of instructor.
Introduction to normative decision models and their applications. Morris.

863 Control Theory G 3
Prereq.: 706, 764, 798D.
Advanced work in the theory of control of industrial operations. Bishop.

866 Programming and Control Research G 3-12
Prereq.: 706, 761, 764.
Advanced work in the several phases of programming and control theory. Consists primarily of application of mathematical methods to the formulation and solution of process programming and control problems. Bishop.

871 Safety Engineering Research G 3-12
Prereq.: 771.
Advanced work in one or more phases of safety engineering: plant design, equipment design, and other accident prevention programs. Rockwell.
International Studies

Office: 100 University Hall, 216 N. Oval Dr.
ASSOCIATE PROFESSOR 1NEMZER (Chairman); PROFESSORS 1JOWETT, 1LOVENSTEIN, 1RANDELL, and 1SMITH; ASSOCIATE PROFESSORS 1BOURGUIGNON and 1MEIDEN; ASSISTANT PROFESSORS 1GRIEDER and 1LOTT.

410 Basic Issues in World Affairs U 5
W. 3 cr.
General introduction to contemporary international problems, conducted cooperatively by members of several departments.

520 The Oriental World U 5
Sp. 5 cr.
Interdepartmental survey of contemporary Asian civilization; geographic and racial background, historical and cultural heritage, social organizations, economic and political problems, and international relations.

540 Introduction to the Soviet Union U 5
A, Sp. 5 cr.
A survey of the land, people, history, politics, social institutions, literature and arts of the Soviet Union, conducted by members of several departments. Nemzer and staff.

601 Selected Problems in International Studies W. 2 cr.
Prereq.: Pol. Sci. 615 or equ. 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. Nemzer and staff.

705 Honors Course U 3-5
A.
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.
Informal conferences to allow full scope to 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.

706 Honors Course U 3-5
W.
See prereq. for 705.

707 Honors Course Sp.
See prereq.: for 705.

721 Area Study Pro-Seminar U G 2
Su. 5 cr.
Repeatable to a maximum of 12 cr. hrs.
721A Europe
721B Latin America
721C The Far East
721D The Middle East
721E Africa
721F The Soviet Union
Italian

Office: 116 Derby Hall, 154 N. Oval Dr.
PROFESSORS BABCOCK (Chairman), and GRIFFIN; ASSISTANT PROFESSORS ANGELO and MANCINI.

401 Elementary Italian
A, W. 5 cl.
Elementary reading based on Italian geography, history and customs.

402 Elementary Italian
W, Sp. 5 cl.
Prereq.: 401.
May not be taken concurrens with French 401-402, Span. 401-402.

403 Modern Italian Drama
Sp. 5 cl.
Prereq.: 401.

503 Modern Italian Poetry
Sp. 5 cl.
Prereq.: 402.

504 Italian Neo-Realism
A. 5 cl.
Prereq.: 402.

505 Italian Literature since the end of the second World War.
Mancini.

510 Italian Conversation and Composition
U 5 cl.
Prereq.: 402 or equiv. Mancini.

611 Dante
U G 3 or 5
W. 3 cl. in Engl.; 2 additional cl. in Ital. for 5 cr. hrs.
Prereq.: Permission of instructor.

612 Petrarch and Boccaccio
U G 3 or 5
W. 3 cl. in Engl.; 2 additional cl. in Ital. for 5 cr. hrs.
Prereq.: Permission of instructor.

613 Modern Italian Fiction
U G 3 or 5
Sp. 3 cl. in Engl. 3 additional cl. in Ital. for 5 cr. hrs.
Prereq.: Permission of instructor.

701 Minor Problems in Italian
Prereq.: Permission of instructor. Mancini.

950 Research in Italian Language or Literature
Research for thesis or dissertation purposes only. Mancini.

Japanese

Office: 415 University Hall, 216 N. Oval Dr.
ASSOCIATE PROFESSOR CHING.

401 Elementary Japanese
A. 5 cl.

402 Elementary Japanese
W. 5 cl.
Prereq.: 401.

403 Intermediate Japanese
Sp. 5 cl.
Prereq.: 401.

404 Intermediate Japanese
A. 5 cl.
Prereq.: 403.

505 Japanese Conversation
W. 3 cl.
Prereq.: 404 or permission of instructor.

506 Japanese Composition
Sp. 3 cl.
Prereq.: 404 or permission of instructor.

517 Study Tour of Japan
U 15
Su. 15 cl., two weeks at OSU; 8 weeks in Japan.
Prereq.: 25 cr. hrs. of Japanese or permission of instructor.

609 Advanced Reading, Conversation, and Composition I
Su. 3 cl.
Prereq.: 555 and 506 or permission of instructor.

610 Advanced Reading, Conversation, and Composition II
Su. 3 cl.
Prereq.: 609 or permission of instructor.

A-134
611 Advanced Reading, Conversation, and Composition II  U G 3
   Su.  3 cr.
   Prereq.: 610 or permission of instructor.
   Continuation of 610.

695 Private Reading  U 2-5
   Prereq.: Permission of instructor.
   Repeatable to a maximum of 10 cr. hrs.

Journalism

Office: 204 Journalism Bldg., 242 West 18th Avenue.

PROFESSORS: BARTON (Acting Director), CULLMAN, and POLLARD; ASSOCIATE PROFESSORS IMAGUIRE, NORTON, and SEIFFERT; ASSISTANT PROFESSORS DRENTON, FIRST, HOLZINGER, and Lauer; LECTURERS BOSTWICK, GAUMER, MCGIFFERT, and PULLMAN; INSTRUCTORS HUDDSON and MULLINS.

401 Introduction to Journalism  U 3
   Su, A, W, Sp.  3 cl.
   Prereq.: Eng. 416.
   An introduction to newspapers, magazines, radio-television, and public relations. Lauer, Lemmon, McGiffert.

402 News Writing  U 3
   A, W, Sp.  2 cl., 1 lab. hr.
   Prereq.: 401.
   Writing news and feature articles. Hudson, Lauer, Lemmon.

501 Editing  U 3
   Su, A, W, Sp.  2 cl., 2 lab. hr.
   Prereq.: 402.
   Editing of copy, headline writing, re-writing, and general copy desk work; introduction to photo editing and make-up. Lemmon, McGiffert.

505 Reporting Public Affairs  U 3
   A, Sp.  3 cl.
   Prereq.: 501, Pol. Sci. 401, 410, or 507.
   Reporting of court and governmental news. Students attend court trials, legislative and council sessions, visit governmental agencies as reporters and write news stories. Gaumer, Bostwick.

508 Technical Writing  U 3
   Su, A, W, Sp.  3 cl.
   Prereq.: 3rd or 4th yr. standing.
   Not open to students majoring in Jour.
   Writing for special, trade and professional publications. Designed for non-journalism students in Agriculture, Engineering, Business, Education, Dentistry, Law, Medicine, Home Economics, Maguire, Seiffert.

509 Journalism Laboratory  U 1
   Su, A, W, Sp.  1 3-cr. lab.
   Prereq.: 502 or permission of instructor.
   Repeatable to a maximum of 5 cr. hrs.
   Laboratory in one or more of the following: reporting, news writing, feature writing, broadcast news, editing, makeup, critical writing, photojournalism, cartooning. Bostonch, Drenthen, Mulfus.

510 Photojournalism  U 3
   Su, A, W.  2 cl., 1 2-hr. lab.
   Prereq.: 501.
   Reporting the news with a camera. How to recognize, develop, and create picture stories. Experience in coordinating words and news pictures. Picture editing. Layout. Drenthen.

517 History of U.S. Journalism  U 3
   Sp.  3 cl.

519 Typography and Printing  U 3
   Su, A, W, Sp.  2 cl., 2-hr. lab.
   Typographic and printing processes and their relation to graphic arts in the mass media. Guesmer.

555 Factual Writing  U 5
   Su, A, W, Sp.  5 d.
   Prereq.: Eng. 416 or equiv.
   Not open to students with credit for 401.
   Instruction and practice is gathering and presenting factual material. Observation, research, interviewing, critical analysis, and rewriting are stressed. Barton, Hudson, McGiffert.

602 Magazine Writing I  U G 3
   Su, A, W, Sp.  3 cl.
   Prereq.: Major standing in Journ. or permission of instructor.
   Non-fiction writing for publication in general, professional, trade or Sunday magazines. Norton.

603 The Writing of Reviews and Criticisms  U G 3
   Su, A, Sp.
   Prereq.: Major standing in Journ. 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. Barton, O'Tool.

605 News in Broadcasting I  U G 3
   Su, A, Sp.  2 cl., 2-hr. lab.
   Prereq.: Major standing in Journ.; others by permission of instructor.
   Preparation and broadcasting of news. Study of the development of news-type programs in the broadcasting industry, both radio and television. Drenthen.

606 News in Broadcasting II  U G 2
   A, W, Sp.  1 cl., lab. arr.
   Prereq.: 605 or equiv.
   Practice in writing and editing news for broadcasting at various broadcasting stations, and output of newscasts at WOSU and WOSU-TV. Drenthen.

607 Special Radio and Television News Programs  U G 3
   W, Th, 2 3-hr. lab-s.
   Prereq.: 605 or permission of instructor.
   Planning and production of special news programs; such as the sportscast, the interview, special events, and documentaries. Drenthen.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>608</td>
<td>The Press and Basic Issues of Our Times</td>
<td>UG 3</td>
<td>Senior or graduate standing, or permission of instructor</td>
<td>Distinguished faculty members and nationally known off-campus specialists in economics, history, journalism, law, political science, sociology, the sciences, will analyze issues in the news. Boston U.</td>
</tr>
<tr>
<td>612</td>
<td>Magazine Writing II</td>
<td>UG 3</td>
<td></td>
<td>Continuation of 602 with emphasis on the full-length magazine article. Norton.</td>
</tr>
<tr>
<td>613</td>
<td>Journalism Laboratory</td>
<td>UG 1</td>
<td>Senior or graduate standing</td>
<td>Laboratory work in one of the following: reporting, news writing, feature writing, editing, makeup, reviews, photojournalism, or news broadcasting. Boston U. Drexel, Miami U.</td>
</tr>
<tr>
<td>615</td>
<td>Journalism Laboratory</td>
<td>UG 2-5</td>
<td></td>
<td>Provides credit for those holding responsible positions on the Ohio State Lantern or in approved broadcasting stations. Boston U. Drexel, Miami U.</td>
</tr>
<tr>
<td>617</td>
<td>Public Relations I</td>
<td>UG 3</td>
<td>3rd yr. standing</td>
<td>Survey of public relations—history, social, economic, and political implications; applications in business, industry, government, trade and professional associations and education, labor, social agencies and politics. Seifert.</td>
</tr>
<tr>
<td>618</td>
<td>Public Relations II</td>
<td>UG 3</td>
<td></td>
<td>Study of research methods in public relations and mass media. Review of contemporary research in public opinion and attitude measurement. Seifert.</td>
</tr>
<tr>
<td>619</td>
<td>Public Relations III</td>
<td>UG 3</td>
<td>617 or permission of instructor</td>
<td>Industrial editing. The theory, development, and scope of institutional publications; practice in the planning and preparation of these publications. Seifert.</td>
</tr>
<tr>
<td>621</td>
<td>The Editorial Page</td>
<td>UG 3</td>
<td>4th yr. standing</td>
<td>Study of the purpose, form, style, and spirit of the editorial. Consideration of current events, practice in news interpretation, and other editorial writing. First.</td>
</tr>
<tr>
<td>624</td>
<td>Mass Media Research</td>
<td>UG 3</td>
<td>4th yr. or graduate standing</td>
<td>Types and methods of qualitative and quantitative research in the news media. Analysis of methods and findings of typical studies.</td>
</tr>
<tr>
<td>625</td>
<td>Journalism Internship</td>
<td>UG 2-5</td>
<td>501 or permission of Director of the School of Journalism</td>
<td>Employment in newspaper, magazine, broadcasting, or public relations work off-campus. Kiemle, Barton, Drexel.</td>
</tr>
<tr>
<td>626</td>
<td>Newspaper Management, Circulation, and Advertising</td>
<td>UG 3</td>
<td>4th yr. standing</td>
<td>Consideration of the tasks and problems of newspaper management with emphasis on circulation policies and methods and those affecting advertising.</td>
</tr>
<tr>
<td>627</td>
<td>Public Relations IV</td>
<td>UG 3</td>
<td></td>
<td>Public relations methods and techniques; publicity and the mass media; preparation and production of special media. Arter.</td>
</tr>
<tr>
<td>700</td>
<td>Honors Course</td>
<td>UG 3</td>
<td></td>
<td>A reading program for students who are candidates for a degree with distinction in Journalism. Barton, First.</td>
</tr>
<tr>
<td>701</td>
<td>Honors Course</td>
<td>UG 3</td>
<td></td>
<td>A continuation of 700. Barton, First.</td>
</tr>
<tr>
<td>702</td>
<td>Honors Course</td>
<td>UG 3</td>
<td></td>
<td>A continuation of 700. Drexel.</td>
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<tr>
<td>711</td>
<td>Special Problems in Journalism</td>
<td>UG 2-10</td>
<td></td>
<td>This course is designed to permit students to make extensive and significant studies in the field of Journalism. Barton, Drexel, Norton, Seifert.</td>
</tr>
<tr>
<td>714</td>
<td>Law of the Press, Radio, and Television</td>
<td>UG 3</td>
<td></td>
<td>History, principles, and provisions of the law of libel, slander, copyright and other statutes affecting newspapers, other publications and broadcasting.</td>
</tr>
<tr>
<td>802</td>
<td>Seminar in Journalism</td>
<td>UG 3</td>
<td></td>
<td>Integrated reading and research in the fields of Journalism.</td>
</tr>
<tr>
<td>803</td>
<td>Seminar in Journalism</td>
<td>UG 3</td>
<td></td>
<td>Integrated reading and research in the fields of Journalism.</td>
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</tbody>
</table>
LANDSCAPE ARCHITECTURE

507 * History of Landscape Architecture U 3
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.

508 * History of Language Architecture U 3
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.

509 * History of Landscape Architecture U 3
Sp. 3 cl.
The role of the landscape architect in developing the contemporary urban and natural environment. Tobey.

550 Design of Gardens and Small Properties U 5
Sp. 2 cl., 9 lab. hrs.
Landscape design for non-professional student emphasizing the design, construction, and planting of residential properties. Tobey.

587* Landscape Construction U 3
A. 1 cl., 6 lab. hrs.
Prereq.: Land. Arch. 3rd yr. standing.
Interpretation of topography. Problems in the development of ground forms, in road alignment, and construction. Tobey.

588* Landscape Construction U 3
W. 1 cl., 6 lab. hrs.
Prereq.: 587.
Continuation of 587. Tobey.

589* Landscape Construction U 3
Sp. 1 cl., 6 lab. hrs.
Prereq.: 588.
Continuation of 588. Tobey.

617 Intermediate Landscape Design U 6
A. 1 cl., 15 lab. hrs.
Prereq.: Land. Arch. 4th yr. standing. Arch. 512.
An intermediate course in design with original problems involving outdoor space such as residential properties, land subdivisions, parks and other public areas. Thornberry.

618 Intermediate Landscape Design U 6
W. 1 cl., 15 lab. hrs.
Prereq.: 617.
Continuation of 617. Thornberry.

619 Intermediate Landscape Design U 6
Sp. 1 cl., 15 lab. hrs.
Prereq.: 618.
Continuation of 618. Thornberry.

627 Planting Design U 3
A. 1 cl., 6 lab. hrs.
Not open to students with credit for 727.
A study of the use of plant material in landscape design with particular emphasis on composition and ecology. Thornberry.

628 Planting Design U 3
W. 1 cl., 6 lab. hrs.
Prereq.: 627.
Not open to students with credit for 728.
Continuation of 627. Thornberry.

629 Planting Design U 3
Sp. 1 cl., 6 lab. hrs.
Prereq.: 628.
Not open to students with credit for 729.
Continuation of 628. Thornberry.

657 Landscape Construction U 4
A. 1 cl., 9 lab. hrs.
Prereq.: 589.

688 Landscape Construction U 4
W. 1 cl., 9 lab. hrs.
Prereq.: 657.
Continuation of 687. Thornberry.

689 Landscape Construction U 4
Sp. 1 cl., 9 lab. hrs.
Prereq.: 688.
Continuation of 688. Thornberry.

701 Special Studies in Landscape Architecture U G 2-10
A.
Prereq.: Land. Arch. 4th or 5th yr. standing and permission of the department.
For students in the Graduate School and those who wish to pursue special studies in landscape architecture. Staff.

702 Special Studies in Landscape Architecture U G 2-10
W.
Continuation of 701. Staff.

703 Special Studies in Landscape Architecture U G 2-10
Sp.
Continuation of 702. Staff.
717 Advanced Landscape Design
A. 1 cl., 15 lab. hrs.
The integration of landscape construction and planting design
in the development of problems in advanced landscape design.
Individual research and criticism. Packard.

718 Advanced Landscape Design
W. 1 cl., 15 lab. hrs.
Prereq.: 717.
Continuation of 717. Packard.

719 Advanced Landscape Design
Sp. 1 cl., 15 lab. hrs.
Prereq.: 718.
Continuation of 718. Packard.

759 Professional Practice
A. 3 cl.
A study of professional practice including ethics, office organiza-
tion and the preparation of contracts and specifications. Today.

787 Advanced Landscape Construction
A. 1 cl., 9 lab. hrs.
Prereq.: 659.
Theory and methods, codes and specifications pertaining to
advanced landscape construction, and preparation of working
drawings. Packard.

788 Advanced Landscape Construction
W. 1 cl., 9 lab. hrs.
Prereq.: 787.
Continuation of 787. Packard.

789 Advanced Landscape Construction
S. 1 cl., 9 lab. hrs.
Prereq.: 788.
Continuation of 788. Packard.

Latin

Office: 217 Derby Hall, 154 North Oval Drive.
PROFESSORS:
STITCHNER (Chairman), IABBOTT, and
IFORMANCE; ASSOCIATE PROFESSORS:
R. JONES,
ILENIEK, and ILENARDON; ASSISTANT PROFESSORS:
BRUNNER, HOLSINGER, LAZZATI, and MORFORD.

See also Classical Languages and Literatures.

Students with two years of high school Latin should enroll in
Latin 404; with three years of high school Latin, including Cicero,
in Latin 406; with four years of high school Latin, including
Vergil, in 404 or 406. 406 is advised for Latin majors. All students
except those taking Latin 401 are required to take a Placement
Test, which will indicate the University Course for which each is

best prepared. A Placement Test will be given at the beginning
of each quarter.

401 Elementary Latin
A. 5 cl.
Not for students who have studied Latin. Credit in 401
will be counted toward graduation only if followed by
successful completion of 402, or if taken after successful
completion of the fourth regular University course in
another foreign language.

Grammar and practice in translation of the Latin idiom.

402 Elementary Latin and Caesar
W. 5 cl.
Prereq.: 401.
Continuation of grammar and selected readings.

404 Cicero
A, W, Sp. 5 cl.
Prereq.: 402, 412, or 2 yrs. of high school Latin.
Readings from Cicero with review of syntax.

405 Vergil
W, Sp. 5 cl.
Prereq.: 404 or eqv. in high school Latin.
Readings from the Aeneid.

406 Horace
A. 5 cl.
Prereq.: 405 or 4 yrs. of high school Latin.
The ode of Horace through the first book with selected poems
from the later books. Brunner.

407 Livy
W. 5 cl.
Prereq.: 405 or 4 yrs. of high school Latin.
The first book of Livy describing the founding of the Roman
state. Brunner.

408 Latin Comedy
Sp. 5 cl.
Prereq.: 405 or 4 yrs. of high school Latin.
Selected plays of Plautus and Terence. Brunner.

412 Latin Review
A. 5 cl.
Prereq.: Placement test.
This course is intended for those students whose elementary Latin
will begin with a review and continue as a preparation for
Latin 404.

501 Tacitus, Martial
W. 3 cl.
Prereq.: 407 or 408.
Brunner.

502 Letters of Pliny and Cicero, Catullus
A. 3 cl.
Prereq.: 407 or 408.

503 Ovid, Sullust on Jurgurtha, or Petronius
Sp. 3 cl.
Prereq.: 407 or 408.
Brunner.

505 Grammatical Review
A. 3 cl.
Prereq.: 407 or 408.
Brunner.
541* Essays of Cicero U 5
Su. 5 cl.
Prereq.: 406, 407, 408 or equiv.
Not open to students with credit for 530.

541† Vergil: Elogues, Georgics and Epic U 5
Su. 5 cl.
Prereq.: 406, 407, 408 or equiv.
Not open to students with credit for 521.

542† Summer Lecture Series U 2
Su. 2 cl.
Prereq.: 406, 407, 408 or equiv.
Not open to students with credit for 522.
a. The archaeology of Rome.
b. Roman private life.
c. Literary forms, writing, materials, books and libraries.
d. History of Medieval Literature.
e. Roman Stoicism.

543† Sallust on Catiline; Livy on Hannibal U 5
Su. 5 cl.
Prereq.: 406, 407, 408 or equiv.

544† Ovid, Metamorphoses U 5
Su. 5 cl.
Prereq.: 406, 407, 408 or equiv.

603 Advanced Reading U G 3
Su. 3 cl.
Prereq.: 16 cr. hrs. of Latin more advanced than 405.

612 Latin Prose Composition U G 3
W. 3 cl.
Prereq.: 16 cr. hrs. of Latin more advanced than 405.
Exercises and lectures on Latin idiom and style. Brunner.

615 Proseminar I U G 3
Su. W. 3 cl.
Prereq.: 16 cr. hrs. of Latin more advanced than 405.
Lectures on the life and period of Cicero. Readings from the letters and essays. Latin 615 is designed especially for students preparing to teach Latin. Morford.

616 Proseminar II U G 3
Sp. 3 cl.
Prereq.: 16 cr. hrs. of Latin more advanced than 405.
Lectures on the life and works of Vergil, and his influence on modern literature; readings from the Elogues and Georgics. Lassetti.

617 Proseminar III U G 3
A. 3 cl.
Prereq.: 16 cr. hrs. of Latin more advanced than 405.
Lectures on topics suggested by the study of Caesar's Gallic and Civil Wars, special consideration of literary style, political and military campaigns. Lassetti.

625 Introduction to Medieval Latin U G 3
Su. 3 cl.
Prereq.: For majors in Class. Lang., 16 hrs. of Latin more advanced than 405; for others, two yrs. of high school Latin and a reading knowledge of a modern Romance language or German.
Extensive reading in texts illustrating the history of Latin language and literature from the fourth through the thirteenth century. Forbes.

627 Vulgar Latin U G 3
W. 3 cl.
Prereq.: 16 hrs. of Latin more advanced than 405, or French 801 or equiv., linguistic basis.
Lectures and the study of texts and inscriptions illustrating the development of the popular speech. Abbott.

631 Private Reading and Minor U G 1-6
Problems
Prereq.: One reading course more advanced than 408.
Passages for private reading and topics for investigation will be suggested to meet the needs of individual students. Abbott, Morford, Lassetti.

650 History of Roman Literature U G 3
A. 3 cl.
Prereq.: Three reading courses more advanced than 408.
Repeatable for graduate credit.
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. Titchener.

651 History of Roman Literature U G 3
Su., W. 3 cl.
Prereq.: Three reading courses more advanced than 408.
Continuation of 650. Abbott.

652 History of Roman Literature U G 3
Sp. 3 cl.
Prereq.: Three reading courses more advanced than 408.
Continuation of 651. Titchener.

701 Special Problems U G 1-4
Prereq.: 10 cr. hrs. of 600 level work in Class. Lang. for class. lang. majors; or permission of instructor.
Assigned reading and individual research. Registration for this course should be followed by a letter designating the field of study.

702* Plautus and Terence U G 3
A. 3 cl.
Prereq.: 20 cr. hrs. of Latin more advanced than 405.
Aim and accomplishment in Rome's earliest successful literary effort. Abbott.

703* Horace U G 3
W. 3 cl.
Prereq.: 20 cr. hrs. of Latin more advanced than 405.
The practice of literary theory in the poetic essay and the lyric of human philosophy. Titchener.

704* Tacitus U G 3
Sp. 3 cl.
Prereq.: 20 cr. hrs. of Latin more advanced than 405.
The last great literary exponent of the Greco-Roman theory of the method and value of historical writing. Forbes.
COURSES OF INSTRUCTION

LATIN

705 * Seneca U G 3
A. 3 cr.
Prereq.: 20 cr. hrs. of Latin more advanced than 405.
The moral essay and philosophic drama of the Silver Latin period. Abbott.

706 * Livy and Republican History U G 3
W. 3 cr.
Prereq.: 20 cr. hrs. of Latin more advanced than 405.
Early attempts at historical writing down to the culmination in the Augustan Period. Titchener.

707 * Prose Fiction: Petronius and Apuleius U G 3
Sp. 3 cr.
Prereq.: 20 cr. hrs. of Latin more advanced than 405.

720 Introduction to Historical Greek and Latin Grammar A. 3 cr.
Prereq.: 10 cr. hrs. of 600 level work in the Classics.

800 Seminar G 3
W, Sp.
Textual criticism and research problems. The author to be studied will be assigned by the instructor. Titchener.

950 Research in Classical Languages C Arr.
Research for thesis or dissertation purposes only.

Law

Office: 112 Law Building, 1659 North High Street.
PROFESSORS: RUTLIDGE, (Dean), BALL, BURKE, CALLAHAN, CARRINGTON, HERMAN, KARTS, LYNN, NORDSTROM, POLLACK, RASKIND, STANGER, and WILLS; ASSOCIATE PROFESSORS WAXMAN AND SLAGLE; ASSISTANT PROFESSORS CHRISTENSEN, GLANDER, MAYER, and PLATT; INSTRUCTOR, MRS. VELMAN.

090 Introduction to the Study of Law P 0
A.
First-year students in the College of Law meet for the discussion of matters introductory to the study of law. Nordstrom.

091 Freshman Jury Service P 0
W.
First-year law students are required to serve as jurors in the cases tried by seniors in the course in Trial Practice.

092 Appellate Practice I P 0
W, Sp.
Procedural and substantive aspects of appellate practice. The student prepares a brief and presents an oral argument on the basis of assigned research materials. See Appellate Practice II and III. Herman and Most Court Governing Board.

093 Appellate Practice II P 0
W, Sp.
Preparation of a brief and presenting an oral argument to a panel comprised of law faculty, bench, and bar. (Appellate Practice II is required of all students not participating on the Law Journal. See Appellate Practice I and III). Herman and Most Governing Board.

094 Appellate Practice III P 0
A, Sp.
Evaluation of briefs and oral arguments presented in Appellate Practice I. (Appellate Practice III is required of all third-year students not participating on the Law Journal. See Appellate Practice I and II.) Herman and Most Court Governing Board.

500 Contracts P 9
A. 3 cr., W. 3 cr., Sp. 3 cr. Credit given only on completion of all 9 cr. hrs.
Breach of breach; offer and acceptance; consideration; third party beneficiaries; assignment of rights and delegation of duties; conditions; impossibility and frustration; statute of frauds. Stenger, Nordstrom.

505 Torts P 8
A. 2 cr., W. 3 cr., Sp. 3 cr. Credit given only on completion of all 8 cr. hrs.
Trespass to person and property; conversion; privileges; negligence; strict liability; nuisance; owners and occupiers of land; tort and contract; misrepresentation; defamation; right of privacy. Karel, Rutledge.

510 Property I P 6
A. 3 cr., W. 3 cr. Credit given only on completion of all 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, Lynn.

511 Property II P 3
Sp. 3 cr.
Acquisition and transfer of ownership; adverse possession; conveyances (deeds, mortgages, and leases); intestacy, wills, the recording systems; title registration. Callahan.

515 Civil Procedure I P 6
A. 3 cr., W. 3 cr. Credit given only on completion of all 6 cr. hrs.
Civil procedure in state and federal courts; abolition of common law forms of action; res judicata; jurisdiction of subject matter, person, res, and personal status; venue. Wills, Carrington, Herman.

516 Civil Procedure II P 3
Sp. 3 cr.

520 Criminal Law P 4
Sp. 4 cr.
Criminal laws as means of attaining socially desirable ends, stressing criminal behavior and handling of those who engage in that behavior. Herman, Burke.
525 Agency-Partnership  P 3
Establishment of agency and partnership, relationships, tort and contract liability; estoppel, ratification; devices to mitigate risks through special powers; insurance; variations in form of employment.

530 Administrative Practice  P 4
Introduction to administrative process; reconciliations of the primary features of this process, with traditional political-legal theories of separation of governmental powers. Boll.

545 Legal Process  P 4
Comparative evaluation of law-making by private parties, courts, legislatures, and administrative agencies; retroactivity; adherence to precedent; purposes of legislation; statutory interpretation. Burke, Pollock.

550 Constitutional Law  P 6
A. 3 cr., W. 3 cr. Two qtr. sequence; credit given only on completion of all 6 cr. hrs.
Functional study of the major substantive, methodological, and federalistic limitations upon governmental power obtaining under practice of judicial review. Karst, Rutledge.

555 Evidence  P 6
A. 3 cr., W. 3 cr. Two qtr. sequence; credit given only on completion of all 6 cr. hrs.
Survey of rules of evidence: particularly demonstrative, testimonial, and circumstantial proof; qualifications and examination of witnesses; privilege; relevancy; documents; hearsay rule and its exceptions. Boll.

560 Restitution  P 4
Restitutionary remedies available for tort, misrepresentation, breach of contract, and for benefits conferred voluntarily, under duress or mistake, or in partial performance of contract. Nordstrom, Standig.

565 Pleading  P 3
Pleading under code and Federal Rules of Civil Procedure. Requirements of pleadings; variance and amendments; defenses; denial and new matter; counterclaims; reply; demurrers; motions; interrogatories; joinder. Wills.

570 Legal Research  P 2
A. 2 cr.
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. Pollock.

575 Negotiable Instruments Law  P 3
Types of commercial or negotiable paper; transfer; purchase and payment in due course, discount and security. Lynne.

580 Income Taxation  P 4
Study of the federal income tax; the concept of taxable gross income; deductions; methods for reporting income; capital gains and losses; treatment of corporations and shareholders, partnerships and trusts. Raskind.

585 Private Corporations  P 6
A. 3 cr., W. 3 cr. Two qtr. sequence; credit given only on completion of all 6 cr. hrs.
Business corporation as a device for the furtherance of trade and manufacturing.

600 Legal Clinic  P 3
Su. A. W., Sp.
Three consecutive quarters for regular students Sn, A. W.; for students accelerating and graduating in December, Sp. Su. A.
Practical experience in handling actual cases for legal aid clients in conjunction with Legal Aid Society and under supervision of Director of Legal Clinic, Daehler, Messerman.

605 Trial Practice  P 4
A. 3 cr., W. 3 cr. Two qtr. sequence; credit given only on completion of all 6 cr. hrs.
Prereq.: 555, 556.
State and federal procedure in a civil cause. Individual practice in the jury trial of a civil cause. Herman, Standig.

610 Labor Law  P 4
Collective bargaining processes and duty to bargain; grievance arbitration; legal limitation on economic pressures, including interference with bargaining, strikes, picketing, and boycotts. Rutledge.

615 Trusts  P 4
The nature, creation, and elements of trusts; charitable, resulting, and constructive trusts, rights and liabilities of parties. Lynn.

625 Conflict of Laws  P 4
Privy law pertaining to juridical relations containing one or more foreign elements: jurisdiction; foreign judgments; domicil; choice of law; torts; workmen’s compensation acts; contracts; property; family law; decedents’ estates. Nordstrom, Burke.

630 Sales and Secured Transactions  P 3

650 Administration of Criminal Justice  P 2
Processes of criminal justice from arrest to parole and probation. Herman.

651 Administration of Decedents’ Estates  P 3
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.

652 Admiralty Law  P 3
Admiralty jurisdiction; injuries to seamen and maritime workers; bills of lading; charter parties; salvage; general average; limitation of liability. Stenger.

653 Advanced Legal Research  P 3
Research techniques providing basic experience in analyzing legal questions, using appropriate publications, and reaching competent solutions to legal problems. Pollock.

654 Arbitration Law and Practice  P 3
Commercial and labor arbitration under Ohio and federal arbitration statutes; drafting arbitration clauses; conduct of proceedings; arbitrable issues; court enforcement or impeachment of awards. Rutledge.

655 Bankruptcy  P 3
Prereq.: 585.
Methods used for the liquidation of debtors’ estates, emphasizing first seven chapters of the Bankruptcy Act.

658A Comparative Law—Western Europe  P 3
Substantive and procedural aspects of foreign legal systems in comparison with American law.

658B Comparative Law—Latin America  P 3

659 Corporate Organization and Finance  P 3
Prereq.: 585.
Practices used to finance corporations in the process of formation and those used, under varying conditions, after the corporation has had a business experience.

A-141
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>660</td>
<td>Domestic Relations</td>
<td>3</td>
<td>Marriage, dissolution, divorce, alimony, custody, inter-family relationships and relations of family members with others; integration data from other disciplines dealing with problems of family. Messeret.</td>
</tr>
<tr>
<td>661</td>
<td>Estate-Gift Taxation</td>
<td>3</td>
<td>Federal gift and estate tax; federal tax practice. Interrelationships of death and gift taxes with federal income taxes. Glander, Raskind.</td>
</tr>
<tr>
<td>662</td>
<td>Federal Courts</td>
<td>3</td>
<td>The Federal judicial system; original jurisdiction; removal jurisdiction; venue; substantive law in federal courts; Federal Rules of Civil Procedure. Willa.</td>
</tr>
<tr>
<td>663</td>
<td>Future Interests</td>
<td>3</td>
<td>Future interests in real and personal property; their classification, creation, and characteristics; class gifts; powers; rules against perpetuities. Lynn, Callahan.</td>
</tr>
<tr>
<td>664</td>
<td>Insurance</td>
<td>3</td>
<td>Insurance law and practice with particular reference to fire, life, and automobile insurance; insurable interest; warranties and representations; waiver and estoppel; construction standard policies. Lynn, Mager, Callahan.</td>
</tr>
<tr>
<td>665</td>
<td>International Law</td>
<td>3</td>
<td>Current problems in international law; international agreements; status of states and individuals; recognition; jurisdiction and procedural prerequisites to assertion of international claims. Stanger, Burke.</td>
</tr>
<tr>
<td>666</td>
<td>Jurisprudence</td>
<td>3</td>
<td>Jurisprudential thought as represented by general theories of or about law; assessment of leading juridical doctrines; relationship to social control policy and to legal precepts. Pollock.</td>
</tr>
<tr>
<td>667</td>
<td>Local Government Law</td>
<td>3</td>
<td>Types and organizations of local government units; intergovernmental relations; &quot;home rule&quot; power of Ohio municipalities; personnel; lawmaking; community planning; taxing and finance; contracts; legal liability. Kast.</td>
</tr>
<tr>
<td>668</td>
<td>Appellate Practice IV</td>
<td>2</td>
<td>Procedural and substantive aspects of appellate practice; perfection of appeals, preparation of briefs, and oral argument. Herman.</td>
</tr>
<tr>
<td>669</td>
<td>Public Utilities</td>
<td>3</td>
<td>Public utility concept as developed at common law and by statute; obligations of the public utility status and their enforcement.</td>
</tr>
<tr>
<td>670</td>
<td>Real Property Mortgages</td>
<td>3</td>
<td>Mortgages and their use as a security device in real property transactions; common mortgage provisions; methods of enforcement of rights; &quot;equitable&quot; mortgages. Callahan, Bell.</td>
</tr>
<tr>
<td>671</td>
<td>Receivership and Reorganization</td>
<td>2</td>
<td>&quot;Prep.: 585.&quot; Equity receivership and corporate reorganization under Chapter X of the Bankruptcy Act; arrangements under Chapter XI of the Act.</td>
</tr>
<tr>
<td>673</td>
<td>State and Local Taxation</td>
<td>3</td>
<td>Legal problems arising in property, excise, income, and estate-inheritance taxation; tax administration and procedure. Glander.</td>
</tr>
<tr>
<td>677</td>
<td>Legal Problems of Foreign Trade and Investment</td>
<td>3</td>
<td>Principal problems confronting Americans engaged in export and import trade and in doing business in Western Europe. Day.</td>
</tr>
<tr>
<td>679</td>
<td>Business Regulation</td>
<td>2</td>
<td>&quot;Prep.: 675.&quot; Exclusion from trade by patent monopoly; interrelationship of antitrust and patent law; limitation of business entry by certification; business regulation through price and other controls. Day.</td>
</tr>
<tr>
<td>680</td>
<td>Unfair Trade Practice</td>
<td>3</td>
<td>Unfair trade practices at common law and statutes, trademarks, trade names, misappropriation of ideas, false advertising, disparagement, resale price maintenance, and price discrimination. Day.</td>
</tr>
<tr>
<td>681</td>
<td>Taxation of Foreign Income</td>
<td>3</td>
<td>Taxation of individuals and businesses operating in United States and abroad; jurisdiction, income source, foreign tax credit; treaty structure; special statutory entities for foreign trade. Raskind.</td>
</tr>
<tr>
<td>682</td>
<td>Oil and Gas Law</td>
<td>3</td>
<td>Incidents of ownership as applied to oil and gas; the oil, gas and mineral leases; oil and gas conveyancing; and, regulation of oil and gas production. Sledge.</td>
</tr>
<tr>
<td>693</td>
<td>Individual Studies</td>
<td>1-6</td>
<td>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.</td>
</tr>
<tr>
<td>695</td>
<td>Seminars in Legal Planning</td>
<td>3</td>
<td>A., W. S. 3 cl. Small-group training in the non-litigious functions of the practicing lawyer. Legal planning involves the resolving of fact situations and policy questions of means and ends, together with the effectuation of determinations made in connection therewith. Effectuation of policy decisions often involves the skills of negotiation and draftsmanship, as well as the technique of counseling and litigation. (Training in these latter two techniques is provided by Legal Clinic and Trial Practice, respectively.) Following is a list from which Seminars in Legal Planning are drawn each year:</td>
</tr>
<tr>
<td>695A</td>
<td>Business Planning</td>
<td></td>
<td>Planning and drafting in field of business associations; principally concerned with problems in general and limited partnerships, business trusts, and closely held corporations.</td>
</tr>
<tr>
<td>695B</td>
<td>Estate Planning</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>695C</td>
<td>Federal Tax Planning</td>
<td></td>
<td>Tax problems in business organizations, corporations, partnerships, and individual estates.</td>
</tr>
<tr>
<td>695D</td>
<td>General Legal Planning</td>
<td></td>
<td>Representative types of personal and business transactions which confront general practitioners, including contracts, partnership agreements, purchase agreements, sales agreements, deeds, wills, and trusts.</td>
</tr>
</tbody>
</table>
695E Planning Through Negotiation
Planning negotiations; weighting legal, economic and social factors and use of techniques for attainment of objectives.

695F Legislative Planning
Role of lawyer in advocating or opposing state and federal legislation; problems selected from past and current proposals before legislatures.

695G Planning Seminar in Law
(Repeatable to a maximum of 8 cr. hrs.)
Topics will change as specially scheduled in any quarter.

696 Seminars in Legal Research
A. W., S. 3 cr.
Individual training in original research, together with practice in expository legal writing. Subject matters are chosen for their capacity to provide training in the effective integration, with legal factors, of relevant social, economic, and other non-legal materials.

Following is a list from which Seminars in Legal Research are drawn each year:

696A Antitrust Law and Economics
Prereq.: 678.
Evaluation of antitrust law on the basis of current economic theories. (Inter-departmental seminar of the Department of Economics and the College of Law.)

696B Antitrust Law and International Cartelization
Prereq.: 679.
Application of domestic antitrust policy to foreign operations of American corporations.

696C Constitutional Problems
Advanced constitutional questions, involved in evolution of judicial review, intergovernmental relationships, protection of civil liberties, special problems under Ohio Constitution.

696D Employees' Rights
Federal wage and hour legislation, including: nature of employment relation; Fair Labor Standards Act; exceptions; compensable time; overtime on fluctuating workweek; child labor.

696E Legal Problems of Foreign Trade and Investment
Problems encountered by American business enterprises engaged in foreign trade or investment.

696F Legal Regulation of Business Practice
Prereq.: 679.
Regulation of competitive practices through legislative, administrative, and judicial action; equality of opportunity for small business; the Robinson-Patman Act.

696G 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.

696H Problems in the Law of Evidence
Prereq.: 555.
Advanced evidentiary questions involved in preparation for and trial of cases.

696I 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.

696J 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.

696K 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.

696L Legal and Economic Problems in State and Local Taxation
Prereq.: 673.
State taxation and intergovernmental tax relations in terms of law and fiscal economics. (Offered in cooperation with the Department of Economics.)

696M 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.

696N The Individual and His Government
Govermental powers in democratic and totalitarian countries; relation of power to will of people; justice and fair hearing; personal freedoms surviving legislative and executive encroachments.

696O Comparative Labor Law
Prereq.: 610.
Problems in American labor law viewed from the standpoint of both American and foreign law; collective bargaining; the use of economic force; internal and inter-union affairs.

696P 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.

696Q Regulated Industries
Principal regulatory agencies, both federal and state, with respect to licensing, rate-making, mergers, and general supervision of business practices.

696R International Law of Shared and Strategic Resources
Processes of interaction, claims, and decisions with respect to resources largely open to use by all states, including the ocean, "outer" space, air space, international rivers, canals, and polar areas.

696S 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.

696T Research Seminar in Law
(Repeatable to a maximum of 6 cr. hrs.)
Topics will change as specially scheduled in any quarter.
COURSES OF INSTRUCTION

LINGUISTICS

Linguistics

Office: 405-D University Hall, 216 North Oval

ASSOCIATE PROFESSOR LEHISTE (Chairman), ASSOCIATE PROFESSOR IWANG, ASSISTANT PROFESSORS FILLMORE and LANGENDOEN.

See also the course listings in English, the foreign languages, Romance Linguistics and Linguistic Studies.

522 Introduction to Language U 5
A. W. Sp. 5 cl.
Not open to students with credit for Engi. 522.
A general survey of language and languages and the ways available to study them, with English as the focal language.

523 Writing Systems of the World U 5
A. W. Sp. 5 cl.
Introduction to the nature of selected writing systems, both at the present time and in all periods since the beginning of the use of writing.

601 Introduction to Linguistics U G 5
A. 5 cl.
A broad introduction to the categories and techniques of general linguistics: phonemic, morphemic, and syntactic analysis; applied historical and comparative linguistics.

602 Syntactic Structures U G 5
W. 5 cl.
Prereq.: 601.
The grammatical construction of a number of natural languages will be examined. Syntax, morphemics and their relation to linguistic meaning.

603 Phonological Structures U G 5
Sp. 5 cl.
Prereq.: 601.
The phonological construction of natural languages will be examined. Phonemic theory and its role in the description of diverse languages.

650 Field Methods in Linguistics U G 5
Sp. 4 cl.
Prereq.: 601.
Techniques for describing languages by the use of native informants.

671 Linguistics and Language Acquisition U G 5
W. 4 cl.
Prereq.: 601.
The contribution of linguistic theory to the study of the acquisition of grammatical, semantic, and phonological skills. Fillmore.

672 Languages of the World U G 3-5
A, W, Sp. 3-5 cl.
Prereq.: 601.
Under direction of the linguistics staff, informant and laboratory techniques will be employed to teach a selected language not otherwise offered at the University.

679 The Classification of Linguistic Structures A. 5 cl.
Prereq.: 601.
An examination of the schemes for classifying linguistics structures, phonetic (typological) and genotypic (genetic or genealogical), and some of the content of each type. Langendoen.

701 Minor Problems in Linguistics U G 1-5

720 Seminar in Linguistics U G 3-5
A, W, Sp. 3-5 cl.
Prereq.: 602 and 603 or permission of instructor.
Topics include the history of linguistics, grammatical theory, mathematical models in linguistics, history or structure of individual languages.

761 Historical Linguistics I G 5
W. 5 cl.
Prereq.: 601.
An introduction to the methods, conventions, and literature of comparative-historical linguistics with primary attention to the comparisons and reconstructions of phonological systems. Lehiste.

762 Historical Linguistics II G 5
Sp. 5 cl.
Prereq.: 761.
Advanced work in the comparison and reconstruction of morphological, phonological, and syntactic systems. Detailed examination of some of the results of past and current scholarship. Lehiste.

771 Transformational Analysis G 5
A. 5 cl.
Prereq.: 602 and 603 or permission of instructor.
The theory of grammatical transformations: its formal properties; its justifications; its adequacy as a device for explicating grammatical notions in natural languages. Fillmore.

820 Seminar in Syntax Sp.
Prereq.: 720 or permission of instructor.
Repeatable.
Advanced topics in syntactic analysis.

821 Seminar in Phonology W.
Prereq.: 720 or permission of instructor.
Repeatable.
Advanced topics in phonological analysis.

822 Seminar in Historical Linguistics G 5
A.
Prereq.: 720 and permission of instructor.
Repeatable.
Advanced topics in methods and principles of diachronic analysis.

950 Research in Linguistics G Arr.
Su, A. W, Sp.
Research for thesis purposes only.

Mathematics

Office: 150 Mathematics Building, 231 West 18th Avenue

UNIVERSITY RESEARCH PROFESSORS: TADO, TASSANGEHUSEN, PROFESSORS: RGSS (Chairman), WANN (on leaves), BAMBAY, BUCHI, BDARDOT, BFISHER, HELSEL, KURN (Emeritus), HMICKLE, HILLER, MORRIS (Emeritus), hy-BELDERFER, iHALTZER, IDWHITNEY, JDWOODS, ASSOCIATE PROFESSORS: IABIAN, IASANSKI, ROJANIC, IACAROLL, IDAACON, IDOLSON, IDNOWHEIM, IDERENBRANDT, IDONES (Emeritus), IDAPP, ID, IDLEIGH, IDEVINE, IDMARGARIS, IDMEYERS, IDREEVES, IDRIVER, IDUSTAGI, IDHAIRO, INDUCHESTON, IDULL, IDZIERER, ASSISTANT PROFESSORS: IDABNE, IDUMROUGHT, IDARS (Emeritus), IDAVIS, IDEN, IPFOULK, IKAPPE, ID, IOKHLEN, INELAND, IRAU, IDRICHARD (Emeritus), IDZIVI, IDCHENSEL, IIDEHALG, IMSITH, IDTROY, IDWALUM, IDYAOUB.

400 Arithmetic and Elementary Algebra U 5
Su. 5 cl.
Final or hr. will be added to graduation requirements of any student taking this course. An additional fee will be charged.
This course consists of a review of arithmetic combined with topics from elementary algebra and geometry.
Intermediate Algebra and Trigonometry U 5
Su. 5 cl.
Five cr. hrs. will be added to graduation requirements of any students taking this course. An additional fee will be charged.
A review of material which is usually contained in a second high school algebra course and in one semester of high school trigonometry.

Principles of Mathematics U 3
Su, W, Sp. 3 cl.
Prereq.: Elem. Educ. standing and satisfactory score on OSU Math Test.
The course develops basic ideas of arithmetic, algebra, geometry through the study of the structure of selected mathematical systems.

Introduction to Mathematics I U 5
A. 5 cl.
Open to freshmen who qualify for Level I in English Placement but who do not qualify for Math 440 or higher on the basis of OSU Math Test. Exceptions may be made by special permission of the Department of Mathematics.
The course is designed to provide an introduction to the basic ideas of mathematics from the students in the humanities, life and social sciences. Ross.

Introduction to Mathematics II U 5
W. 5 cl.
Prereq.: 418.

Introduction to Mathematics III U 5
Sp. 5 cl.
Prereq.: 413.

First Year College Mathematics U 5
Su, A, W, Sp. 5 cl.
Prereq.: Satisfactory score on OSU Math Test.
The course 416, 417 is designed as a terminal sequence of courses in Mathematics and to prepare students to enter a calculus sequence. 416 treats sets, functions, algebra, graphs, and vector spaces.

First Year College Mathematics U 5
Su, A, W, Sp. 5 cl.
Prereq.: 416.
A continuation of 416. An introduction to analytic geometry, linear programming, trigonometry, matrix algebra, limit.

Introduction to Calculus, Probability and Statistics U 5
Sp. 5 cl.
Prereq.: 416 and 417.
Not open to students with credit for 418, 435, 536, 537, 538, 541, 542, or 543.
Differentiation, integration of polynomials, maxima, mean value theorems, probability spaces, density functions, introduction to estimation, testing hypotheses.

Mathematics of Finance U 5
W, Sp. 5 cl.
Prereq.: 416 or 439
The principles of interest and discount with applications to annuities, sinking funds, capitalization, depreciation, valuation of bonds.

Elementary Mathematical Statistics U 5
Sp. 5 cl.
Prereq.: 416 or 439.
Elementary principles of probability and introduction to the use of the binomial and normal distributions.

Algebra and Trigonometry U 5
Su, A, W, Sp. 5 cl.
Prereq.: Satisfactory score on OSU Math Test.
Students may not use the combination of 418 and 439 to satisfy a 10 hr. Math requirement.
Inequalities, functions, graphs, exponential and logarithmic and trigonometric functions and their graphs, complex numbers, inverse functions.

Calculus and Analytic Geometry U 5
Su, A, W, Sp. 5 cl.
Prereq.: 439.
Not open to students with credit for 418.
Lines, slopes, derivatives, limits, differentiation, rules, mean-value theorem, applications of derivatives to: curve sketching, maxima and minima, linear motion, related rates, approximations, conics.

Calculus and Analytic Geometry U 5
Su, A, W, Sp. 5 cl.
Prereq.: 440.
Not open to students with credit for 536.
Continuation of 440. Approximating areas, the integral, integrals, formulas, applications of integration, inverse functions, logarithmic and exponential functions, hyperbolic functions, integration techniques.

Calculus and Analytic Geometry U 5
Su, A, W, Sp. 5 cl.
Prereq.: 541 or 441.
Not open to students with credit for 537.
Continuation of 541. Polar coordinates, rotation of axes, vectors, velocity, acceleration, space vectors and three dimensional analytic, geometry, cylindrical and spherical coordinates. Linear systems, matrices, characteristic values.

Calculus and Analytic Geometry U 5
Su, A, W, Sp. 5 cl.
Prereq.: 542.
Not open to students with credit for 538.
Continuation of 542. Partial derivatives, multiple integrals, infinite series.

Differential Equations and Their Applications U 5
A, W, Sp. 5 cl.
Prereq.: 538 or 543.
Not open to students with credit for 608 or 611.
Ordinary differential equations with particular emphasis on linear differential equations, systems of differential equations, applications to electrical, mechanical, and chemical systems.

Applications of Mathematics U 5
W, Sp. 5 cl.
Prereq.: Ed. standing and 546 or 541 or 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.

Introduction to Statistics U 3
A, W, Sp. 2 cl. 1 2-hr. lab.
Prereq.: 538 or 543.
Combination: probability, fundamental concepts of probability distributions, sample statistics, estimation and testing hypotheses, roots of statistical theory.

Statistical Methods in Engineering U 5
A, W, 5 cl.
Prereq.: Indus. E, 3rd yr. standing and 546.
Topics included are probability, frequency distributions, testing hypotheses, and estimation.
590 Introduction to Digital Computer Programming
Su, A, W, Sp. 3 cl., 2 2-hr. lab.
Prereq.: 416 or 439.
Introduction to programming language; laboratory experience with computers installed in Numerical Computation Laboratory. Scientific, statistical and business applications.

599 Special Topics in Mathematics U 2-5
Su, A, W, S.
Prereq.: Permission of instructor.
Repeatable.
This course is intended to give the student an opportunity to pursue special studies not otherwise offered.

601 Advanced Calculus U G 5
Su, A, Sp. 5 cl.
Prereq.: 538 or 543.
A rigorous presentation of limits, derivatives, mean value theorems, definite integrals, sequences, and series.

605 The Mathematical Approach U G 5
W, Sp. 5 cl.
Fundamental concepts in mathematics.

607 Introduction to the Theory of Functions of a Complex Variable U G 5
Su, W. 5 cl.
Prereq.: 601.
Not open to students with credit for 634.
Topics discussed include power series expansions, the formula of Cauchy, residues, conformal mappings, and elementary functions in the complex domain.

609 Fourier Series and Boundary Values U G 3
Problems for Engineers
A, W. 3 cl.
Prereq.: 608 or 544 or 611.
Fourier series, applications of Fourier series to the solution of boundary value problems involving partial differential equations, Bessel functions.

611 Differential Equations U G 5
A, W. 5 cl.
Prereq.: 538 or 543.
Not open to students with credit for 544 or 608.
Equations of first and second orders, linear equations, series solutions, approximate solutions, systems of ordinary equations, Legendre and Bessel equations.

621 Advanced Geometry U G 5
A, W. 5 cl.
Prereq.: 539 or 541 or 442.
Advanced topics from Euclidean Geometry.

622 Vector Analysis for Engineers U G 3
A, W. 3 cl.
Prereq.: 608 or 544 or 611.
Not open to students with credit for 681.
Vector algebra, vector operators, line integrals, vector integral theorems, curvilinear coordinates; applications.

624 Complex Variables for Engineers U G 3
W, Sp. 3 cl.
Prereq.: 622 or Elec. E. 617 or Elec. E. 617 concur.
Introduction to complex variables, analytic functions, complex integral theorems, power series, residues, conformal mapping.

626 Fourier Series and Boundary Value U G 5
Problems
W, Sp. 5 cl.
Prereq.: 609 or 611 or 544.
Not open to students with credit for 609 or 721.
Expansion of function in Fourier series and in series of Legendre polynomials or Bessel functions; solution of boundary value problems from physics.

631 History of Mathematics U G 5
A, Sp. 5 cl.
Prereq.: 538 or permission of instructor.
The development of mathematics from its primitive origins to its present form. Topics include: development of arithmetic, algebra, geometry, trigonometry, and calculus.

635 Fundamentals of Mathematics U G 4
A. 4 cl.
Prereq.: Permission of instructor.
Not open for graduate credit to majors in Math.
This sequence emphasizes the fundamentals of mathematics and is 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.

636 Fundamentals of Mathematics U G 4
W. 4 cl.
Prereq.: 635.
A continuation of 635.

637 Fundamentals of Mathematics U G 4
Sp. 4 cl.
Prereq.: 636.
A continuation of 636.

641 Elementary Modern Algebra U G 5
A, 5 cl.
Prereq.: 537 or 542.
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.

642 Principles of Mathematics for Science and Mathematics Teachers G 5
A. 5 cl.
Prereq.: Permission of instructor.
(NSF students only).
Introduction to modern mathematics, sets, functions, topology.

643 Topology U G 5
Sp. 5 cl.
Prereq.: 543.
Sets and functions, metric spaces, completeness, Baire's Theorem, continuous mappings, Euclidean spaces, compactness, connectedness, topological spaces.

645 Modern Geometry for High School Teachers G 5
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.
646 Modern Algebra for High School Teachers
Su. 5 cl.
(Non-SF 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.

647 Analysis for High School Teachers
Su. 5 cl.
(Non-SF 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.

651 Fundamental Ideas in Mathematics
A, W. 5 cl.
Prereq.: 526 or 541 or 441.
Basic ideas concerning: number systems, sets, fields, axiom systems, finite geometries, projective geometry.

652 Fundamental Ideas in Mathematics
W, Sp. 5 cl.
Prereq.: 651.
Continuation of 651.

661 Vector Analysis
Su, W, Sp. 5 cl.
Prereq.: 601.
Not open to students with credit for 622.
The algebra and calculus of vectors with applications to mechanics. Differential operators and integral theorems. Introduction to potential theory.

665 Mathematical Logic
Sp. 5 cl.
Prereq.: 537 or 542 or permission of instructor.
A first course in the study of formal logical systems and their applications to the foundations of mathematics. Topics include: definitions of mathematical proofs; number theory, set theory, and analysis formalized within the predicate calculus; theorems of Gödel and the Church; recursive function theory and idealized digital computers.

666 Mathematical Logic
Sp. 5 cl.
Prereq.: 665.
A continuation of 665.

670 Matrices and Determinants
Su, W. 5 cl.
Prereq.: 537 or 542.
The fundamentals of matrix theory with emphasis on determinants, systems of linear equations, vectors, spaces, rank, characteristic polynomials, similarity and congruence transformations.

672 Mathematical Statistics
A. 5 cl.
Prereq.: 538 or 543.

673 Mathematical Statistics
W. 5 cl.
Prereq.: 672.

674 Theory of Probability
Sp. 5 cl.
Prereq.: 672.
Discrete probability spaces, random walk, Markov chains, stochastic processes, strong laws of probability.

680 Elementary Number Theory
Sp. 5 cl.
Prereq.: 537 or 542.
Prime numbers, congruences. Diophantine equations, the quadratic reciprocity law, and selected topics. This course utilizes concrete examples to introduce concepts of modern algebra.

692 Numerical Analysis I
A, Sp. 4 cl., 1 2-hr. lab.
Prereq.: 590 or Engr. Mech. 650, or equiv.; 544 or 611 or equiv.; or permission of instructor.
Basic techniques of numerical analysis; finite differences, interpolation, solution of equations, integration, difference and differential equations. Laboratory use of computers.

694 * Numerical Analysis II
Sp. 4 cl., 1 2-hr. lab.
Prereq.: 692 and 670 or 725, or permission of instructor.

695 Programming for Digital Computers
Su, W. 4 cl., 1 2-hr. lab.
Prereq.: 590 or 692 or Engr. Mech. 650, or equiv.

698! Numerical Solution of Differential Equations
Sp. 3 cl., 2 2-hr. lab.
Prereq.: 692 and 611 or permission of instructor.

699 Special Topics in Mathematics
Prereq.: Permission of instructor. Repeatable.
This course is intended to give the student an opportunity to pursue special studies not otherwise offered.

700 Minor Problems
Conferences, assigned readings, and reports on minor investigations.

701 Introduction to Analysis
Su, A. 5 cl.
Prereq.: 601.
The main objective is to train students to understand and apply the basic ideas and methods of analysis. Topics discussed include point sets, the real continuum, Riemann integration, interchange of limit processes, sequences, series, and measure.

702 Introduction to Analysis
W. 5 cl.
Prereq.: 701.
A continuation of 701.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>704</td>
<td>Introduction to the Theory of Approximation I</td>
<td>U G 5</td>
<td>A. 5 cl.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Prereq.: 601</td>
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<tr>
<td></td>
<td>Approximation by polynomials and trigonometric</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>polynomials, Chebyshev's theory of best</td>
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<td>approximation and its generalizations.</td>
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<td>Interpolation processes and Mechanical</td>
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<td></td>
<td>Quadrature, Orthogonal Polynomials and elements</td>
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<td>705</td>
<td>Introduction to the Theory of Approximation II</td>
<td>U G 5</td>
<td>W. 5 cl.</td>
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<td>A continuation of 704.</td>
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<td>Prereq.: 607 and 611; or 609, 622 and 624.</td>
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<td>Linear differential equations, solutions about</td>
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<td>singular points; Fourier series; Sturm-Liouville</td>
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<td></td>
<td>problems; Bessel functions and Legendre</td>
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<td>polynomials; boundary value problems associated</td>
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<td>with Laplace's equation.</td>
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<td>Prereq.: 670 or 723 or permission of instructor.</td>
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<td>Introduction to tensor analysis with applications</td>
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<td></td>
<td>to geometry. Elements of the calculus of</td>
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<td>variations with applications to physical</td>
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<td>problems.</td>
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<td>quadratic and Hermitian forms, groups and</td>
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<td>vector spaces, applications to physics and</td>
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<td>engineering.</td>
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<td>Integral Equations and Their Applications</td>
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<td>Orthogonal functions, linear, integral</td>
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<td>equations of first and second kinds, relations</td>
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<td>to ordinary differential equations, Volterra's</td>
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<td>equation, boundary value problems, practical</td>
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<td>Eigenvalue Problems</td>
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<td>Distribution of eigenvalues, self-adjointness,</td>
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<td>properties, approximation of eigenvalues,</td>
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<td>eigenfunction expansions, Ritz method, iteration</td>
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<td>Applied Operational Calculus</td>
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<td>Laplace transformation in real domain,</td>
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<td>applications in physics and engineering;</td>
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<td>differential equations; Laplace transformation</td>
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<td>in complex domain, application to partial</td>
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<td>differential equations; Fourier transform,</td>
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<td>applications.</td>
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<td>728 *</td>
<td>Special Functions</td>
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<td>Power series developments, asymptotic</td>
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<td>functions, spherical harmonics, orthogonal</td>
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<td>polynomials, hypergeometric functions,</td>
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<td>theta functions, elliptic functions,</td>
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<td>integrals, numerical techniques.</td>
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</table>

729 * Applied Complex Analysis U G 5
W. 5 cl.
Prereq.: 604, or 607 and 611.
Basic facts of complex analysis; conformal mapping properties of elementary functions; Schwarz—Christoffel formulas; distortion theorems; uniformization; applications to electromagnetic fields, fluid dynamics, heat flow.

730 * Non-Linear Differential Equations U G 5
Sp. 5 cl.
Prereq.: 608 or 544 or 611.
Existence and uniqueness of solutions; initial conditions; periodic solutions; Krylov-Bogoliuboff method; graphical and numerical methods; applications to vibrational problems, relaxation theory, and nonlinear mechanics.

731 Probability and Statistics U G 5
Sp. 5 cl.
Prereq.: 601.
General probability distributions, Stirling's integral, characteristic functions, limit theorems.

733 * Statistics: Design and Analysis of Experiments U G 5
W. 5 cl.
Prereq.: 734.
Analysis of variance distributions, tests of linear hypotheses, analysis of variance in an r-way classification, non-orthogonal data, latin squares, and lattices.

734 Statistical Inference U G 5
A. 5 cl.
Prereq.: 731.
Point, interval estimation, maximum likelihood estimators, principles of estimation, tests of hypotheses. Neyman-Pearson theory, power function non-parametric tests, sequential tests, decision functions.

741 Introduction to General Topology U G 5
Su. A. 5 cl.
Prereq.: 701 or permission of instructor.
This sequence is designed to give training in the areas of modern geometry, particularly in analytic topology.

742 Introduction to General Topology U G 5
W. 5 cl.
Prereq.: 741.
A continuation of 741.

743 Projective Geometry U G 5
Sp. 5 cl.
Prereq.: 762.
The combinatorial and algebraic aspects of projective geometry, including non-Desarguesian and finite projective planes, coordinatization, the theory of conic sections, incidence, matrices, latin squares.

750 * Introduction to Functional Analysis I U G 3
A. 3 cl.
Prereq.: 607, 702 or equiv.

751 * Introduction to Functional Analysis II U G 3
W. 3 cl.
Prereq.: 750.
A continuation of 750.
761 Introduction to Higher Algebra U G 5
Su, A. 5 cr.
Prereq.: Permission of instructor.
Groups, rings, fields, ideals; selected topics from Galois theory, lattice theory, and the theory of rings with minimum conditions.

762 Introduction to Higher Algebra U G 5
W. 5 cr.
Prereq.: 761.
A continuation of 761.

763 Introduction to Higher Algebra U G 5
Sp. 5 cr.
Prereq.: 762.
A continuation of 762.

790 Advanced Computer Systems Programming U G 5
W. 5 cr.
Prereq.: 695 or permission of instructor.
Symbolic programming. Design of symbolic programming systems, and algebraic compilers. Dynamic storage assignments. Symbol manipulation, information retrieval, and related topics. Classroom exercises involve use of computers.

793 Mathematical Foundations of the Design and Use of Automatic Systems U G 3
A.
Prereq.: Graduate 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.

794 Mathematical Foundations of the Design and Use of Automatic Systems W.
Prereq.: 793 and graduate standing or permission of instructor.
Continuation of 793.

Prereq.: 794 and graduate standing or permission of instructor.
Continuation of 794.

798 Advanced Studies in Mathematics U G 2-5
Prereq.: Permission of instructor.
Repeetable.
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.

801 Theory of Functions of a Complex Variable G 5
W. 5 cr.
Prereq.: 701 or permission of instructor.
The complex number system, analytic functions, theorems of Cauchy and Goursat, series, expansions, singularities, conformal mapping, harmonic and subharmonic functions, Picard's theorem and related topics.

802 Theory of Functions of a Complex Variable G 5
Sp. 5 cr.
Prereq.: 801.
Continuation of 801.

807 * Partial Differential Equations and Their Applications G 3
A. 3 cr.
Prereq.: 702 or permission of instructor.

808 * Partial Differential Equations and Their Applications G 3
W. 3 cr.
Prereq.: 807.
Continuation of 807.

815 * Dimension Theory G 5
Sp. 5 cr.
Prereq.: 702, 743, and 762.
Dimension in separable metric spaces with application to Euclidean spaces. Covering theorems, imbedding theorems, and approximation theorems. Relationships between the concepts of dimension and measure.

817 * Potential Theory G 3
A.
Prereq.: 607 and permission of the instructor.

818 * Potential Theory G 3
W.
Prereq.: 817.
Continuation of 817.

819 * Theory of Rings G 5
Sp. 5 cr.
Prereq.: 763 or permission of instructor.
The modern structure theory of rings, rings with minimum conditions, simple and semi-simple rings, Jacobson radical, non-associative rings, applications to geometry and combinatorial analysis.

821 * Funcional Analysis G 3
A.
Prereq.: 750, 751.
Banach Algebras, spectral theory, harmonic analysis, fixed-point theorems. Applications to analysis.

822 * Functional Analysis G 3
W.
Prereq.: 821.
Continuation of 821.

823 * Functional Analysis G 3
Sp.
Prereq.: 822.
Continuation of 822.

826 * Measure and Integration G 5
A. 5 cr.
Prereq.: 702.

827 * Measure and Integration G 5
W. 5 cr.
Prereq.: 826.
Continuation of 826.
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<th>Course Code</th>
<th>Title</th>
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<td>Measure and Integration</td>
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<td>830</td>
<td>Transfinite Arithmetic</td>
<td>G 5</td>
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<td>A.</td>
<td>Prereq.: 701 and 761.</td>
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<td>Axiomatic Set Theory. Ordinal numbers and Transfinite functions.</td>
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<td>Polynomial representation. Normal forms. Number classes. Inequalities</td>
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<td>for cardinal numbers. Consequences of the continuum hypothesis.</td>
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<td>Inaccessible numbers.</td>
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<td>831</td>
<td>Transfinite Arithmetic</td>
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<td>841</td>
<td>Differential Geometry</td>
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<td>Prereq.: Permission of Instructor.</td>
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<td>Curves, tensor calculus, surfaces, first and second fundamental</td>
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<td>of Levi-Civita and its generalisation, special surfaces.</td>
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<td>842</td>
<td>Differential Geometry</td>
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<td>844</td>
<td>Combinatorial Topology</td>
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<td>Prereq.: 702, 742, and 762.</td>
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<td>Homology and cohomology of simplicial and abstract complexes.</td>
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<td>Duality, relative homology and cohomology groups in the simplicial</td>
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<td>case. The axiomatic approach. Extension to general spaces with</td>
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<td>emphasis on the Cech theory and singular theory. Applications in</td>
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<td>Advanced Topics in Mathematical Statistics</td>
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<td>855</td>
<td>Advanced Theory of Probability</td>
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<td>Selected topics from foundations, distribution functions, limit</td>
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<td>theorems of probability, stochastic processes, weak and strong laws,</td>
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<td>856</td>
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<td>Theory of Matrices</td>
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<td>Prereq.: 762 or permission of instructor.</td>
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<td>Permutations, combinations, partitions; enumerations by recursions</td>
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<td>such as Latin squares, Steiner triplets, finite geometries, incidence</td>
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<td>Lattice Theory</td>
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<td>An introduction to partially ordered sets and lattices, distributive</td>
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<td>and modular Lattices, relations to Boolean algebras and projective</td>
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<td>geometries, applications to groups and rings.</td>
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<td>871</td>
<td>Group Theory</td>
<td>G 5</td>
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<td>Basic theorems on subgroups, normal subgroups, homomorphism;</td>
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<td>Group Theory</td>
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<td></td>
<td>Continuation of 871.</td>
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<tr>
<td>873</td>
<td>Analytic Number Theory</td>
<td>G 5</td>
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<td>Sp. 5 cl.</td>
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<td>Prereq.: Permission of instructor.</td>
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<td></td>
<td>The distribution of prime numbers. Waring's problems, and selected</td>
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<td></td>
<td>topics.</td>
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<tr>
<td>880</td>
<td>Theory of Algebraic Numbers</td>
<td>G 5</td>
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<td>A. 5 cl.</td>
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<td>Prereq.: 762.</td>
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<td>Ideals in algebraic number fields, unique decomposition into prime</td>
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<td>ideals different and discriminant, ideal classics, application of</td>
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<td>Galois theory and analytical methods to the theory of algebraic</td>
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<td>numbers distribution of prime ideals.</td>
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<td>881</td>
<td>Theory of Algebraic Numbers</td>
<td>G 5</td>
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<td>W. 5 cl.</td>
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<td>Prereq.: 880.</td>
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<td>Continuation of 880.</td>
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<td>890</td>
<td>Mathematical Logic</td>
<td>G 5</td>
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<td>A. 5 cl.</td>
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<td>Prereq.: 701 and 761.</td>
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<td>Topics include: pure and applied predicate calculi; formal number</td>
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<td>theory; Gödel's completeness and incompleteness theorems;</td>
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<td></td>
<td>selections from recursive function theory, set theory, and</td>
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<td>intuitionism.</td>
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<td>950</td>
<td>Research in Mathematics</td>
<td>G Arr.</td>
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<td>Su, A. W., Sp.</td>
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<td>Research for thesis or dissertation purposes only.</td>
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MECHANICAL ENGINEERING

601 Thermodynamics U G 5
A. W. 5 cl.
Prereq.: Math. 543 and Physics 432 or 532.
Not open to students majoring in Mech. E.
A study of the principles of thermodynamics as an engineering science. Zimmerman.

607 Thermodynamics and Fluid Dynamics U G 5
A. W. 5 cl.
Prereq.: Professional division standing.
Not for graduate credit to students majoring in Mech. E.
Not open to students with credit for 600-604-605.
A study of basic engineering thermodynamics, including an integrated treatment of fluid flow. Zimmerman.

608 Thermodynamics and Fluid Dynamics U G 5
W, Sp. 5 cl.
Prereq.: 607, or Chem. 681 and Physics 603.
Continuation of 607.

609 Thermodynamics and Fluid Dynamics U G 3
A. Sp. 3 cl.
Prereq.: 608.
Continuation of 608.

610 Heat Transfer U G 4
A. W. 4 cl.
Prereq.: 605 or 609.
Not for graduate credit to students majoring in Mech. E.
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. Jordan.

614 Principles of Heat Generation U G 3
W, Sp. 3 cl.
Prereq.: 610 or 611.
Not for graduate credit to students majoring in Mech E.
Not open to students with credit for 606.
A quantitative and qualitative study of heat generation including molecular and nuclear processes. Marco.

615 Kinematics of Machines U G 5
A, Sp. 5 cl.
Prereq.: Professional division standing.
Not for graduate credit to students majoring in Mech E.
A study of displacements, velocities, and accelerations of machine members using graphical and numerical methods of analysis. McLarnan.

616 Dynamics of Machinery U G 4
A, W. 4 cl.
Not for graduate credit to students majoring in Mech. E.
Not open to students with credit for 620.
A study of the interrelationships among forces, motions, and moments as related to rigid or elastic machine members, including force analysis, vibration, impact, and balancing. Starkey.

621 Heat Transfer and Fluid Flow U G 5
W, Sp. 5 cl.
Prereq.: 601.
Not open to students majoring in Mech. E.
A study of the fundamental principles of heat transfer and fluid flow in the design of heat exchange equipment with applications to electrical machinery and apparatus. Jones.

627 Materials of Engineering U G 4
A, W. 4 cl.
Prereq.: Professional division standing.
A study of the structure of engineering materials and of their properties as used in engineering design. Marco.

672 Hydraulic Laboratory U G 1
A. 1-3 hr. lab.
Prereq.: Must be taken concurrently with Civil E. 728.
A study of incompressible fluid flow through various primary elements and through a centrifugal pump. Burton.

703 Internal Combustion Engines U G 3
A. 3 cl.
Prereq.: 625, or 614 and 722.
A study of combustion chambers, valve mechanisms, and the dynamic balance of internal combustion engines. Marco.

704 Internal Combustion Engines U G 3
W. 3 cl.
Prereq.: 625, or 614 and 722.
Force analysis as related to the design of engine components such as pistons, bearings, valve springs, and crankshafts. Marco.

710 Heating, Ventilating, and Air Conditioning U G 4
A. 4 cl.
Prereq.: 610 or 611, and 723.
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. Sepoy.

716 Refrigeration and Air Conditioning U G 3
W. 3 cl.
Prereq.: 610 or 611, and 723.
A study of fundamentals, processes and equipment associated with refrigeration systems using vapor compression, air cycle, absorption, magnetic and thermoelectric cooling. Sepoy.

721 Principles of Energy Conversion U G 3
In Turbomachinery A, W. 3 cl.
Prereq.: 605 or 609.
Not for graduate credit to students majoring in Mech. E.
Not open to students with credit for 720.
A study of the principles of energy conversion and transfer, performance and physical characteristics of power-absorbing, power-generating and power-transmitting turbomachinery. Zimmerman.
722 Principles of Energy Conversion  U G 3
in Positive Displacement Machinery
A, Sp.   3 cl.
Prereq.: 605 or 609, and 606 or 614.
Not for graduate credit to students majoring in Mech. E.
Not open to students with credit for 625.
A study of the principles of energy conversion and transfer, performance and physical characteristics of power-absorbing, power-generating, and power-transmitting positive displacement machinery. Jones.

723 Principles of Environmental Control  U G 3
A, Sp.   3 cl.
Prereq.: 610 or 611, and 616 or 620.
Not for graduate credit to students majoring in Mech. E.
Not open to students with credit for 710.
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. Seppey.

724 Principles of Heat Exchangers  U G 3
W, Sp.   3 cl.
Prereq.: 610.
Not for graduate credit to students majoring in Mech. E.
A study of the principles of heat and mass transfer as applied to the design of heat exchangers. Marco.

725 Diesel Engines  U G 3
Sp.   3 cl.
Prereq.: 625, or 614 and 722.
An advanced study of Diesel engine design, operation, and economics. Marco.

726 Gas Turbine Power Plants  U G 3
W.   3 cl.
Prereq.: 608 or 614, and 720 or 721.
A study of the principles, performance, and design of gas turbine power plants. Zimmerman.

736 Machine Design  U G 5
W, Sp.   5 cl.
Not open to students majoring in Mech. E.
A study of the application of the general principles and empiricisms of mechanics of solids to the creative design of mechanical equipment. Starkey.

745 Vapor Power Cycles  U G 3
A.   3 cl.
Prereq.: 605 or 609, 610, and 614.
A descriptive and analytical study of elementary and advanced power plant cycles. Buxton.

755 Nuclear Power Plants  U G 3
Sp.   3 cl.
Prereq.: 610 or 611, and 727 or 736 or 767, and Physics 502 or 615.
A study of the thermal and mechanical design aspects of nuclear power plants and processes. Jones.

756 Cryogenic Systems  U G 3
Sp.   3 cl.
Prereq.: 601 or 605, or 609, and 610 or 621.
Study of low-temperature processes and equipment; physical properties at low-temperatures; practical application of low-temperature techniques and processes in engineering systems. Marco.

A-152
773 Preliminary Design A, Sp. 3 2-hr. lab.
Prereq.: 771.
Continuation of 771.

778 Mechanical Engineering Measurements A, Sp. 1 cl., 1 4-hr. lab.
Prereq.: 605 or 609, 610 or 611, and 616 or 630.
Not for graduate credit for students majoring in Mech. E.
Not open to students with credit for 664 and 665.
A theoretical and experimental study of the principles of operation and performance characteristics of measuring instruments used in mechanical engineering. Doeblein.

779 Mechanical Engineering Laboratory U G 3 W, Sp. 2 2-hr. lab. and 5 hrs. lab. planning and report writing.
Prereq.: 605 or 778.
Not for graduate credit for students majoring in Mech. E.
The study and application of methods of experimental analysis. Buxton.

780 Mechanical Engineering Laboratory A, Sp. 2 2-hr. lab. and 5 hrs. lab. planning and report writing.
Prereq.: 779.
Continuation of 779.

Prereq.: Permission of instructor.
Advanced topics in the various phases of Mech. E. 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.

Prereq.: Permission of instructor.
Repeatable to a maximum of 34 cr. hrs. with a maximum of 10 cr. hrs. in any one subdivision.
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, and air conditioning, industrial hydraulics, machine design, refrigeration, steam power plants, and thermodynamics.

801 Advanced Applied Thermodynamics G 3 A, 3 cl.
Prereq.: 601 or 605, and Math. 544, or equiv.
An analytical study of the thermodynamics of fluid flow. Zimmernann, Jones.

802 Advanced Applied Thermodynamics G 3 W. 3 cl.
Prereq.: 601 or 605 and Math. 544 and 546, or equiv.
A study of classical thermodynamics, systems in equilibrium, and the thermodynamics of irreversible phenomena. Zimmernann, Jones.

803 Advanced Applied Thermodynamics G 3 Sp. 3 cl.
Prereq.: 802.
Continuation of 802.

807 Advanced Heat Transfer G 3 W. 3 cl.
Prereq.: 610, and 831 or Math. 609, or Math. 626.
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. Marco, Han.

809 Advanced Heat Transfer G 3 A. 3 cl.
Prereq.: 808 and Math. 544, or equiv.
A study of phase change and radiative heat transfer processes. Marco, Han.

810 Internal Combustion Power Plants G 3 W. 3 cl.
Prereq.: 722, or equiv.
An advanced study of reciprocating internal combustion power plants. Marco.

811 Advanced Principles of Energy Conversion in Turbomachinery G 3 Sp. 3 cl.
Prereq.: 721 or equiv.
An advanced study of power-absorbing, generating, and transmitting turbomachinery. Zimmerman.

812 Preliminary Design of Power Systems G Arr.
Prereq.: Permission of instructor.
Preliminary design and evaluation of novel systems including analysis, synthesis, and possible experimental verification. Zimmerman.

820 Advanced Principles of Refrigeration G 3 W. 3 cl.
Prereq.: 710 or equiv.
Advanced study of conventional and novel processes including thermoelectric, magnetic, and gas systems. Sepuy.

821 Advanced Environmental Control G 3 Sp. 3 cl.
Prereq.: 723 or equiv.
An advanced study of conventional and unique systems used to control the environment for occupancy by people, equipment, and material. Sepuy.

822 Advanced Environmental Control G 3 Arr.
Prereq.: 710 or equiv.
Prereq.: Permission of instructor.
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. Sepuy.

830 Advanced Steam Power Cycle and Turbine Analysis G 3 W. 3 cl.
Prereq.: 605 or 660, 610, and 721.
An advanced study of steam power cycles and design of steam turbine nozzles and blading. Buxton.

831 Advanced Combined Vapor Power Cycle Analysis G 3 Sp. 3 cl.
Prereq.: 605 and 830, or permission of instructor.

A-153
832  Advanced Vapor Power Cycle and Component Studies  G  Arr.  
A. W. Sp.  Conf.  
Prereq.: 630 or 831, or permission of instructor.  
Courses to be conducted on a conference basis with problems assigned to each student based on his needs and area of interest.  
Buxton.

840  Advanced Mechanical Design  G  3  
A.  3 cl.  
Prereq.: 767 and Math. 544, or equiv.  
A study of concepts, principles, and phenomenological theories related to the failure-prevention aspect of mechanical design.  
Starkey.

841  Dynamics of High Speed Machinery  G  3  
W.  3 cl.  
Prereq.: 763 or 769, and Math. 544, or equiv.  
An advanced study of the interrelationships among forces, motions, and masses as related to rigid or elastic machine members.  
Starkey.

843  Stress Analysis of Machinery  G  3  
S.  3 cl.  
Prereq.: 736, or 768 and 769; 861 or Math. 609, or equiv.  
A study of the concepts, principles, and procedures related to the analysis of stresses and strains in machine parts.  
Starkey.

844  Kinematic Synthesis and Analysis  G  3  
A.  3 cl.  
Prereq.: 615, and 736 or 769.  
A study of fundamental methods for the synthesis and analysis of motions in mechanical systems.  
McLennan.

853  Dynamics of Inviscid Fluids  G  3  
W.  3 cl.  
Prereq.: 609, and 861 or Math. 609, or equiv.  
Not open to students with credit for 808 or 850.  
Three dimensional, compressible, and incompressible inviscid flows, including irrotational and rotational motion with and without flow discontinuities.  
Han.

854  Laminar Flow and Heat Transfer  G  5  
S.  3 cl.  
Prereq.: 610 and 853.  
Not open to students with credit for 808 or 850.  
Laminar boundary layers and fluid flow with and without heat transfer, fully established entrance flows, free convection, extensions to compressible flows.  
Han.

855  Turbulent Flow and Heat Transfer  G  5  
A.  3 cl.  
Prereq.: 854.  
Not open to students with credit for 808 or 850.  
Turbulent boundary layers and flows with and without heat transfer for internal and external flows including laminar instability, Reynolds stressors, and mixing length theory.  
Han.

860  Lump Parameter System Analysis  G  3  
A.  3 cl.  
Prereq.: Math. 544 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.

861  Distributed Parameter Systems  G  3  
A.  3 cl.  
Prereq.: 610 and Math. 544, or equiv.  
Not open to students with credit for 807, 850, or 853.  
Numerical and analytical methods for obtaining solutions to engineering problems in heat transfer, fluid mechanics, and other field problems.  
Bridge.

890  Mechanical Engineering Seminar  G  2  
A, W, Sp.  4 cl.  
Prereq.: Mech. E. grad. standing.  
A group study of the frontiers of knowledge in Mech E. by assignment of reading in technical literature, student presentations, and related group discussions.

950  Research in Mechanical Engineering  G  Arr.  

Medicine

Office: N-1013 University Hospital, 410 West 10th Avenue  
PROFESSORS: WARREN (Chairman), SASHE, BROWNING,  
DULL, FANCHER, HAMMEL, HEISEL, HENISE, KNIES,  
MITCHELL, MYERS, PALMER, HORNE, ROTHERMIC,  
RYAN, SASLAW, SCHIEF, SHEPARD, ANDERSON,  
WILSON. ASSOCIATE PROFESSORS: TATTWELL, GREGG,  
BEMAN, DURN, BRADLEY, BURK, EVANS, W,  
FORMAN, WU, GREEN, HAYNE, JOHNSON, KRUGER,  
MCCOY, W. MITCHELL, SCHOFEN, SILBERSTEIN, ISTM,  
WALL, and WEISSINGER: ASSISTANT PROFESSORS:  
BROWNS, BOWERS, CARBART, CARY, H. CASSEL,  
CASS, CLODFELTER, CONN, DEEMER, DENKOS,  
DONNE, ENGELSTON, GIFFORD, GOLBERG, GOODMAN,  
GOULDER, GRAVES, GRIER, GUTHRIE, GUENTHER,  
GWYNN, HARD, HATCHER, HATFIELD, HUMMEL,  
HUMPHREY, HUSTON, GAGE, JOHNSON, KELLNER, KIRK,  
KRESS, LANEY, LEFKE, LITTLE, LONG, LOVE, MATE,  
McKINSTRICK, MENDELSON, MERKEL, METZGER, MORRICE,  
MURPHY, O'SULLIVAN, PARKER, FELD, PHILLIPS, FINE,  
FOLKERS, FOWLER, FRASER, FRICKETT, READ, ROSENBERG,  
ROSS, SELLER, SHARKEY, SEPEL, SIMON, SMITH,  
STEEV, STEVENSON, TAGUCHI, TIBBE, TOMASHEFSKI,  
TRONSTEIN, VINCENT, WEINBERG, WIELAND, and  
WOOLEY.

601  The Comprehensive Evaluation of the Patient  P  6  
W.  90 cl. and conf. hrs.  
Prereq.: Med. 2nd yr. standing.  
Complete evaluation of the whole patient including bedside instruction, seminars, demonstrations and lectures.

602  The Comprehensive Evaluation of the Patient  P  15  
Sp.  220 cl. and conf. hrs.  
Prereq.: Med. 2nd yr. standing, and 601.  
Continuation of 691.
651  Principles of Medicine  P 2
    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 if material is available.

675  The Art and Science of Medicine  P 0
    W. 1 cl.
    Prereq.: Med. 1st yr. standing.
    The development of modern methods of diagnosis and treatment. The consideration of the art as well as the science of medicine.

714  Ward Clinics in Infectious Diseases  P 6
    1 month, offered all months except June.
    Prereq.: Med. 3rd or 4th yr. standing.
    Clerkship and seminars on common and unusual infectious diseases. Formal instruction between 8 a.m. and 6 p.m., but student is on call throughout 24 hours. Suslovo.

715  Clinical Medicine  P 24
    4 months, offered July, Nov., Mar.
    Prereq.: Med. 3rd yr. standing.
    Student will spend four months in medicine, one-third of the time in each of these areas: General Medical Ward, Out-Patient Department, and Subspecialty Ward Services. Formal instruction is between 8 a.m. and 6 p.m., but student is on call throughout 24 hours. Subspecialties included are:
    a. Allergy
    b. Cardiology
    c. Dermatology
    d. Endocrinology
    e. Gastroenterology
    f. Hematology
    g. Neurology
    h. Cardiology
    i. Pulmonary Diseases
    j. Renal Diseases
    k. Rheumatology

716  Ward Clinics in Pulmonary Diseases  P 6
    1 month, offered all months except June.
    Prereq.: Med. 3rd yr. standing.
    Clerkship and seminars at Ohio Tuberculosis Hospital with emphasis on pulmonary medical problems. Formal instruction between 8 a.m. and 6 p.m., but student is on call throughout 24 hours.

733  Medical Law  P 1
    Su, Sp. 1 cl.
    Prereq.: Med. 4th yr. standing.
    The Civil and criminal aspects of legal medicine as they relate to the responsibilities, privileges, and rights of the practicing physician are considered.

736  Dispensary Clinics in Medicine  P 13
    Prereq.: Med. 4th yr. standing.

740  Dispensary Clinics in Medicine  P 6
    1 month, offered all months except June.
    The diagnosis and treatment of ambulatory patients with general and special medical problems.

749  Medical Specialties  P 4
    Prereq.: Med. 4th yr. standing.

751  Medical Specialties  P 6
    1 month, offered all months except June.
    Prereq.: 715 and permission of instructor.
    Ward clerkship in the following subspecialties of medicine, with bedside, didactic and seminar instruction. Formal instruction is between 8 a.m. and 6 p.m., but student is on call throughout 24 hours.
    a. Allergy and Dermatology
    b. Cardiology
    c. Endocrinology
    d. Gastroenterology
    e. Genetics
    f. Hematology
    g. Neurology
    h. Pulmonary Diseases
    i. Renal Diseases
    j. Rheumatology
    k. Tuberculosis
    l. General Internal Medicine (Private)

770  Basic Science Review  P 2
    1 month, May.
    Prereq.: Med. 4th yr. standing; Concur.: Pharmacol. 770.
    Didactic review of basic science developments; practice in electrocardiographic and phonocardiographic interpretation. McCoy.

771  Medical Civics and Economics  P 1
    1 month, May.
    Prereq.: Med. 4th yr. standing; Concur.: Pharmacol. 770.
    Elements of office practice and community relations. McCoy.

780  Individual Studies in Medicine  P 12, 18, 24
    G 1-5
    2, 3 or 4 months, offered all months except June.
    Prereq.: Med. 4th yr. standing, and permission of division chief.
    Research on a minor problem under faculty supervision in the following specialties of medicine:
    a. Allergy and Dermatology
    b. Cardiology
    c. Endocrinology
    d. Gastroenterology
    e. Genetics
    f. Hematology
    g. Infectious Diseases
    h. Neurology
    i. Pulmonary Diseases
    j. Renal Diseases
    k. Rheumatology

781  Internship in Medicine  P 18
    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.

782  Residency in Medicine  P 18
    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 out-patient services; consultative activities, supervisory and teaching responsibilities in patient-care team; rounds; conferences.

950  Research in Medicine  G. Arr.
    Research for thesis or dissertation purposes only.
Metallurgical Engineering

PROFESSORS: FONTANA, (Chairman), BECK, HIRTH, MUELLER (Emeritus), NOLD (Emeritus), SPEISER, SPRETTUS, and J. PIERRE, VISITING PROFESSOR LESLIE; ASSOCIATE PROFESSORS: POWELL and WILLIAMS; ASSISTANT PROFESSORS: MOAED, FACITZ, and INSTRUCTOR.

420 Industrial Experience U 5
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. Two summers or 20 weeks of approved work in industrial industries. Williams.

501 Foundry Technology U 4
W. 3 cl., 1 2-hr. lab.
Prereq.: 560.
Survey of melting procedures, fundamentals of freezing metals, bases in metals, casting structures and properties, production of machine components by casting techniques. Williams.

560 Phase Diagrams of Metals and Alloys U 3
A. 3 cl.
The phase rule. Relationship of microstructure to phase diagrams and to properties of metals and alloys. MOAD.

611 Elements of Materials Science U 4
W, Sp. 4 cl.
Metals and alloys, plastics, ceramics, and corrosion. Hirth, Rapp.

630 Physical Metallurgy I U G 3
W. 3 cl.
Prereq.: 560.
Not for graduate credit to students majoring in Met. E.
States, crystal structure, and properties of single crystals of pure metals. Fosdick.

631 Physical Metallurgy II U G 3
Sp. 3 cl.
Prereq.: 560.
Not for graduate credit to students majoring in Met. E.

632 Physical Metallurgy III U C 3
A. 3 cl.

642 Casting Manufacturing Procedures U G 3
A. 3 cl.
Prereq.: 501.
Not for graduate credit to students majoring in Met. E.
A description and analytical study of investment, die, centrifugal, permanent, mold, shell, vacuum, and slush casting methods. Williams.

645 Inspection Trip U 2
Sp. Taken between W. and Sp. Qtrns.
One week trip to visit industrial plants and laboratories. Report required. Maximum expense, $90.00. Williams.

661 Principles of Metallurgical Processes I U G 4
A. 4 cl.
Prereq.: Chem. 681 or concur.
Not for graduate credit to students majoring in Met. E.

662 Principles of Metallurgical Processes II U G 4
W. 4 cl.
Prereq.: 661, concur. Chem. 682.
Not for graduate credit to students majoring in Met. E.

663 Principles of Metallurgical Processes III U G 3
Sp. 3 cl.
Prereq.: 662.
Not for graduate credit to students majoring in Met. E.
Mass and heat transfer problems associated with metallurgical processes. Rapp.

671 Metallurgy I U G 2
Sp. 1 4-hr. lab.
Concur.: 631.
Not for graduate credit to students majoring in Met. E.
Principles and practice of metallurgy. Moazed.

672 Metallurgy II U G 2
A. 1 4-hr. lab.
Prereq.: 671.
Not for graduate credit to students majoring in Met. E.
Continuation of 671. Fosdick.

673 Metallurgy III U G 2
W. 1 4-hr. lab.
Prereq.: 672.
Not for graduate credit to students majoring in Met. E.
Continuation of 672. Moazed.

703 Heat Treatment of Steels U G 3
W. 3 cl.
Prereq.: 632.
Not for graduate credit to students majoring in Met. E.
Decomposition of austenite and the hardenability of steels. Moazed.

704 Physical Metallurgy IV U G 4
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 703.

710 Metallurgical Investigations U G 1-6
A, W, Sp. 1 cl., 2 to 4 3-hr. lab.
Prereq.: Permission of department.
Repeatable to a maximum of 9 cr. hrs.
The class is divided into groups for investigation along the lines of their special interests as follows:
a. The properties of metals and alloys.
b. Production and refining of metals.
c. Mineral and coal beneficiation.
d. Fuels.
e. Metallurgical equilibria.
f. Corrosion engineering.
712 Metallurgical Thermodynamics U G 3
A. 3 cl.
Prereq.: Chem. 683.
The application of thermodynamics to the study of metallurgical systems. Rapp.

716 Materials of Nuclear Technology U G 3
Sp. 3 cl.
Prereq.: 611 or equivo.
The physical metallurgy of reactor materials; the effects of reactor environment on the structure, the physical and mechanical properties of these materials. Poscell.

721 Foundry Molding Materials U G 3
A. 3 cl.
Prereq.: 501, Mineral 506.
A study of materials used in compounding of sand mixtures and the effect of thermal shock upon the properties of molded masses. Williams.

722 Foundry Molding Methods, Gating, and Risering U G 3
W. 3 cl.
Prereq.: 501, 663.
The manufacture of sand molds by various methods. Gating and risering—a study of fluid flow and solidification to produce sound castings. Williams.

724 Casting Control U G 3
Sp. 3 cl.
Prereq.: 721 or 722.
A study of the factors involved in the elimination of defective products. Williams.

730 Corrosion U G 3
A, Sp. 2 cl., 1 2-hr. lab.
Prereq.: Engr. 4th yr. standing.
Fontana.

731 Advanced Corrosion U G 3
W. 3 cl.
Prereq.: 730.
Theories and mechanisms of corrosion. Fontana.

735 Mechanical Metallurgy U G 3
A. 3 cl.
Behavior of metals under simple and combined stress systems. Elements of elastic theory, plastic deformation, dislocation theory, strength theories, and fracture. Sprenk.

740 Advanced Physical Metallurgy I U G 3
W. 3 cl.
Prereq.: 704.
Detailed discussion of nucleation theory, preparation of single crystals, metallic crystals and grains, interpretation of microstructure in terms of interfacial tensions, grain growth, alloying. Muozek.

741 Advanced Physical Metallurgy II U G 3
A. 3 cl.
Prereq.: 704.
Diffusion in metals. Powell.

742 Advanced Physical Metallurgy III U G 3
Sp. 3 cl.
Prereq.: 740 and 741.
Classification of phase transformation, precipitation from solid solution, martensitic transformations, decomposition of austenite, order-disorder. Sprenk.

743 Advanced Physical Metallurgy IV U G 3
A. 3 cl.
Prereq.: 742.
Relation of properties to microstructure. Muozek.

745 Shaping and Forming of Metals U G 3
W. 3 cl.
Prereq.: 735.
Fundamental aspects of deformation of metals by forging, rolling, wire drawing, tube drawing, extrusion, piercing, and deep drawing. Sprenk.

759 Engineering Metallurgy I U G 3
A. 3 cl.
Prereq.: 703.
Basic properties of metals and alloys, cost structure, design factors, specifications, statistical methods. Selection of metals and alloys, service failures. Sprenk.

760 Engineering Metallurgy II U G 3
W. 3 cl.
Prereq.: 759.
Continuation of 759. Sprenk.

761 Principles of Extractive Metallurgy I U G 3
W. 3 cl.
Prereq.: 663, 712, or permission of instructor.
Unit processes in metal extraction and refining. St. Pierre.

762 Principles of Extractive Metallurgy II U G 4
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 761.

763 Process Metallurgy U G 3
W. 3 cl.
Prereq.: 762.

770 Theory and Properties of Metals U G 3
Sp. 3 cl.
Prereq.: 704, Chem. 683, and Math. 544, or permission of instructor.
Dependence of physical properties on structure; regularities in the structure of alloy systems; stability of alloy systems; transport phenomena in metals and alloys; magnetic phenomena. Speiser.

771 Theory and Properties of Metals U G 3
A. 3 cl.
Prereq.: 770.
Continuation of 770. Speiser.

772 Theory and Properties of Metals U G 3
W. 3 cl.
Prereq.: 771.
Continuation of 771. Speiser.
774 Advanced Properties of Materials U G 3
Sp. 3 cl.
Prereq.: Math. 544, Physics 614, and graduate standing or permission of instructor.

776 Advanced Structure of Materials U G 3
W. 3 cl.
Prereq.: 611 or equiv.
Not open to students majoring in Met. E.

780 Structures of Metals and Alloys U G 3
W. 3 cl.
Prereq.: 632 and 704, Math. 544, Chem. 683, or permission of instructor.

790 * Energetics and Kinetics of Surfaces U G 3
Sp. 3 cl.
Prereq.: 712 or equiv.
Discussion of properties of interfaces and their role in rate processes. Mouss.

801 Graduate Seminar G 1
Prereq.: Met. E. grad. standing.
Repeatable to a maximum of 6 cr. hrs.
Discussion of current thesis problems and outstanding current literature in metallurgical engineering. Round table discussion of selected metallurgical topics.

815 * Physical Chemistry of Process Metallurgy G 3
Sp. 3 cl.
Prereq.: 763 or permission of instructor.
Detailed discussion of current literature related to the refining of metals. St. Pierre.

820 Quantitative Dislocation Theory G 3
W. 3 cl.
Prereq.: Math. 544 and permission of instructor.

830 Point Defects in Crystalline Materials G 3
Sp. 3 cl.
Prereq.: 712 and 730 or equiv., or permission of instructor.
A thermodynamic and electrochemical treatment of the formation, concentrations, mobilities, and interactions of ionic and electronic point defects in ionic compounds at high temperatures. Rapp.

833† Theory and Properties of Metals G 3
A. 3 cl.
Prereq.: 772 or Elec. E. 769, or permission of instructor.
Continuation of 770-771-772. Speiser.

835 Advanced Mechanical Metallurgy G 3
Sp. 3 cl.
Prereq.: 735.

843 Metallurgical Kinetics G 3
A. 3 cl.
Prereq.: 845.
Application of rate theory to transport phenomena in metals and alloys, and to metallurgical reactions. Speiser.

844 Advanced Metallurgical Thermodynamics G 3
A. 3 cl.
Prereq.: 712.

845 Metallurgical Thermodynamics G 3
W. 3 cl.
Prereq.: 844.
Continuation of 844 with major emphasis on practical applications. Numerous problems. Speiser.

850 Theoretical Metallurgy G 3
A. 3 cl.
Prereq.: Met. E. graduate 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.

851 Theoretical Metallurgy G 3
W. 3 cl.
Prereq.: 850.
Continuation of 850.

852 Theoretical Metallurgy G 3
Sp. 3 cl.
Prereq.: 851.
Continuation of 851.

901 Advanced Topics in Metallurgical Engineering G 2
A, W, Sp. 2 cl.
Prereq.: Permission of the instructor.
Repeatable to a maximum of 8 cr. hrs.
Pertinent topics to be announced.

950 Research in Metallurgy Arr.
Research for thesis or dissertation purposes only.
Microbiology

PROFESSORS: IRHEINS (Acting Chairman), STAHLY (Vice Chairman), BIRKELAND, BROHL, IDDOUD, HUDSON (Emeritus), MACPHERSON, IRANDELLES, IRIDLLE, ISAILAW, IWEISER, and WOOLSEY (Emeritus). ASSOCIATE PROFESSORS: ROSE and ISUE, ASSISTANT PROFESSORS ALCENDER-FER, ICHORPENNING, IDUGAN, KINSLEY, IKREISER, WOLFF, and WEAVER.

For related courses see Biology.

409 Microbiology for Dental Hygienists

W. 2 cl., 2 2-hr. lab.
Prereq.: Admission to Dental Hygiene program.
A survey of techniques and principles of bacteriology with reference to sterilization, asepsis, and disease prevention. Note and assistants.

509 Microbiology in Relation to Man

Su, A, W, Sp. 3 cl., 2 1-hr. lab.
Prereq.: 10 hrs. of natural science.
Not open to students with credit for 600 level courses in Microbiol. Note to be taken on recurrent 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. Birkeland, Weiser, Mote and assistants.

510 Microbiology for Nurses

Su, W, Th. 3 cl., 2 3-hr. lab.
Prereq.: Nursing 1st yr. standing.
A survey of the principles and techniques of microbiology and immunology with special emphasis on their application to nursing. Stahl, Wolff and assistants.

511 General Microbiology

A. 3 cl., 6 hr. 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. Stahl, Kinsley and assistants.

512 General Microbiology

W. 3 cl., 6 hr. 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. Huldes, Dugan and assistants.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600 AND 700

Unless otherwise indicated the prerequisites for 600 and 700 courses are fifteen hours of chemistry and ten hours of biological science.

602 Veterinary Microbiology

W. 3 cl., 3 2-hr. lab.
A study of the mechanisms of infection and resistance to disease, followed by discussion and laboratory exercises on characteristics of bacteria pathogenic for animals. Keeler and assistants.

603 Veterinary Microbiology

Sp. 3 cl., 2 2-hr. lab.
Continuation of Microbiol. 602. Lectures and laboratory exercises deal with the characteristics of bacteria, viruses, rickettsiae, and viruses that are pathogenic for animals. Keeler and assistants.

605 Basic Microbiology for Science Teachers

W. 3 cl., 3 2-hr. lab.
Prereq.: Biological science majors in the College of Education, or students in the Academic Year Institute, or graduate 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. Stahl and assistants.

607 General Microbiology

Su, A, W, Sp. 3 cl., 3 2-hr. lab.
May not be taken concurrent with 605.
Not for graduate credit to students majoring in Microbiol.
Not open to students with credit for 505.
The characteristics of microorganisms and their applications in everyday processes; experience in isolating and identifying bacteria. Stahl, Kinsley, Dugan, Wolf and assistants.

608 Introduction to Pathogenic Microbiology

Sp. 3 cl.
Prereq.: 607.
A general course dealing with the mechanism of infection and resistance, and the epidemiology of microbial diseases of man. Chernoff.

610 Dairy Microbiology

W. 3 cl.
Prereq.: 550 or 607.
Microorganisms involved in desirable and undesirable fermentations and methods of control. Emphasis is placed upon milk-borne diseases in relation to the public health. Weiser.

611 Dairy Microbiology: Laboratory

W. 3 2-hr. lab.
Prereq. or concurrent: 610.
A study of standard methods used to control microorganisms discussed in Microbiol. 610. Normal and abnormal fermentation are studied in detail. Weiser and assistants.

620 Pathogenic Protozoology

W. 3 cl.
Prereq.: 622 and 623 or permission of instructor.
Various pathogenic protozoa of animals; host-parasite relationships; pathogenesis of protozoa diseases; structural characteristics of parasites. Keeler.

622 Principles of Infection and Resistance

Su, A, W, Sp. 3 cl.
Prereq.: 607 or equiv.
A study of host-parasite relationships, with emphasis on pathogenicity and immunity. Dodd, Chernoff.

623 Serology

Su, A, W, Sp. 3 cl., 3 2-hr. lab.
Prereq. or concurrent: 622.
Theories, principles and techniques of the immunological phenomena such as acquired immunity, hypersensitivity, blood groups, etc., and the fundamental properties of antigens, antibodies, and their reactions. Dodd, Chernoff and assistants.

633 Advanced General Bacteriology

A. 3 cl., 2 2-hr. labs.
Prereq.: 607 and Chem. 551 or 647 or equiv.
An advanced and detailed study of the basic phenomena of bacterial morphology, composition, growth, cultivation, variation, and classification. Huldes and assistants.
COURSES OF INSTRUCTION

MICROBIOLOGY

634 Sanitary Microbiology U G 3
W. 2 cl., 2 2-hr. lab.
Prereq.: 550 or 607.
The microbiology of municipal water purification. The role of microorganisms in treatment of domestic sewage and industrial wastes. Dugan and Assistant.

635 Physiology of Bacteria U G 3
W. 3 cl.
Prereq.: 633 and Chem. 551, 552 or 647, 648 or equiv.
Nutritional requirements of bacteria, mechanisms of anaerobic dissimilation of carbon compounds, and industrial fermentation. Randles.

636 Food Microbiology U G 3
A. Sp. 3 cl.
Prereq.: 607.
The role of microorganisms in normal and abnormal fermentation in foods and related sanitation and public health problems are discussed. Weiser, Kinsley.

637 Food Microbiology Laboratory U G 3
A. 3 2-hr. lab.
Prereq.: 607, 638 or concur. 608, or 634 or 659 or equiv. recommended or concur.
Laboratory work on organisms discussed in Microbiol. 636. Weiser, Kinsley and Assistant.

638 Physiology of Bacteria U G 3
Sp. 3 cl.
Prereq.: 635 and Chem. 551, 552 or 647, 648 or equiv.
Bacterial enzymes, mechanisms, and energy relationships in respiration, nitrogen metabolism, and bacterial synthesis. Randles.

649 Viruses U G 3
W. 3 cl.
Prereq.: 622 and 633, and 654 or 659, or equiv.
The nature and action of viruses as ultra-microscopic parasites of man, animals, and plants. Wolf.

652 General and Pathogenic Microbiology for Dental Students P G 6
W. 4 cl., 2 2-hr. lab.
Prereq.: Dent. 2nd yr. standing.
A survey of the techniques and principles of microbiology and immunology with special reference to the microbiology of the oral cavity. Dodd, Rosen and assistants.

654 Pathogenic Bacteriology U G 5
A. Sp. 3 cl., 3 2-hr. lab.
Prereq.: 607 and 632.
A study of the pathogenic cocci and enteric bacilli causing diseases of man with emphasis on properties associated with infection and on epidemiologic and immunologic relationships. Rhines and Assistants.

659 Pathogenic Bacteriology U G 5
Su. W. 3 cl., 3 2-hr. lab.
Prereq.: 622.
A study of the mycobacteria, corynebacteria, clostridia, pasteurella, and spirochetes causing diseases of man with epidemiologic and immunologic relationships. Rhines and Assistants.

Medical Microbiology
(See Pathology 667)

Soil Microbiology
(See Agronomy 665)

A-160

701 Minor Investigations U G 1-5
Prereq.: Microbiol. 4th yr. major or grad. standing and permission of instructor.
Repeatable.
Outlined by instructor to meet individual student's needs.

710 History of Microbiology and Allied Fields U G 3
Sp. (Lectures, confr., and library work.)
Prereq.: Microbiol. advanced graduate standing or permission of instructor.
The historical development of bacteriology, immunology, and allied fields. Hudson.

720 Viruses: Laboratory G 3
Sp. 2 3-hr. labs.
Prereq.: 622, 633, 654, 659, and 649, 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 and assistant.

7221 Immunology G 3
Sp.
Prereq.: 622, 633, 654, and 659, courses in Biochem. and Phys. Chem. Permission of instructor.
Advanced studies of immunological phenomena, with emphasis on the physical and chemical aspects of antigens and antibodies. Dodd.

735 Bacterial Physiology Laboratory U G 5
Sp. 3 cl., 2 3-hr. lab.
Prereq.: 638 and permission of instructor.
Laboratory study of bacterial physiology by a variety of techniques. Randles, Dugan and assistant.

807 Seminar in Microbiology G 1
A.
Prereq.: Microbiol. graduate standing.

808 Seminar in Microbiology G 1
W.
Continuation of 807.

809 Seminar in Microbiology G 1
Sp.
Continuation of 838.

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

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

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

950 Research in Microbiology G Arr.
Research for thesis or dissertation purposes only.
Military Science

Office: 204 Military Science Bldg., 2121 Tuttle Park Place.
Army Reserve Officers Training Corps
COLONEL VON ROHR and STAFF.

BASIC MILITARY SCIENCE (FRESHMAN AND SOPHOMORES)

401 American Military History U 2
A, W. 1 2-hr. cl., 1 drill hr.
An introduction to the Army and the ROTC. American military history from 1607 through 1865. Military drill.

402 American Military History U 2
W, Sp. 1 2-hr. cl., 1 drill hr.
Prereq.: 401 or permission of department head.
American military history from 1865 to the present. Military drill.

403 Individual Weapons and Marksmanship U 2
Su, A, W, Sp. 1 2-hr. cl., 1 drill hr.

501 Map and Aerial Photograph Reading U 2
Su, A. 1 2-hr. cl., 1 drill hr.
Application of basic principles of map reading, emphasizing terrain, evaluation, including map symbols, military grid system, and elementary aerial photographs reading. Military drill and command.

502 U.S. Army and National Security U 2
W. 1 2-hr. cl., 1 drill hr.

503 Introduction to Operations and Basic Tactics U 2
Su, Sp. 1 2-hr. cl., 1 drill hr.
Mission, organization, and composition of the infantry rifle squad; combat formations, patrolling; field fortifications and camouflage; principles of offensive and defensive combat. Military drill and command.

ADVANCED MILITARY SCIENCE (JUNIORS AND SENIORS)

601 Military Leadership and Military Teaching Principles A 2 2-hr. cl., 1 drill hr.
Prereq.: 401 through 502 or equiv.
Study of psychological, physiological, and sociological factors affecting human behavior; study of the principles, methods, and techniques fundamental to military instruction. Leadership, command and conduct of military drill.

602 Small Unit Tactics and Communications U 3
W. 2 2-hr. cl., 1 drill hr.
Prereq.: 601 or permission of Professor of Military Science.
Study of the principles and fundamentals of small unit tactics in combat operations, including communications systems. Leadership, command and conduct of military drill.

603 Branches of the Army and Tactics U 3
Sp. 2 2-hr. cl., 1 drill hr.
Prereq.: 602 or permission of Professor of Military Science.
Familiarization with the various branches of the Army. A continuation of the principles and fundamentals of small unit tactics in combat operations. Leadership, command and conduct of military drill.

MINERALOGY

701 Military Operations U 3
A, W. 2 2-hr. cl., 1 drill hr.
Prereq.: 601, 603, or permission of professor of Military Science.
Study of Division Brigade, Battalion and Company organization and operations to include estimates and orders of Infantry units in the attack, defense, and withdrawal with emphasis on military intelligence and tactics. Leadership, command and conduct of military drill.

702 Logistics and Administration U 3
Su, W. 2 2-hr. cl., 1 drill hr.
Prereq.: 701 or permission of professor of Military Science.
Study of logistics, medical service evacuation, troop movements, motor transportation and Army administration. Leadership, command and conduct of military drill.

703 Military Justice and The United States in World Affairs U 3
Sp. 2 2-hr. cl., 1 drill hr.
Prereq.: 702 or permission of professor of Military Science.
Study of Military Justice. Review of Map Reading and student presentations on the role of the United States in world affairs considering world economic, political, geographic, and resource factors. Leadership, command and conduct of military drill.

Mineralogy

Office: 143 Metallurgical Building, 116 West 19th Avenue.
PROFESSORS FOSTE (Chairman), McCONNELL, McLACHLAN, and M.WENDEN; ASSOCIATE PROFESSOR SEHLM; ASSISTANT PROFESSOR TETTENHORST.

506 Principles of Mineralogy U 5
A, W, Sp. 3 cl., 2 2-hr. lab.
Prereq.: Chem. 412 or 405, Math. 439 or 417.
Not open to students with credit for 511 or 512.
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. Ehlers, Tottenhorst.

511 Crystallography and Descriptive Mineralogy U 5
A. 3 cl., 2 2-hr. lab.
Prereq.: Chem. 412 or 405.
Not open to students with credit for 506.
Principles of crystallography, using models, crystals, and cleavage fragments. Physical and chemical properties, origin, association, occurrence, and site identification of about 160 of the most important minerals. Emphasis on crystallochemical principles. Tottenhorst, Weden.

A-161
 COURSES OF INSTRUCTION
MINERALOGY

512 Crystallography and Descriptive Mineralogy U 5
W. 3 cl., 2 2-3 hr. lab.
Prereq.: 511.
Continuation of 511.

601 Advanced Crystallography U G 5
A. 3 cl., 2 2-3 hr. lab.
Prereq.: 506, 511, or equin., or permission of instructor.

605 Thermochemical Mineralogy U G 5
A. 5 cr. hrs.
Prereq.: Chem. 683 or equin., or permission of instructor.
Thermal properties of minerals. Application of high temperature equilibrium to problems of petrology and technology, using phase diagrams. Foster.

611 Microscopy of Opaque Minerals U G 3
Sp. 3 2-4 hr. lab.
Prereq.: 506 or 512, 631.
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. Wendem.

621 Microscopic Mineralogy U G 5
A, W. 2 cl., 3 2-3 hr. lab.
Prereq.: 506 or 512, and Physics 412 or equin. A, Geol. graduates: W, Cer., E. majors.
Not open to students with credit for 625.

701 Mineralogical Investigations U G 3-5
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, or other advanced non-thesis research. Wendem, Ehlers, Foster, Tettenhorst.

706 Advanced Thermochemical Mineralogy U G 3
W. 3 cl.
Prereq.: 605.
Derivation and interpretation of phase diagrams of ternary and quaternary systems of importance in petrology and technology. Foster.

722 Microscopic Petrography U G 4
W. 2 cl., 2 2-3 hr. lab.
Prereq.: 521.

725 Advanced Optical Mineralogy U G 3
A. 3 2-3 hr. lab.
Prereq.: 722 or equin.
Theory and determination of optical constants and directional features using Universal Stage. Includes determination of optical angles, feldspar compositions, double variational technique and petrofabric analysis. Ehlers.

730 Clay Mineralogy U G 3
Sp. 3 cl., conf.
Prereq.: 506 and 724, 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.

754 X-Ray Crystallography U G 5
W. 3 cl., 2 2-3 hr. lab.
Prereq.: 506, 511, or equin.
Not open to students with credit for Chem. 854.

755 Crystallochemical Mineralogy U G 3
Sp. 3 cl.
Prereq.: 506, 512, 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.

801 Seminar in Mineralogy G 1-3
A, W, Sp. 2-6 hr. conf.
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.

950 Research in Mineralogy and Petrography G Arr.
Research for thesis or dissertation purposes only.

Mining Engineering

Office: 212 Lord Hall, 124 West 17th Avenue.
Mr. W. J. Verner

431 Industrial Work U 5
A.
Ten weeks of approved summer work in the mining industries.
A written report on the operation and design of the plant, including flow sheets and drawings, is required by November 1. Employer evaluation letter is required. Verner.

5041 Introduction to Mining Engineering U 3
Sp. 3 cl.
Prereq.: Prof. Dic. 1st yr. standing.
Verner.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Notes</th>
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<tbody>
<tr>
<td>602</td>
<td>Explosives and Rock Work</td>
<td>U G 3</td>
<td>A: 3 cr.</td>
<td>Not for graduate credit to students majoring in Min. E. Explosives and the principles of application to mining. Verner.</td>
</tr>
<tr>
<td>603</td>
<td>Mining Systems Engineering</td>
<td>U G 3</td>
<td>W: 3 cr.</td>
<td>Not for graduate credit to students majoring in Min. E. Fundamentals of mining systems for bedded, massive, vein, and surface deposits. Verner.</td>
</tr>
<tr>
<td>604</td>
<td>Mining Systems Engineering</td>
<td>U G 3</td>
<td>Sp: 3 cr.</td>
<td>Continuation of 603. Verner.</td>
</tr>
<tr>
<td>632‡</td>
<td>Inspection Trip</td>
<td>U 2</td>
<td>Sp:</td>
<td>A trip to coal, metallic, and non-metallic mines plus mineral processing and preparation plants. A written report is required by November 1.</td>
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<tr>
<td>642‡</td>
<td>Mining Evaluation and Analysis</td>
<td>U G 3</td>
<td>W: 3 cr.</td>
<td>Continuation of 641. Verner.</td>
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<tr>
<td>643‡</td>
<td>Mining Evaluation and Analysis</td>
<td>U G 3</td>
<td>Sp: 3 cr.</td>
<td>Continuation of 642. Verner.</td>
</tr>
<tr>
<td>704‡</td>
<td>Mine Gases and Ventilation</td>
<td>U G 3</td>
<td>A: 3 cr.</td>
<td>The principal mine gases including poisonous and explosive gases. Principles of fluid mechanics as they apply to ventilation of mines. Verner.</td>
</tr>
<tr>
<td>707</td>
<td>Mining Plant Engineering</td>
<td>U G 4</td>
<td>A: 3 cr., 1 3-hr. lab.</td>
<td>Principles of mining haulage, hoisting, pumping, and energy transmission systems. Applications to mining problems. Verner.</td>
</tr>
<tr>
<td>708</td>
<td>Mining Plant Engineering</td>
<td>U G 3</td>
<td>W: 3 cr.</td>
<td>Continuation of 707. Verner.</td>
</tr>
<tr>
<td>709</td>
<td>Mining Plant Engineering</td>
<td>U G 3</td>
<td>Sp: 3 cr.</td>
<td>Continuation of 708. Verner.</td>
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</tbody>
</table>

### Music

**Office:** 105 Hughes Hall, 1099 North College Road.

**Professors:** SCHEIDER (Acting Director), WEIGEL (Emeritus), WILSON (Emeritus), HARMON, JEFFERSON, EVANS, HEDT, HADDAD, HANSEN, HADDEN, HILDE, HOPPEN, HUGHES, HUGHES, LIVINGSTON, MAHROD, MCGINNIS, MCRAY, MOONEY, POLAND, RAMSEY, SPORN, TALLEY-KARDOS, THOMAS, TUTTIS, VEDDER, WALKER, and WILSON.

**Professor Emeritus:** BEAVERS, BARNES, BULKHALE, CADY, COOPER, DAVIS, KEARNES, MIXED, MUSCHIE, REIM, SEXTON, SIMMONS, DUNMORE, and WHITTON.

**Instructors:** BAKER, DART, GREEN, HENNING, and MANLEY.

Preceding the class sessions of Mus 401 and Mus 408 A, B, C, D, E, F, or G, placement tests will be given to determine the ability of students in these subjects. (See School of Music for details of time and place.) Students with less than the expected ability will be requested to change from the original registration to Mus 400X or Music 400 A, B, C, D, E or G.

**400 Applied Music**


Include letter with number on schedule card.

The fundamentals and techniques of applied music. This course is designed for, and open only to, students who do not qualify in the placement test, or who, in the first quarter, do not maintain satisfactory standards of work in Music 408A, B, C, D, E, F, or G. Applied Music Staff.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>400A</td>
<td>Piano</td>
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<tr>
<td>400B</td>
<td>Voice</td>
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<tr>
<td>400C</td>
<td>Strings</td>
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<td>400D</td>
<td>Woodwinds</td>
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<tr>
<td>400E</td>
<td>Brass</td>
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<tr>
<td>400G</td>
<td>Percussion</td>
</tr>
</tbody>
</table>

A-163
400 Introduction to Music U 1
2 cr. for 2 hrs. (400 X, Y, Z) section meetings, or concert attendance each week for all freshmen. Attendance at twenty-seven concerts or recitals for 3 crs. (400 N, P, R) on a cumulative basis for all sophomores. A final grade for credit will be given at the end of the 8th crs.

Lectures, discussions, conferences, and field trips, which will include: (a) Orientation of the student to University resources and to requirements of the School of Music. (b) Introduction to fields of music. (c) Assessment and advising of the student. (d) Recital and Concert attendance.

A record of recital attendance will be kept in the School of Music office. Each course as follows is prerequisite to the next course. Moore.

400K Orientation 400N Concert Attendance
A. A, W, Sp. 0 A, W, Sp. 0
400L W. 0 400P A, W, Sp. 0
400M Sp. 0 400R A, W, Sp. 1
Concerts and recitals approved for attendance credit include all Meridian Auditorium and Hughes Hall events.

400X Review of the Fundamentals of Music Theory U 0
A. 6 lab. hrs. This course is designed for students who do not qualify in placement tests for Music 401. Poland.

401 Music Theory U 3
A. 6 lab. hrs. Prereq.: 401.

The elements of music. Development of aural and notational skills. Theory Staff.

402 Music Theory U 3
W. 6 lab. hrs. Prereq.: 401.

Interval studies, rhythmic drill, sight-singing, dictation, keyboard practice, detailed study of primary harmonies and the dominant-seventh chord. Theory Staff.

403 Music Theory U 3
Sp. 6 lab. hrs. Prereq.: 402.

Complex interval studies, rhythmic drill, sight-singing, dictation, keyboard practice, non-chordal tones, the introduction of secondary triads. Theory Staff.

404 Introduction to Music U 3
Su, A, W, Sp. 3 cr. Prereq.: 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. Main, Broekema.

408 Applied Music U 1-2
(Include letter with number on schedule card.) Prereq.: Passing of Placement Test or 400 A, B, C, D, E, F, or G. Concur: 400 N, P, or R.

Instruction in Applied Music for the purpose of developing musicianship, performance, and a wide reading knowledge of music literature. Instruction is given in individual lessons of two one-half hour periods each week. In addition, students are required to attend the Studio Classes and Honors Recitals on Tuesday and Thursday at 1:00 p.m. during the 3rd, 5th, 7th and 10th week of each quarter. Open to other qualified students within the limits of instructional facilities by permission of the Director of the School of Music.

408A Piano
Su. (either term) (1 cr. hr.), A, W, Sp. (2 cr. hrs.) Haddad, Jones, Mooney, Whallon. Tenney-Kordos.

408B Voice
Su. (either term) (1 cr. hr.), A, W, Sp. (2 cr. hrs.) Gilliland, Steiger, Musich, Dieckes, Cooper, Reins.

408C Strings

408D Woodwinds

408E Brass
Su. (1st term) (1 cr. hr.), A, W, Sp. (2 cr. hrs.) Evans, Kearns, Suddendorf, Dart.

408F Organ
A, W, Sp. (2 cr. hrs.) Held.

408G Percussion

451 Introduction to the History of Western Music I U 3
A, W, Sp. 3 cr. Prereq.: 434.

Not for credit to Mus. majors.

An historical survey of music from classical antiquity to about 1750. Kearns.

452 Introduction to the History of Western Music II U 3
Su, A, W, Sp. 3 cr. Prereq.: 404.

Not for credit to Mus. majors.

An historical survey of music from 1750 to the present. Kearns.

508 Applied Music U 1-2
(Include letter with number on schedule card.) Prereq.: 408 A, B, C, D, E, F, or G. Concur: 400 N, P, or R.

Instruction in Applied Music for the purpose of developing musicianship, performance, and a wide reading knowledge of music literature. Instruction is given in individual lessons of two one-half hour periods each week. In addition, students are required to attend the Studio Classes and Honors Recitals on Tuesday and Thursday at 1:00 p.m. during the 3rd, 5th, 7th and 10th week of each quarter. Open to other qualified students within the limits of instructional facilities by permission of the Director of the School of Music.

508A Piano
Su. (either term) (1 cr. hr.), A, W, Sp. (2 cr. hrs.) Haddad, Jones, Mooney, Whallon. Tenney-Kordos.

508B Voice
Su. (either term) (1 cr. hr.), A, W, Sp. (2 cr. hrs.) Gilliland, Steiger, Musich, Dieckes, Cooper, Reins.

508C Strings
508D Woodwinds

508E Brass
Su. (1st term) (1 cr. hr.), A, W, Sp. (2 cr. hrs.) Evans, Kearns, Suddendorf, Dart.

508F Organ
A, W, Sp. (2 cr. hrs.) Held.

508G Percussion

509 Applied Music U 2-4
(Include letter with number on schedule card.)
Prereq.: 408 A, B, C, D, E, F, or G. Concert: 400 N, F, or R. Performance in applied music at the professional level. Instruction in Applied Music for the purpose of developing musicianhip, performance, and a wide reading knowledge of music literature.

Instruction is given in individual lessons of two one-half hour periods each week. In addition, students are required to attend Studio Classes and Honors Recitals on Tuesday and Thursday at 1:00 p.m. during the 3rd, 5th, 7th, and 9th week of each quarter. Open to other qualified students within the limits of instructional facilities by permission of the Director of the School of Music.

509A Piano

509B Voice
Su. (either term) (2 cr. hrs.), A, W, Sp. (4 cr. hrs.) Galliland, Staiger, Mischuck, Diecks, Cooper, Reims.

509C Strings

509D Woodwinds

509E Brass
Su. (1st term) (2 cr. hrs.), A, W, Sp. (4 cr. hrs.) Evans, Kearns, Suddendorf, Dart.

509F Organ

509G Percussion

510 Graduating Recital U 1-2
Su. (either term) (1 cr. hr.), A, W, Sp. (2 cr. hrs.)
Prereq.: 509.

Special preparation for the presentation of the applied music graduating recital for the B. Mus. degree. Applied Music Staff.

511 Applied Music Methods and Materials U 1-2
(Include letter with number on schedule card.)

511A Piano

511B Voice

511C Strings

511D Woodwinds

511E Brass
Su. (1st term) (1 cr. hr.), 4 cl., W. (2 cr. hrs.), 4 cl. Evans, Dart.

511G Percussion
Sp. (2 cr. hrs.), 4 cl. Spohn.

512 Applied Music, Methods and Materials U 2
(Include letter with number on schedule card.)
Prereq.: 511.

512C Strings

512D Woodwinds

512E Brass
Sp. (2 cr. hrs.), 4 cl. Evans, Dart.

514 Music for Group Recreation U 2
Sp. 3 hrs.
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.

515 Fundamentals of Opera U 2
A, W. 4 lab. hrs.
Reproducible to a maximum of 4 cr. hrs.
Instruction and laboratory experience in rehearsal techniques, study of operatic literature, and coaching and study of operatic roles. Reims.

517 Ear-Training I U 2
A. 4 ab. hrs.
Prereq.: 403.
Sight-singing, dictation, and keyboard harmony.

518 Ear-Training II U 2
W. 4 lab. hrs.
Prereq.: 517 and 527.
Intermediate sight-singing, dictation and keyboard harmony.

519 Ear-Training III U 2
Sp. 4 lab. hrs.
Prereq.: 518 and 528.
Advanced sight-singing, dictation, and keyboard harmony.

522 Elementary School Music U 4
A. 4 cl.
Prereq.: Mus. 3rd yr. standing. Not open to students with credit for 622.
The function of music in the elementary schools and the introduction to music material and teaching procedures for this level. Thomas, Ramsey.

523 Music for children U 3
W. 3 cl.
Prereq.: 533.
Not open to students with credit for 633.
Singing and listening materials suitable for the elementary classroom and for school and public performances. Thomas, Wilson.

524 Vocal Music for Junior and Senior High Schools U 4
High Schools
Sp. 4 cl.
Prereq.: 532.
Not open to students with credit for 624.
The function of vocal music in the junior and senior high school and the introduction to music material and teaching procedures for this level. Cody, Simmons, Ramsey.
COURSES OF INSTRUCTION

MUSIC

527 Harmony I
   A. 3 cl.
   Prereq.: 403.
   Seventh chords, common-chord modulation, borrowed tones and borrowed chords.

528 Harmony II
   W. 3 cl.
   Prereq.: 527.
   Secondary dominants, modulation to remote keys and elementary instrumentation.

529 Harmony III
   Sp. 3 cl.
   Prereq.: 528.
   Chromatic chord forms, chromatic modulation, composition.

530 Form and Analysis
   Su, A. 3 cl.
   Prereq.: 529.

532 Instrumentation
   W, Sp. 3 cl.
   Prereq.: 529.
   An elementary course in scoring for the instruments of the orchestra and the band. McClure, Barnes.

540 Beginning Conducting
   A, W, Sp. 3 cl.
   Prereq.: 527.
   The basic technique of the baton. A syllabus of selected literature and reading assignments will be used as a basis of study. Gilliland, McGinnis.

541 Instrumental Music for the Junior and Senior High School
   W. 4 cl.
   Prereq.: 522.
   The function of instrumental music in the junior and senior high school and the introduction to music material and teaching procedures for this level. Benner, Wilson.

546 Survey and Appreciation of Music Literature
   A, W, Sp. 4 cl.
   Prereq.: Elem. Ed. standing.
   Lectures, illustrations and analyses of elements involved in active, intelligent listening, understanding and appreciation of representative works of the great masters of music. Sexton and others.

547 Fundamentals of Music
   Su, A, W, Sp. 5 cl.
   Prereq.: Elem. Ed. standing. Ear-training, music reading, creative writing, voice production, and some instrumental experience. School song materials are used for this work. Sexton and others.

548 Music Education
   Su, A, W, Sp. 5 cl.
   Prereq.: Elem. Ed. standing and 547.
   Music literature and teaching aids for children, including singing, rhythmic, creative, and listening experiences, and their presentation. Sexton and others.

551 Music History
   A. 4 cl., 1 lab. hr.
   Prereq.: 403.
   The development of music from the earliest times through the sixteenth century. Davis.

552 Music History
   W. 4 cl., 1 lab. hr.
   Prereq.: 551.
   The development of music in the seventeenth and eighteenth centuries. Davis.

553 Music History
   Sp. 4 cl., 1 lab. hr.
   Prereq.: 553.
   The development of music in the nineteenth and twentieth centuries. Davis.

562 Counterpoint
   A. 3 cl.
   Prereq.: 539.
   A fundamental course in counterpoint including species counterpoint, double counterpoint, imitation, and two-voice canon. Barnes, Walker.

576 Field Experience in Church Music
   Prereq.: 540 and 671, or concur. 671.
   Repeatable to a maximum of 8 cr. hrs.
   Supervised experience in the actual church situation. Held.

581 Composition
   W, Sp. 3 cl.
   Prereq.: 529.
   Creative writing in the small forms. Vedder, Barnes.

601 The Romanticists
   U G 3
   W. 3 cl.
   Prereq.: 530 or 562 and 553.
   The music of the romantic period in Germany and France. Davis.

602 The Opera
   Sp. 3 cl.
   Prereq.: 530 or 562 and 553.
   A survey of the antecedents of opera and a study of representative works from each of the major periods in the history of opera. Remis.

603 Modern Music
   U G 3
   Sp. 3 cl.
   Prereq.: 530 or 562 and 553.
   Major trends in the development of music since 1900. Hoppin.

604 Organ Literature
   U G 3
   Sp. 3 cl.
   Prereq.: 530 or 562 and 553.
   A comprehensive survey from the earliest compositions to the works of present-day composers. Held.

607 The Classic Period
   U G 3
   A. 3 cl.
   Prereq.: 530 or 553 and 533.
   Vocal and instrumental music of the middle and late eighteenth century. Davis.

609 Medieval Modes
   U G 3
   A. 3 cl.
   A study of the historical background and characteristics of plainsong, including the technical aspects of notation, modes, rhythm, and chironomy. Kuechle.

610 Piano Literature
   U G 3
   Su (1st term), Sp. 3 cl.
   Prereq.: 530 or 562 and 553.
   A study of the piano sonatas and other characteristic forms from the pre-piano period to the present time. Haddad, Tetley-Kardos.

A-166
611 The Baroque Era U G 3
Su. 3 cl.
Prereq.: 530 or 562 and 553.
The development of musical styles from Monteverdi through Bach.
Minter.

612† Music in the Renaissance U G 3
W. 3 cl.
Prereq.: 530 or 562 and 553.
The development of musical styles from Dufay through Palestrina and Lassus.

613† Music in the Middle Ages U G 3
A. 3 cl.
Prereq.: 530 or 562 and 553.
The development of western music through the fourteenth century. Hoppen.

614† Choral Literature U G 3
W. 3 cl.
Prereq.: 530 or 562 and 553.
A survey of choral music from the Renaissance to the present. Livingston.

615 The Literature of Chamber Music U G 3
A. 3 cl.
Prereq.: 530 or 562 and 553.
A survey of chamber music of the Classic and Romantic periods. Livingston.

616 Symphonic Literature U G 3
Su, W. 3 cl.
Prereq.: 530 or 562 and 553.
A survey of orchestral music from the classic period to the present. Minter.

617 Individual Composers: Their Lives and Works U G 3
Sp. 3 cl.
Prereq.: 530 or 562 and 553.
A comprehensive study of the works of an individual composer. Topic varies from year to year. 1905-66: Haydn. Main.

620 Introduction to Bibliographic Method U G 3
Su. A. 3 cl.
Prereq.: 530 or 563 and 553.
The collection, examination and documentation of information about music. Including general as well as music library materials. Minter.

621 Basic Concepts in Music Education G 3
Su. (2nd term), A. 3 cl.
Prereq.: Ed. 530 or 538.
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. Schneider, McBride.

622† Music Education in the Elementary School I G 3
Su. (1st term) 5 cl.
The role of the general vocal music program in elementary schools including the relationship of music to the total learning program. Ramsey.

623 Music Education in the Elementary School II G 3
Sp. 3 cl.
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. Ramsey.

624† Vocal Music Education in the Secondary School G 3
Su (2nd term). Sp. 5 cl.
The organization, direction and purpose of the vocal music program in the secondary schools. Ramsey, Barr.

625 The Study and Use of Literature for Vocal Music Education G 3
Su (1st term). 5 cl.
A study of vocal literature for choral groups in the secondary school music program. Ramsey, Barr.

626 General Music I G 3
Sp. 3 cl.
Prereq.: Graduate standing or permission of instructor.
Designed to prepare teachers of general music courses in junior and senior high schools. Ramsey.

627 General Music II G 3
Su. (2nd term). 5 cl.
Prereq.: Graduate standing or permission of instructor and 553, Fine Arts 494 or 497.
Designed to prepare teachers for teaching courses in which the appreciation and understanding of music are taught with reference to other art forms. Ramsey.

630 Analysis: The Classic Period U G 3
Su, W. 3 cl.
Prereq.: 530 and 553.
An analytical study of representative works from Classic literature.

632† Orchestration U G 3
Su. A. 3 cl.
Prereq.: 532.
Scoring for the concert band. Barnes.

633 Orchestration U G 3
Su, A. 3 cl.
Prereq.: 532.
Scoring for the orchestra. Barnes, Walker.

635 * Analysis: The Romantic Period U G 3
Su. W. 3 cl.
Prereq.: 530 and 553.
An analytical study of representative works from Romantic literature. Barnes, Vedder.

641 Principles and Practices in Instrumental Music Education G 3
W. 5 cl.

642 The Study and Use of Literature for Instrumental Music Education G 3
Su. (2nd term). 5 cl.
Relationship of teaching materials and performance repertoire to education objectives. Selection of literature, interpretation, rehearsal procedures, conducting problems, attainment of instrumental understanding through literature. Wilson.

643 Advanced Conducting (Instrumental) U G 3
Su. (1st term), 5 cl. Sp. 3 cl.
Prereq.: 530 and 540.
This course aims to develop the power to interpret the larger forms of instrumental literature and to read from full score. McGinnis.
COURSES OF INSTRUCTION

MUSIC

646 Advanced Conducting (Vocal)  U G 3
Su. (1st term), W.  3 cl.
Prereq.: 530 and 540.
This course aims to develop the power to interpret the larger forms of choral literature and to read from full score. Gilliland.

650 Minor Problems  U G 1-5
Prereq.: Permission of instructor.
Investigation of minor problems in the field of music. Graduate Staff.

650X Research Techniques  U G 2
Su (1st term), A.  3 cl.
Benner.

650Z Collegium Musicum  U G 2
Study and performance of music from the Medieval, Renaissance, and Baroque periods. Practical study of early musical instruments. Main.

656 Principles of Music Learning  U G 3
Su. (1st term), W.  3 cl.
An analysis of the factors in learning to appreciate and perform music in early childhood and through adult life. Schneider.

659 Modal Counterpoint I  U G 3
W.  3 cl.
Prereq.: 530 and 553.
Not open to students with credit for 761.

662 Counterpoint  U G 3
W.  3 cl.
Prereq.: 563.
Studies in imitation and invertible counterpoint, applied in the writing of two-and three-part inventions.

664 Counterpoint  U G 3
Su, A.  3 cl.
Prereq.: 662.
Writing of choral preludes, trio sonata movements and fugal expositions. Walker.

667† Advanced Keyboard Harmony  U G 3
W.  3 cl.
Prereq.: 529.
Practice in harmonizing melodies, realizing figured bass, improvisation and modulation at the keyboard.

670 Liturgies  U G 3
W.  3 cl.
A study of the historic liturgies of the church as a background for the work of the church musician. Contemporary movements in liturgical practice. Hall.

671 Techniques and Materials for Church Choirs  U G 3
Sp. 3 cl.
A study of anthem materials, chants and proper, with consideration of programming and performance. Hall.

672 Hymnology  U G 3
A.  3 cl.
Prereq.: 529 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. Hall.

681 Composition  U G 3
Su, A, W, Sp.  3 cl.
Prereq.: 581.
Repeatable to a maximum of 6 cr. hrs.
Creative writing. Analysis, discussion, and employment of devices used in contemporary music. Barnes, Walker.

701† The History of Performance Practices  G 5
Sp. 3 cl.
Prereq.: Permission of instructor.
A study of primary sources pertaining to contemporary attitudes and practices in the performance of music from the Middle Ages to the present. Livingston.

702 Notation to 1300  G 5
A.  3 cl.
Prereq.: 613 or concur.
A study of neumes, the development of staff and square notation, primitive systems, rhythmic modes, Franciscan notation, and the innovations of Petrus de Cruce. Hoppen.

703 Notation of Fourteenth and Fifteenth Centuries  G 5
W.  3 cl.
Prereq.: 702.
A study of Ars Nova Notation, Mannered Notation, and the transition to white notation. Hoppen.

704 Notation of the Late Fifteenth and Sixteenth Centuries  G 5
Sp. 3 cl.
Prereq.: 703.
The study of proportions, keyboard notation, and lute tablatures. Mitter.

707 Musical Sources and Historiography  G 5
Sp. 3 cl.
Prereq.: 620.
A study of music historiography, supplemented by the examination of musical documents from each of the periods of music history. Mitter.

709 Applied Music  G 2-4
(Include letter with number on schedule card.)
Prereq.: Placement examination.
A specialized and intense study of applied music literature and the techniques of performance.
Open to other qualified students within the limits of instructional facilities by permission of the Director of the School of Music. Renewable.
Instruction is given in individual lessons of two one-half hour periods each week or the equivalent.

709A Piano
Su. (either term) (1-2 cr. hrs.), A, W, Sp. (2 or 4 cr. hrs.), Haddad, Jones, Mooney, Tietjens-Kardos.

709B Voice
Su. (either term) (1-2 cr. hrs.), A, W, Sp. (2 or 4 cr. hrs.) Gilliland, Dierckx, Steiniger, Reims, Muschick.

709C Strings
A, W, Sp. (3 or 4 cr. hrs.), Hardesty, McClure, Epperson.

709D Woodwinds
A, W, Sp. (2 or 4 cr. hrs.), McGinnis, Wilson, Titus.

709E Brass
Su. (1st term) (1-2 cr. hrs.), A, W, Sp. (2 or 4 cr. hrs.), Evans.
709F Organ
A, W, Sp. (2 or 4 cr. hrs.), Held.

709G Percussion
A, W, Sp. (2 or 4 cr. hrs.), Spohn.

712† Supervision of Music in the Elementary Schools
UG 3
Su. (1st term) 5 cl.
Prereq.: Mus. 4th yr. or grad. standing.
A study of the specific problems of music supervision with special attention given to curriculum construction in the elementary schools. Barr.

713† Supervision of Music in Secondary Schools
UG 3
Su. (1st term) 5 cl.
Prereq.: Mus. 4th yr. or grad. standing.
Designed to study evaluation criteria and the problems of the music supervisor in the secondary school. Barr.

717 Song Literature
UG 3
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. Gilliland.

719 Theory Pedagogy
UG 3
Su. (1st term) 5 cl.
Prereq.: Mus. 4th yr. standing.
The teaching of music theory in colleges and secondary schools. Walker.

720† Piano Pedagogy
G 3
Su. (1st term) 5 cl.
Prereq.: Mus. grad. standing and minimum of 6 cr. hrs. of applied study in piano.
An analysis of the principles and practices current in the teaching of piano. Haddad.

721 Vocal Pedagogy
G 3
Su. (1st term) 5 cl.
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. Gilliland.

722† String Instrument Pedagogy
G 3
Su. (1st term) 5 cl.
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. Burkholder.

723† Woodwind Instrument Pedagogy
G 3
Su. (1st term) 5 cl.
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. Wilson.

724 Brass Instrument Pedagogy
G 3
Su. (1st term) 3 cl.
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.

730 Advanced Analysis: The Classic Period
A.
Prereq.: 630 or 635.
An analytical study of selected major works from the classic literature. Barnes.

731 Advanced Analysis: The Romantic Period
G 3
W. 3 cl.
Prereq.: Two of the following courses: 630, 635, 730
An analytical study of selected major works from the Romantic literature. Barnes.

732 Advanced Analysis: Post-Romantic to Modern Music
G 3
Sp. 3 cl.
Prereq.: 730 or 731.
Analysis of selected works reflecting the evolution from the post-romantic period to contemporary styles. Walker.

747 Problems in Vocal Music Education
UG 1-5
Su., (or either term), A, W, Sp.
Prereq.: Permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Study of problems encountered in the teaching and supervising of music. Graduate Staff.

748 Choral Problems
UG 1-5
Su., (or either 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. Graduate Staff.

749 Problems in Instrumental Music
UG 1-5
Education
Su., (or either term), A, W, Sp.
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. Graduate Staff.

750 Development of Music Theory I
G 5
A. 3 cl.
A study of the principal treatises on music theory before 1400. Phelps.

751 Development of Music Theory II
G 5
W. 3 cl.
A study of the principal treatises on music theory from 1400 to 1700. Phelps.

752 Development of Music Theory III
G 5
Sp. 3 cl.
Critical study of music and theory texts from 1700 to 1900. Phelps.

753 Contemporary Theories of Music
G 3
Sp. 3 cl.
Prereq.: Mus. grad. standing.
Fundamental concepts of theory construction and experimental verification of contemporary theories of music. Poland.

760 Modal Counterpoint II
G 3
Sp. 3 cl.
Prereq.: 659.
Advanced counterpoint based on the vocal polyphonic style of the sixteenth century. Kuehnefuhs.

765 * Contrapuntal Techniques
G 3
Sp. 3 cl.
Prereq.: 662 or 664.
Analysis and stylistic writing of canons, invertible counterpoint, and variations. Walker.
766† Fugue  
Su. (2nd term), 5 cl.  Sp.  3 cl.  
Prereq.: 683.  
Detailed study of the fugue; writing of three-voice and four-
voice fugues.  Walker.  

780 Advanced Composition  
Prereq.: 2 yrs. of 681, or equiv.  
Creative writing in the large forms at an advanced level.  Barnes,  
Walker.  

784 Studies in Medieval Music  
A.  3-5 cl.  
Problems and research in music before 1400.  Hoppin.  

785 Studies in Renaissance Music  
W.  3-5 cl.  
Problems and research in music between 1400 and 1600.  Mixter.  

786 Studies in Baroque Music  
Sp.  3-5 cl.  
Problems and research in music between 1600 and 1750.  Liv-
ingston.  

787† Studies in Classic Music  
A.  3-5 cl.  
Problems and research in music of the late eighteenth century.  
Davis.  

788† Studies in Romantic Music  
W.  3-5 cl.  
Problems and research in music of the nineteenth century.  Hoppin.  

789 Studies in Modern Music  
Su.  3-5 cl.  
Problems and research in music of the twentieth century.  Main.  

850 Advanced Studies in Music  
G 3  
(Inclusive letter with number on schedule card.)  
850C† Supervision and Administration of School Music.  
Su.  (3 cr. hrs.)  
Prereq.: Permission of instructor.  

850D† The Instrumental Program in the Public Schools—Elementary Grades.  
Su.  (2nd term)  (3 cr. hrs.), Schneider.  

850E† The Instrumental Program in the Public Schools—Secondary Grades.  
Su.  (2nd term)  (3 cr. hrs.), Schneider.  

850I Factors in Music Education.  
A, W, Sp.  (3 cr. hrs.)  
A study of sociological and psychological factors which affect instruction in music.  Schneider, Comp.  

850J Music Education and the Curriculum.  
A.  (3 cr. hrs.)  
A study of the application of music education in the school curriculum.  McBride.  

850K Music in Higher Education.  
Su.  (1st term)  (3 cr. hrs.)  
McBride.  

850N† Contrapuntal Techniques.  
A.  (3 cr. hrs.)  
Prereq.: 630 and 693 or permission of in-
tstructor.  
Contrapuntal techniques in the works of twentieth-
century composers.  Walker.  

850Q Seminar in Music: Factors in Choral Tone Production.  
W.  (3 cr. hrs.)  3 cl.  
A study of choral blend and other vocal techniques.  Dieckes.  

880 Seminar in Music  
Su., A, W, Sp.  3 cl.  
Repeatable to a maximum of 15 cr. hrs.  

880B Music Theory.  
Barnes, Phelps, Walker.  

880C Music Education.  
McBride, Schneider.  

881 Seminar in Music History  
Repeatable to a maximum of 15 cr. hrs.  
Livingston, Hoppin.  

890 Individual Studies in Music History  
G 1-5  
Individual research projects not connected with the dissertation.  

950 Research in Music  
G Arr.  
Research for thesis or dissertation purposes only.  

CAMPUS MUSIC ORGANIZATIONS  
University Campus Music Organizations are open to all students in the University who may receive full credit according to regu-
lations of the college in which they are enrolled.  

A. University Choruses  
1  
(1 cr. hr.)  
Three or more hrs. of rehearsal each week.  

A1 University Chorus  
Prereq.: Admission by audition only.  
Oratorio and large choral works are studied and per-
formed.  Dieckes.  

A3 Symphonic Choir  
Prereq.: Admission by audition only.  Application should be made to the director.  
Symphonic Choir is a concert organization singing a 
variety of literature.  Dieckes.  

A4 Women’s Glee Club  
Prereq.: Membership in this concert group is open to all women students in the University by au-
dition.  Auditions are held at stated periods, and 
vacancies in the club are filled with the best avail-
able voices.  
Study and performance of choral literature for women’s voices.  Muschick.  

A5 Men’s Glee Club  
Prereq.: Membership in this concert group is open to all men students in the University by au-
dition only.  Auditions are held at stated periods, and 
vacancies in the club are filled with the best avail-
able voices.  
Study and performance of choral literature for men’s voices.  Stulger.
<table>
<thead>
<tr>
<th>B. University Orchestras</th>
<th>1</th>
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<tbody>
<tr>
<td>(1 cr. hr.)</td>
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<tr>
<td>Prereq.: Admission by audition and permission of the director. Three or more hrs. rehearsal each week.</td>
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<tr>
<td>B1 University Symphony Orchestra</td>
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<tr>
<td>Prereq.: Membership is open to all University students and personnel and to symphony players from in and about Columbus. The University Symphony Orchestra is a seventy-five piece orchestra of full instrumentation devoted to the preparation of standard and modern literature. The group gives at least three concerts each year. Hartley.</td>
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<tr>
<td>B3 University Little Orchestra</td>
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<tr>
<td>Prereq.: Admission by audition. A selected group giving public and broadcast performances. Professional orchestral techniques are emphasized. Earsa.</td>
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<tr>
<td>C. University Marching Bands</td>
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<tr>
<td>(1 cr. hr.)</td>
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<tr>
<td>Prereq.: Admission by audition and permission of the director. Open to men students. Three or more hrs. rehearsal each week.</td>
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<tr>
<td>C1 University Football Marching Band</td>
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<tr>
<td>A.</td>
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<tr>
<td>Prereq.: The University Marching Band is a selected group of 120 brass, wood and percussion players which performs at football games and rallies during the Autumn Qtr. Evans.</td>
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<tr>
<td>C2 ROTC Band (Air-Army)</td>
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<tr>
<td>D. University Bands</td>
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<tr>
<td>(1 cr. hr.) Three or more hrs. of rehearsal each week.</td>
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<tr>
<td>D1 The University Concert Band</td>
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<tr>
<td>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.</td>
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<tr>
<td>D2 The University Buckeye Band</td>
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<tr>
<td>Prereq.: Permission of director. Provides concert-band participation for students unable, for some reason, to play in the University Concert Band. Performs for University functions and gives public concerts. Eears, Wilson.</td>
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<tr>
<td>F. Small Ensembles</td>
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<tr>
<td>(1 cr. hr.) Prereq.: Admission by audition and permission of the instructor. Two or more hours of rehearsal each week.</td>
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<tr>
<td>F1 Opera Ensembles</td>
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<tr>
<td>F2 Vocal Ensembles</td>
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<tr>
<td>F3† Radio Ensembles</td>
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<tr>
<td>A, Sp.</td>
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<tr>
<td>F4 String Ensembles</td>
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<tr>
<td>F5 Woodwind Ensembles</td>
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<tr>
<td>A, W, Sp. Stibbs and Staff.</td>
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<tr>
<td>F6 Brass Ensembles</td>
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<tr>
<td>F7 Miscellaneous Ensembles</td>
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</tr>
<tr>
<td>J. Choral Music</td>
<td>1</td>
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<tr>
<td>Sp. 2 cr. A choral music laboratory designed to provide experiences in teaching music through practice in the selection and presentation of literature and the critique of teaching performance. Simmons.</td>
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<tr>
<td>K. Instrumental Music</td>
<td>1</td>
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<tr>
<td>W, Sp. 2 cr. An instrumental music laboratory designed to provide experiences in teaching music through practice in the selection and presentation of literature and the critique of teaching performance. Renner, Barkhalter.</td>
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</tbody>
</table>

**National Security Policy Studies**

Office: 112 Law Bldg., 1659 North High Street.

**PROFESSOR**: furniss.

701 Minor Problems in National Security Policy  U G 3


Prereq.: Permission of instructor. A special national security topic is assigned to each student for reading and a report. Sherman and Staff.

702 Introduction to National Security  U G 3

A. 1 cr.

Prereq.: Grad. standing or 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. Sherman and Staff.

703 Problems in National Security  U G 3-5

W. 1 cr.

Prereq.: 702 or permission of instructor. Repeatable with permission of instructor to a maximum of 10 cr. hrs. Examination of particular policy problems and the application thereof of social science analytical techniques. Barber.
COURSES OF INSTRUCTION
NATIONAL SECURITY POLICY STUDIES

801 Seminar in National Security Research U G 3-5
Sp. 1 cl.
Prereq.: 702 or permission of instructor.
For advanced graduate students preparing Master's theses and doctoral dissertations in the field of national security. Formulation and application of social science research designs to specific aspects of national security.

Naval Science

CAPTAIN BEADLES, JR., 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 to specialize in Supply or the Marine Corps, in which case there is a variation in course presentation. Naval science courses are open to a limited number of civilian students with permission of the Professor of Naval Science. Normal sequence of courses is as follows: (Naval Science unless otherwise indicated.)

First Year:
- All candidates—441, 442, 443.

Second Year:
- All candidates—541, Psychol. 403, 545.

Third Year:
- Line candidates—441, 442, 643.
- Marine candidates—651, 652, 653.
- Supply candidates—661, 663, 665.

Fourth Year:
- Line candidates—741, 742, 743.
- Marine candidates—751, 752, 753.
- Supply candidates—761, 762, 765.

441 Naval Orientation U 3
A. 3 cl., 1 2-hr. lab.
The basic study of naval lore, covering organization, customs, discipline, vessels of the U.S. Navy, introduction to seamanship, leadership, and tactics.

442 Naval History, Part I U 3
W. 3 cl., 1 2-hr. lab.
Prereq.: 441.
The study of Naval History from earliest recorded history up to World War I, with particular emphasis on the principles of war and influence of sea power upon history.

443 Naval History, Part II U 3
Sp. 3 cl., 1 2-hr. lab.
Prereq.: 442.
The continued study of Naval History from the beginning of World War I to the present time.

541 Naval Weapons, Part I U 3
A. 3 cl., 1 2-hr. lab.
A broad basic study of naval armament, including the fire control problem. An introduction to anti-submarine warfare.

543 Naval Weapons, Part II U 3
Sp. 3 cl., 1 2-hr. lab.
Prereq.: 541.
More advanced study of Naval Weapons and their employment, including guided missiles and nuclear weapons, and a basic study of the technology of space.

A-172

641 Naval Operations U 3
A. 3 cl., 1 2-hr. lab.
A study of fleet operations, including tactics, tactical communications, meteorology, Rules of the Nautical Road, and the principles of relative motion.

642 Naval Operations and Introduction To Navigation U 3
W. 3 cl., 1 2-hr. lab.
A study of the Naval Communications system, shipboard organization, administration and the electronic and dead reckoning methods of marine navigation.

643 Celestial Navigation U 3
Sp. 3 cl., 1 2-hr. lab.
The determination of position by celestial methods of navigation.

651 Evolution of the Art of War, Part I U 3
A. 3 cl., 1 2-hr. lab.
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.

652 Evolution of the Art of War, Part II U 3
W. 3 cl., 1 2-hr. lab.
A continuation of the study of the Evolution of the Art of War from the beginning of the Civil War to the end of World War II.

653 Modern Basic Military Strategy and Tactics U 3
Sp. 3 cl., 1 2-hr. lab.
A survey of modern strategical and tactical principles, and current military developments.

661 The Navy Supply System and Supply Management Afloat, Part I U 3
A. 3 cl., 1 2-hr. lab.
A study of the system of procurement, control and distribution of materials required by the Navy; introduction to Supply Management procedures afloat.

662 Supply Management Afloat, Part II U 3
W. 3 cl., 1 2-hr. lab.
A continuation of supply management afloat, including the procedures for receipt and storage of stock and the naval accounting system afloat.

663 Supply Management Afloat, Part III U 3
Sp. 3 cl., 1 2-hr. lab.
A continuation of the study of supply management afloat, including the expenditure and control of material and financial management afloat.

741 Naval Engineering U 3
A. 3 cl., 1 2-hr. lab.
Principles of ship stability and buoyancy in the practice of damage control. Theory of construction, installation and operation of a modern naval steam engineering plant.

742 Naval Engineering and Introduction to Naval Administration U 3
W. 3 cl., 1 2-hr. lab.
A study of electricity, naval auxiliary systems and shipboard organization and administration.

743 Naval Administration U 3
Sp. 3 cl., 1 2-hr. lab.
Uniform Code of Military Justice. The psychology of human relations and the techniques of leadership; career planning.
NUCLEAR ENGINEERING

751 Amphibious Warfare, Part I U 3
A, 3 cl., 1 2-hr. lab.
The history of amphibious warfare and its development from Gallipoli through Korea.

752 Amphibious Warfare, Part II U 3
W, 3 cl., 1 2-hr. lab.
A familiarization with the doctrinal techniques and present concepts of amphibious warfare including the planning phase.

753 Leadership and the Uniform Code of Military Justice U 3
Sp, 3 cl., 1 2-hr. lab.
Survey of the UCMJ and a study of the psychology of human relationships and techniques of leadership as applied by Marines.

761 Retail Sales U 3
A, 3 cl., 1 2-hr. lab.
A study of the clothing and small stores afloat organization, accounting procedures and related reports, introduction to Ship’s Store Afloat.

762 Advanced Retail Sales and Naval Administration U 3
W, 3 cl., 1 2-hr. lab.
A continuation of the study of Ship's Store Afloat, including stock control, sales procedures and related reports, the psychology of human relations and the techniques of leadership.

744 Nuclear Engineering Laboratory II U G 3
W, Sp. 2 3-hr. lab.
Prereq.: 743 and/or concurs. 783.
Experimental nuclear reactor analysis; understanding of the basic nuclear and reactor parameters and utilizing these fundamental concepts in an economical engineering design.

755 Nuclear Power Plants U G 3
Sp, 3 cl.
(See under Mech. E. 755)

765 Introduction to Nuclear Chemical Engineering U G 3
W, 3 cl.
(See under Chem. E. 765)

766 Nuclear Chemical Engineering U G 3
Sp, 3 cl., 3 hr. lab.
(See under Chem. E. 766)

770 Plasmas and Controlled Fusion U G 3
W, 3 cl.
Prereq.: Physics 615, Mech. E. 621 or Physics 702 or equiv
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.

783 Nuclear Reactor Analysis U G 3
A, 3 cl.
Prereq.: Physics 614, Math. 609 or equiv. Concur.: Physics 615.
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, reactor kinetics.

820 Reactor Dynamics and Control G 3
Sp, 3 cl.
Prereq.: 783, Elec. E. 644 or permission of instructor.
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.

845 Advanced Laboratory Studies G 3-6
Sp.
Prereq.: 743 or 744, and permission of instructor.
Experimental treatment of advanced nuclear engineering concepts.

856 Advanced Nuclear System—Design Concepts G 4
Sp. 3 cl., 3-hr. lab.
Investigations of advanced-converter-reactor design concepts, design problems and basic concepts of thermal and fast breeder reactors, design and economics study of a total reactor system.

894 Advanced Nuclear Reactor Analysis G 5
W, 5 cl.
Prereq.: 783, 820, Math. 731, Physics 726 or 740.
Neutron transport theory, three dimensional multigroup reactor analysis utilizing perturbation theory, new reactor concepts. A high speed digital computer is utilized to facilitate analysis.

890 Nuclear Engineering Seminar G 1
Prereq.: Grad. standing in Nuclear E.
Repeatable to a maximum of 4 cr. hrs.
Current topics in Nuclear Engineering.

950 Research in Nuclear Engineering G. Arr.
Research for thesis or dissertation purposes only.
Nurse Anesthesiology

(Department of Surgery)

Office: 401 University Hospital, 410 West 10th Avenue
PROFESSOR WILLIAM HAMELBERG and STAFF.

401 Introduction to Anesthesia P 15
Prereq.: Graduation from an accredited School of Nursing.

Education and training of nurses in the field of anesthesia; management of technical aspects of anesthesia under physician supervision.

402 Clinical Anesthesia P 15
Prereq.: 401.
Advanced study of anesthetic agents, technics, pharmacology, and physiology with clinical applications.

403 Pediatric Anesthesia P 15
Prereq.: 402.
Advanced study of introductory and clinical anesthesia as applicable to pediatric anesthesia. Training is received at the affiliated Children's Hospital.

404 Advanced Anesthesia I P 15
Prereq.: 403.
Repeatable to a maximum of 45 hrs.
Emphasis of study will be on more difficult anesthetic procedures and in patients with difficult disease processes.

405 Advanced Anesthesia II P 15
Prereq.: 404.
Instruction in the care of the patient undergoing cardio-pulmonary bypass and thoracic anesthesia.

406 Advanced Anesthesia III P 15
Prereq.: 405.
Instruction in the care of the patient undergoing neurosurgery.

424 Problems Solving Methods in Nursing U 2
A, W, Sp. 2 cl.
Prereq.: 401.
Guided use of problem solving methods as a means of meeting patients' needs.

529 Human Relations in Nursing U 2
Sp. 2 cl.
Prereq.: Gen. Nurs. curriculum 1st yr. standing.
Introduction to basic psychiatric concepts as applied to human relations; discussion of culture and personality as related to health and sickness.

539 Fundamentals of Nursing U 6
A. 3 cl. and average of 12 hrs. clinical study per week (word conf., discussion groups, clinical practice, and human relations lab.)
Study of basic needs of hospitalized adult patients and the functions of the nurse in meeting these needs.

547 Medical Nursing I U 8
W, Sp. 4 cl. and average of 16 hrs. clinical study per week (word conf., discussion groups, nursing lab., clinical practice, and human relations lab.)
Prereq.: 539.
Knowledge, understanding, and skill necessary to give nursing care to adult patients treated medically; focus is primarily on patients with cardiovascular or gastro-intestinal conditions; or diabetes mellitus.

548 Surgical Nursing I U 8
W, Sp. 4 cl. and average of 16 hrs. clinical study per week (word conf., discussion groups, nursing lab., clinical practice, and human relations lab.)
Prereq.: 539.
Knowledge, understanding, and skill necessary to give nursing care to adult patients who have commonly needed surgical procedures and which will require minimal guidance in rehabilitation.

563 Introduction to Clinical Experiences for U 2
Medical Technologists
Su. 2 cl.
Prereq.: Med. Tech. 4th yr. standing.
This course acquaints the medical technology student with hospital and health center functioning and helps her develop selected patient-care skills. Price and Staff.

592 Tuberculosis Nursing U 5
Consideration of the total program of medical and nursing care of adult patients with tuberculosis.

604 Problem Solving in Nursing U 0
Prereq.: 539, 547, 548, Eng. 418, Microbiol. 510, Physiol. 508, Psychol. 401, Soc. 401.
The process of planning, providing, and evaluating nursing care of selected patients.

613 Maternity Nursing U 8
Su, A, W, Sp. 4 cl. and average of 16 hrs. clinical study (word conf., discussion groups, nursing lab., clinical practice, and human relations lab.)
Prereq.: 547, 548.
Knowledge, understanding, and skill necessary in providing nursing care to the mother in the antepartal, intrapartal, and postpartal periods in one quarter.

Nursing

Office: School of Nursing, B-301 Stairig Hall, 320 West 10th Avenue.
PROFESSOR INETW (Director); ASSOCIATE PROFESSORS PEASE, J. SMIRK, M. CHAMBERS, H. DORSCH, S. HAYEY, L. ZEN- BEE, I. LEWIS, I. McDOWELL, I. PRICE; ASSISTANT PROFESSORS BALLARD, MILLER, R. D. BUCKERIDGE, CLARK, COVER, CURTIS, DILLIE, GIESER, JOHNSTON, KRUAN, KRUSE, MARTIN, MILLER, POLICY, ROLLER, SCHWARTZ, SHAW, THOMAS, WALLACE, WITTMETTE, and YAGGER.

Open only to students registered in the School of Nursing.

A-174
614 Pediatric Nursing U 8
Su, A, W, Sp. 4 cl. and average of 16 hrs. clinical study (used conf., discussion groups, nursing lab., clinical practice, and human relations lab.)
Prereq.: 613.
Continuation of 613. The effects of illness on the child and his family in the hospital, home, and community.

615 Coordinated Nursing Care U 8
Su, A, W, Sp. 4 conf., 20 hrs. clinical experience.
Prereq.: 591 or equiv., Psychol. 404.
The components of effective nursing care, the functions of health personnel, and the methods of promoting good working relationships.

617 Public Health Nursing U 5
Su, A, W, Sp. 5 cl.
Prereq.: 591 or equiv., 613, 614, 647, and 648.
Not open to students with credit for 603 and 639.
A study of the development and trends of public health nursing and the basic principles underlying its practice.

619 Public Health Nursing Field Experience U 8
Prereq. or concur.: 617, Prev. Med. 618.
Supervised experience is provided in a public health agency which offers a generalized program emphasizing family health.

620 Foundations of Nursing Education U 3
A, Sp. 3 cl.
Prereq.: Psychol. 401 and 404, and Soc. 401.
The historical development of nursing education, surveys used to evaluate its progress, levels of nursing, and essential characteristics of a good school of nursing.

639 Public Health Nursing U 7
Su, A, W, Sp. 3 cl., 20 hrs. clinical experience.
Prereq.: 570, 571, 572, 573, Soc. Work 661, and Psychol. 404.
Supervised nursing experience in a public health agency offering a generalized program in which the family, as the unit of service, is emphasized.

647 Medical Nursing II U 8
Su, A, W, Sp. 4 cl. and average of 16 hrs. clinical study (used conf., discussion groups, nursing lab., clinical practice, and human relations lab.)
Prereq.: 547, 548.
Continuation of 547. Study of patients with disturbed function of the endocrine, integumentary, muscle-skeletal, hematologic, and respiratory (including tuberculosis) systems.

648 Surgical Nursing II U 8
Su, A, W, Sp. 8 cl. and average of 16 hrs. clinical study (used conf., discussion groups, nursing lab., clinical practice, and human relations lab.)
Prereq.: 547, 548.
Continuation of 548. Nursing study of patients with neurosurgical, orthopedic, thoracic, gynecological, or genito-urinary problems in the setting of the operating rooms, recovery room, and patient's units.

649 History of Nursing U 3
Su, A, W, Sp. 3 cl.
Prereq.: Nurs. 3rd yr. standing.
The effect of religious, military, secular, and educational influences on the development of nursing.

663 Nursing Study of The Psychiatric Patient U 8
Su, A, W, S. 4 cl. and average of 16 hrs. clinical study per week.
Prereq.: 613, 614, 647, 648.
Nursing study of the psychiatric patient as an interpersonal, problem-solving process. (Conferences, discussions, clinical practice.)

676 Leadership and Management in Nursing U 8
Su, A, W, S. 3 cl. and 20-24 hrs. cl. study per week.
Prereq.: 613, 614, 647, 648.
Effective team member and team leader experiences; observation and selected experiences in unit management; and guided study of a nursing problem. (Conferences, discussions, clinical practice, human relations laboratory.)

677 Occupational Orientation to Nursing U 10
Su, A, W, S. 4 cl. and 24 hrs. cl. study per week.
Prereq.: 613, 614, 647, 648.
Guided practice of professional nursing; requirements and responsibilities in present day practice, job opportunities, and professional obligations.

701 Minor Problems in Nursing U 3-5
Prereq.: 4 cr. hrs. of 746 and permission of instructor.
Reading, conferences, and minor investigations by individual arrangement for qualified students who desire to study a particular nursing problem intensively.

736 Interpersonal Aspects of Nursing U 3
A. 3 cl.
Influence of modern psychiatry on nursing practice. Emphasis given to nursing as a significant interpersonal process. Independent study, conferences, and seminars.

737 Interpersonal Aspects of Nursing W 3 cl.
Prereq.: 736.
Continuation of 736.

740 Advanced Medical-Surgical Nursing U 3
A, Sp. 3 cl.

741 Advanced Medical-Surgical Nursing U 3
W. 3 cl.
Prereq.: 740.
Continuation of 740. Chambers.

746 Field Instruction U 4-15
A, W, Sp. 2 cl., 4 hrs. clinical experience per cr. hr.
Prereq.: Permission of adviser.
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 situation, conferences, library study, field trips, and written reports. Chambers, Lewis, Foss.

750 Fundamentals of Nursing Administration U 5
W. 5 cl.
Prereq. or concur.: Grad. standing in nursing service administration curriculum, 740, 802, 741 and Bus. Org. 676, 682.
Study of the fundamentals of planning, organizing, and controlling nursing service departments. Dorsch.

751 Supervision of Nursing Services U 5
Sp. 4 cl. and 3 hr. planned observations.
Prereq. and concur.: Grad. standing in nursing service administration curriculum, 750 and Bus. Org. 686.
Exploration of major problems of nursing administration at the supervisory level. Includes observation of clinical situations, conferences, field trips, and written reports. Dorsch.
COURSES OF INSTRUCTION
NURSING

Administration of Nursing Services U G 5
Su. 4 cr. and 3 hr. p.m. seminars.
Prereq. or concurs.: Grad, standing in nursing service adminis-
tration curriculum, 751.
Exploration of major problems in nursing administration at the
top administrative levels. Includes observations of administrative
situations, conferences, field trips, and written reports. Dorach.

Methods of Teaching Nursing U G 4
Sp. 4 cr.
Prereq. or concurs.: Ed. 607, Nurs. 610 recommended.
Instructional planning for courses in clinical nursing with oppor-
tunities to develop teaching-learning units and tools to assess
learning outcomes. Pease, Anderson.

Research Development in Nursing G 3
A, Sp. 3 cr.
A seminar on the status and scope of research in nursing. Written
reports and comparison of various types of research studies will be
required. Newton, Shirk.

Curriculum Development G 5
W. 5 cr.
Prereq.: 646 or equiv. and 4 cr. hrs. of 748.
Study of theories of higher education related to education for
nursing and principles of curriculum development. Students apply
these principles to program planning in nursing. Pease.

Research in Nursing G Arr.
Research for thesis purposes only.

Obstetrics and Gynecology

Office: N-635 University Hospital, 410 West 10th Avenue.
PROFESSORS: ULLERY (Chairman), HOLLIFIELD, and
MEILING; ASSOCIATE PROFESSORS ICPENDA, COX,
DALY, HOLZHAUSEL, HUGGEBERGER, FAYE, and WIL-
LIAMS; ASSISTANT PROFESSORS BARRY, DEBIE, BOUT-
ELLIS, GUFF, EDR, BARTZ, FARKAS, KEYS, PATTER-
SON, KUPERSBERG, SCOTT, SILBERNAGEL, STEELED,
VORIS, and ZAFTMAN.

Clinical Obstetrics and Gynecology P 16
Prereq.: Med. 4th yr. standing.

Clinical Obstetrics and Gynecology P 12
2 months, offered in July, Sept., Nov., Jan., Mar., or
May.
Prereq.: Med. 3rd yr. standing.
Normal and abnormal obstetric and diseases of the female
reproductive tract: management and philosophy of current therapy.
Supervised in-patient and out-patient practice.

Fetus and Newborn
1 month, offered Aug., Dec., May.
Prereq.: 736, Med. 115.
Reproduction biology and human development; the fetal-maternal
axis and the product of conception; supervised clinical training
and service.

Reproduction Endocrinology
and Infertility
1 month, offered Sept. and Mar.
Prereq.: 738.
Selective endocrinological aspects of the speciality; correlation of
biochemical, histochemical and cytologic aspects with clinical
problems.

Obstetric and Gynecologic Specialties P 4
Prereq.: Med. 4th yr. standing.

Obstetric and Gynecologic Specialties P 6
1 month, offered all months.
Prereq.: 736.
Repeatable by permission of instructor.
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.
A. Obstetric emphasis.
B. Gynecologic emphasis.

Individual Studies in Obstetrics
and Gynecology
1 month, offered all months.
Prereq.: Permission of Chairman.
Clinical, laboratory, conference, and library work in Obstetrics
and/or Gynecology.
A. Obstetric emphasis.
B. Gynecologic emphasis.

Residence in Obstetrics and
Gynecology
12 months, full time, beginning July 1.
Prereq.: Appointment as Resident, University Hospital,
Repeatable to a maximum of 360 cr. hrs.
Rotation through obstetric and gynecologic sub-specialties, in-
patient and out-patient services; supervisory and teaching respon-
sibility in the patient-care team; rounds and conferences.

Obstetric and Gynecologic Pathology G 2.5
Prereq.: Permission of instructor.
Laboratory, conference, and library work. Study of current patho-
logical specimens with emphasis upon special investigation.
Ullery, Meiling, Hollifield, Holzhausen, Williams, Boutilier,
Boucher.

Research in Obstetrics and
Gynecology
Research for thesis purposes only.
Occupational Therapy

Office: 187-189 University Hospital, 410 West 10th Avenue.
ASSOCIATE PROFESSOR LOCHER (Chairman); INSTRUCTOR GRANT.

401 Occupational Therapy Orientation U 1
A. 2 cl.
The scope of occupational therapy is presented with its relationship to broad fields of education and medicine and to other allied health professions. Locher, Grant.

402 Occupational Therapy Orientation U 1
W. 2-hr. lab.
Prereq.: 401.
Continuation of 401.

403 Occupational Therapy Orientation U 1
Sp. 2-hr. lab.
Prereq.: 402.
Continuation of 402.

500 Survey of Occupational Therapy U 1
Su, A, W. 1 cl., 2 lab.
The development of occupational therapy and survey of its relationship, history, standards, trends, applications, personnel, opportunities, and problems. Locher.

501 Departmental Organization U 2
Sp. 2 cl.
Prereq.: Registration in Oc. Ther. curriculum.
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. Grant.

602 Occupational Therapy U 5
A. 5 cl.
Prereq.: Anat. 505, concur. Physiol. 506.
Medical information correlated with theory of treatment through activity for general medical and surgical conditions, including tuberculosis, cardiac, geriatric, pediatrie, visual, and auditory disabilities. Locher, existing physicians.

603 Occupational Therapy U 5
W. 5 cl.
Neurological and orthopedic medical information correlated with treatment principles and methods through activity in cases of loss of muscle power, limited joint motion, and amputation. Grant, existing neurologist, and orthopedist.

604 Occupational Therapy U 5
Sp. 5 cl.
Prereq.: Psychol. 541.
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. Locher and psychiatrist.

605 Occupational Therapy U 2
A. 2 cl.
Prereq.: Anat. 505, Phys. Med. 503 and 600 and Physiol. 506 or concur.
Principles and methods of treatment in cases of lack of coordination; adaptation of equipment to meet activity needs of the individuals so involved. Grant.

615 Occupational Therapy Seminar U 1
W. 1 cl.
Prereq.: Major standing in Oc. Ther.
Discussion and demonstration of current methods and problems in Occupational Therapy. Locher, Grant.

616 Occupational Therapy Seminar U 1
Sp. 1 cl.
Prereq.: 615.
Continuation of 615.

617 Occupational Therapy Seminar U 1
A. 1 cl.
Prereq.: 616.
Continuation of 616.

620 Clinical Practice in Occupational Therapy U 6
Prereq.: An average pt. hr. of 2.25 in all professional courses and permission of chairman.
Initial registration in this course may come in the summer following completion of the ninth qtr. of the professional program and may be either for one term or the qtr.
Repeatable to a maximum of 18 cr. hrs.
A practical experience in application of the principles and functions of occupational therapy in selected hospitals, rehabilitation centers, clinics, convalescent workshops, and convalescent facilities.

Ophthalmology

Office: University Hospital, Room N-350, 410 West 10th Avenue.
PROFESSORS MAKLEY (Chairman), BLACKWELL, THAYNER, and PERRY; ASSOCIATE PROFESSORS ANDREW, BATTLES, LIPETZ, MOSES, QUINN, and ISSUE; ASSISTANT PROFESSORS BITONZE, BARTON, BONTLEY, BREDEMEYER, COOK, de la MOTTE, KAPETANSKY, LETSON, MAGNUSON, SAGE, and STINE.

736 Dispensary Clinics in Ophthalmology P 2
Prereq.: Med. 4th yr. standing.
Students are assigned to clinical work in the Out-Patient Department of University Hospital.

780 Individual Studies in P 6, 12, 18
Ophthalmology
1, 2, or 3 months, any month except
Oct., Feb., and June.
Library, conference, clinic, and laboratory work. Makley.

782 Residence in Ophthalmology P 18
12 months full time, beginning July 1.
Prereq.: Appointment as Resident, University Hospital.
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.
Courses of Instruction

Ophthalmology

790 Group Studies in Ophthalmology  P 1
1 month, Oct. and Jan.
Prereq.: Med. 4th yr. standing.
Fundamentals of ophthalmology applicable in general practice
and in other medical specialties. Mkyly.

800 Seminar in Ophthalmology  G 3-5
A., W., Sp.
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.

950 Research in Ophthalmology  G Arr.
Su., A., W., Sp.
Research for thesis purposes only.

Optometry

Office: 111 Optometry Bldg., 338 West 10th Avenue.
PROFESSORS SPRY (Director) and TELLERBROOK; ASSOCI-
ATE PROFESSORS THORBARD, HILL, and WILD; ASSIST-
ANT PROFESSORS ESKRIDGE, HAINES MOYE, and REESE.
Also see courses in Physiological Optics.

514 Practical Optometry  P 4
A. 3 cl., 1-3 hr. lab.
Prereq.: Optom. 4th yr. standing, Physics 412, and
Math 439.
Theory and techniques of keratometry, skintametry, objective and
subjective tests of refraction, accommodation, and functions of
the extra-ocular muscles. Hebbard.

515 Practical Optometry  P 4
W. 3 cl., 1-3 hr. lab.
Prereq.: 514.
Correlation and analysis of data. Systematic determination of the
etiology of anomalies and sources of visual discomfort and lack of

516 Practical Optometry  P 4
Sp. 3 cl., 1-3 hr. lab.
Prereq.: 515.
Ophthalmoscopy and examination of the external parts and the
medial of the eye. Case histories. Techniques of investigating

531 Optical Optics  P 4
A. 3 cl., 1-2 hr. lab.
Prereq.: Optom. 4th yr. standing, Physics 412 and,
Math 439.
Classification of ophthalmic lenses: physical characteristics, manu-
facture, and testing of optical glass and lenses; system of dis-
tribution and stocking; grading and polishing; measuring refract-
ing power. Eskridge.

532 Optical Optics  P 4
W. 3 cl., 1-2 hr. lab.
Prereq.: 531.
Classification, description, manufacture, and distribution of frames
and mountings. Laboratory practice in grading, polishing, and
mounting lenses, and repairing and reconstructing frames and
mountings. Eskridge.
563 Civic and National Problems in Eye Care
Sp. 2 cl.
Prereq.: 562.
Number, distribution, supply, interrelationships, and roles of the various ophthalmic groups; prevalence of visual anomalies; problems and care of the blind and near blind. Hebbard.

601 Advanced Clinical Practice in Optometry
A. 2 cl., 3 3-hr. lab.
Prereq.: Optom. 4th yr. standing and 516.
Advanced clinical practice. The conference periods are devoted to the discussion of problems and cases encountered during the clinic periods. Hebbard.

602 Advanced Clinical Practice in Optometry
W. 2 cl., 3 3-hr. lab.
Prereq.: Optom. 4th yr. standing and 601.
Continuation of 601.

603 Advanced Clinical Practice in Optometry
Sp. 2 cl., 3 3-hr. lab.
Prereq.: Optom. 4th yr. standing and 602.
Continuation of 602.

651 Subnormal Vision
A. 3 cl., 1 2-hr. lab.
Prereq.: Optom. 3rd yr. standing and 516.
Etiology of subnormal vision; measurement of loss of central acuity and other visual functions; design of optical devices for the aid of the partially sighted. Ellerbrock.

652 Aniseikonia
W. 3 cl., 1 2-hr. lab.
Prereq.: Optom. 3rd yr. standing and 516.
Clinical methods of testing and measuring aniseikonia; etiology of aniseikonia; effects associated with uncorrected aniseikonia; design of lenses for aniseikonia. Ellerbrock.

653 Contact Lenses
S. 3 cl., 1 2-hr. lab.
Prereq.: Optom. 3rd yr. standing and 516.
Theory and practice in the use of contact lenses; artificial eyes; ptosis crutches and other prosthetic devices. Ellerbrock.

660 Ophthalmic Pathology
W. 3 cl., 6 lab. hrs.
Prereq.: Optom. 4th yr. standing, 560.
Gross and microscopic pathology of the eye, including diseases of the conjunctiva, orbital cavity and pertinent pathology of the central nervous system.

PATHOLOGY

Otolaryngology
Office: N-320 University Hospital, 410 West 10th Avenue
PROFESSOR W. H. SAUNDERS (Chairman); ASSOCIATE PROFESSOR LOWERY; ASSISTANT PROFESSORS ARTHUR, BIRCK, DEISHLEY, GERSTEN, KRECH, PAPAPELLA, ROTH, SAWYER, SMITH and WEHR.

736 Dispensary Clinics in Otolaryngology
Prereq.: Med. 4th yr. standing.

737 Group Studies in Clinical Otolaryngology
P 1
1 month. Offered Oct. and Feb.
Prereq.: Med. 4th yr. standing.
Clinical work in basic otolaryngology as encountered in general and other medical specialty practice.

740 Individual Studies in Otolaryngology
Any month.
Prereq.: Med. 4th yr. standing.
Practical applications of the principles of otolaryngology. Saunders, Papaellla.

760 Advanced Studies in Otolaryngology
P 18
3 months; offered July, Nov., and Mar.
Prereq.: Med. 3rd or 4th yr. standing.
Library, clinical, or laboratory problems in otolaryngology. Papaellla, Saunders.

782 Residency in Otolaryngology
P 18
12 months, full time, beginning July 1.
Prereq.: Appointment as Resident, University Hospital.
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.

Pathology
Office: M-112 Staving Long Hall, 320 West 10th Avenue.

603 Clinical Pathology
W. 2 cl., 1 3-hr. lab.
Prereq.: Med. 2nd yr. standing.
A study of the changes in the blood, urine, feces, sputum, spinal fluid and gastric contents brought about by disease. Macpherson, Stevenson.
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<tr>
<th>Course</th>
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| General and Special Pathology                                       | P G 10  | A. 2 cl., 2 2-hr. lab.  
Prereq.: Med.; 2nd yr. standing.  
Degenerative, circulatory, inflammatory and neoplastic lesions; reactions to injury; pathiology of infectious diseases; special study of these changes as they apply to the human organ system. Com Haas, Scarpelli, and Staff. |
| General and Special Pathology                                       | P G 5   | W. 3 cl., 3 3-hr. lab.  
Prereq.: 634.  
Continuation of 634.                                                                                                                                  |
| Medical Technology                                                  | U 3     | Su. 3 cl.  
Prereq.: Med. Tech.; 4th yr. standing.  
Hematology, urine analysis, clinical microscopy; blood bank, blood groups, blood types, and blood transfusions. Stevenson. |
| Medical Technology                                                  | U 3     | A. 3 cl.  
Prereq.: Med. Tech.; 4th yr. standing.  
Clinical microbiology, serology, parasitology, and mycology. Macpherson and Staff.                                                                 |
| Medical Technology                                                  | U 3     | Sp. 3 cl.  
Prereq.: Med. Tech.; 4th yr. standing.  
Clinical blood and tissue chemistry, and modes of investigating diseases by biochemical methods. Gruener and Staff. |
| Medical Technology                                                  | U 3     | W. 3 cl.  
Prereq.: Med. Tech.; 4th yr. standing.  
Preparation of tissue for histologic examination by frozen and permanent sections; special stain techniques. Macpherson. |
| Medical Technology                                                  | U 2     | W. 2 cl.  
Prereq.: Med. Tech.; 4th yr. standing.  
The use and interpretation of laboratory tests in medicine. Macpherson and Staff.                                                                      |
| Medical Technology                                                  | U 2     | Sp. 2 cl.  
Prereq.: 636.  
Continuation of 636.                                                                                                                                  |
| Medical Technology Laboratory                                       | U 4     | Su. 12 lab. hrs.  
Prereq.: Med. Tech.; 4th yr. standing.  
Laboratory demonstrations and practice in hematologic techniques and clinical microscopy. Stevenson and Staff.                                           |
| Medical Technology Laboratory                                       | U 9     | A. 27 lab. hrs.  
Prereq.: Med. Tech.; 4th yr. standing.  
| Medical Technology Laboratory                                       | U 9     | Sp. 27 lab. hrs.  
Prereq.: Med. Tech.; 4th yr. standing.  
Demonstrations and applied techniques in the quantitative chemistry of blood and other body fluids. Gruener, Eap. |
| Medical Technology Laboratory                                       | U 9     | W. 27 lab. hrs.  
Prereq.: Med. Tech.; 4th yr. standing.  
Tissue technique; mycology and parasitology. Macpherson, Sutton, Kimbleton.                                                                             |
| Medical Technology Laboratory                                       | U 5     | Su. 15 lab. hrs.  
Prereq.: Med. Tech.; 4th yr. standing.  
Laboratory demonstrations and practice in blood bank and immunohematologic techniques. Stevenson and Staff.                                           |
| Fundamentals of Disease                                             | U 3     | A. 3 cl.  
Prereq.: Med. Tech.; 4th yr. standing.  
The nature of disease, mechanisms involved in the disease process, and use of the laboratory in defining the mechanisms of disease. Macpherson and Staff. |
| Clinical Practice in Medical Technology                             | U 10    | Su., A, W, Sp. 5 3-hr. labs.  
Prereq.: Med. Tech. Senior standing and permission of instructor.  
Application of medical laboratory techniques under supervision in the clinical laboratories of University Hospital. |
| Pathology                                                           | U 5     | A. 3 cl., 6 lab. hrs.  
Prereq.: Optom., 4th yr. standing, Chem. 551-552; Physiol. 601-602; Anat. 601-608.  
General pathology including the etiology of infectious diseases, disturbances of nutrition, inflammation, and neoplasia, with special reference to the influence upon ophthalmic pathology; selected chapters of Special Pathology; histologic and gross demonstrations. Buerger. |
| Clinical Pathology                                                  | P G 6   | W. 4 cl., 3 4-hr. lab.  
Prereq.: Microbiol. 654, 659, Chem. 552 and permission of instructor.  
The changes in the blood, urine, feces, sputum, spinal fluid and gastric contents brought about by disease. Macpherson, Stevenson, and Staff. |
| General Pathology                                                   | P 5     | 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. Buerger and Staff. |
| Medical Microbiology                                                | P G 10  | A.  
Prereq.: Med. 2nd yr. standing.  
Morphologic, physiologic, and serologic characteristics of pathogenic microorganisms; the epidemiology and pathogenesis of infectious diseases; methods of diagnosis, prevention, and treatment. |
Prereq.: Med. 4th yr. standing.  
A clinico-pathological conference correlating the symptomatology of the most important internal and surgical diseases with organ pathology. Com Haas and Staff. |
780 Individual Studies in Pathology

1, 2, 3, or 4 months.
Prereq.: Med. 3rd yr. standing; grad. permission of instructor.
A. Pathologic anatomy. 3 months, offered all months. Boerner.
P G 18
P G 12
C. Serum enzymes for diagnosis of disease. 3 months, offered Mar. Freiha.
P G 18
D. Clinical chemistry. 3 months, offered Mar. Gruemer.
P G 18
P G 18
F. Immunohematology. 1 month, offered Sept., Mar, Apr., May. Macpherson.
P G 6
G. Clinical microbiology. 4 months, offered Nov. Macpherson.
P G 24
P G 12
I. Surgical pathology I. 4 months, offered July, Nov. Old.
P G 24
P G 12
K. Special pulmonary pathology. 2 months, offered July, Prent.
P G 12
L. Ultrastructure of cells in disease. 2 months, offered Nov. Scarpelli.
P G 12
M. Laboratory medicine—The erythrocyte. 2 months, offered Sept. Stevenson.
P G 12
N. Problems in experimental pathology. 4 months, offered Nov. von Haam, Scarpelli.
P G 24
O. Problems in pathology and clinical pathology.
P G 3-5

781 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 12 sections of Pathologic Anatomy and Surgical Pathology, primary responsibility for pathology service; work rounds and staff conferences.

782 Residency in Pathology

12 months full time, beginning July 1.
Prereq.: Appointment as Resident, University Hospital. Repeatable to a maximum of 388 cr. hrs.
Rotation through all Pathology and Clinical Pathology sub-specialties; certain teaching responsibilities, conferences and seminars.

800 Seminar in Pathology and Clinical Pathology

Su, A, W, Sp. 1 2-hr. cl.
Prereq.: Path. grad. standing.
Discussion of pertinent literature, presentation and discussion of research work, and demonstration of fresh specimens and slides.

950 Research in Pathology

Research for thesis or dissertation purposes only.

PEDIATRICS

Office: Children's Hospital, 501 South 17th Street.


715 Ward Clinics in Pediatrics

2 months, offered July, Sept., Nov., Jan., Mar., or May.
Prereq.: Med. 3rd yr. standing.
Didactic and clinical instruction in Children's Hospital is given to students in small sections, the members of which are required to write case histories and make routine clinical and laboratory examinations of cases assigned to them. All of the medical, surgical, and psychiatric aspects of diseases of children will be presented.

781 Internship in Pediatrics

12 months full time, beginning July 1.
Prereq.: Appointment as Intern in Department of Pediatrics. Repeatable to a maximum of 72 cr. hrs.
Eight months at Children's Hospital, four in medical pediatrics, two in pediatric surgery, two in anesthesiology; four months at University Hospital, two emphasizing communicable diseases, two emphasizing the newborn infant.

782 Residency in Pediatrics

12 months full time, beginning July 1.
Prereq.: Appointment as Resident, Children's and University Hospitals. Repeatable to a maximum of 316 cr. hrs.
Supervised care of hospitalized and ambulatory pediatric patients at Children's Hospital and University Hospital, certain teaching responsibilities; conferences and rounds.
Individual Studies in Pediatrics
Prereq.: Med. 4th yr. standing, 715, and permission of instructor.
A. Advanced Pediatrics
   G 3-5
B. Chromosome Study. 1, 2, 3 or 4 months, offered all months.
   P 6, 12, 18, 24
C. Pediatric Infectious Diseases. 1, 2, 3 or 4 months, offered all months except June.
   P 6, 12, 18, 24
D. Pediatric Practice. 1 month.
   P 6

Group Studies in Pediatrics
1, 2, 3, or 4 months.
   for F—Med. 3rd or 4th yr. standing.
   for F—715 and permission of instructor.
A. Advanced Pediatric Problems.
   1, 2, or 3 months, offered all months except June. Graham.
   P 6, 12, 18
B. Ambulatory Pediatrics. 1, 2, 3 or 4 months, offered all months except June. Ambroz, Eberly, Turner.
   F 6, 12, 18, 24
C. Child Development. 2, 3, or 4 months, offered all months. Knabuck, Shereid.
   P 12, 18, 24
D. Diseases of the Newborn. 1 month, offered all months. Graham, Sipric.
E. Inpatient Pediatrics. 1, 2, 3 or 4 months, offered all months except June. Graham.
   F 6, 12, 18, 24
F. Laboratory Investigation of Metabolic Disorders of Children. 2, 3, or 4 months, offered all months. Sotos.
   P 12, 18, 24
G. Pediatric Cardiology. 1 month, offered all months. Sotos.
H. Pediatric Endocrinology and Metabolism. 1, 2, 3, or 4 months, offered all months. Sotos.
   P 6, 12, 18, 24

Seminar in Pediatrics
Prereq.: Permission of instructor.

Research in Pediatrics
Research for thesis purposes only.

Drilling Fluids
W. 1 cl., 2 3-hr. lab.
Prereq.: 602.
The significance and control of drilling fluid qualities. Commercial drilling fluids are analyzed in the laboratory and the control of their properties is demonstrated. Slide.

Physical Analysis of Petroleum Reservoirs
W. 1 cl., 1 4-hr. lab.
Prereq.: 602 or permission of instructor.
A quantitative study of the physical nature of a petroleum reservoir. Includes laboratory analysis of porosity, permeability, saturation, capillary pressure, and multi-phase characteristics of reservoir rocks. Slide.

Reservoir Engineering—Hydrocarbon Phase Behavior
Sp. 2 cl., 1 3-hr. lab.
Prereq.: Chem. 754.
Quantitative study of the physical nature and phase behavior of subsurface reservoir fluids. Slide.

Reservoir Engineering—Fluid Flow
A. 2 cl., 1 2-hr. lab.
Prereq.: 735.
Quantitative study of reservoir fluid flow, including analysis of material balance, producing mechanisms, and well performance. Slide.

Oil and Gas Well Completions
Sp. 3 cl.
Prereq.: 713, 736.
Design of well completion methods emphasizing reservoir damage evaluation and evaluation of reservoir conditions, casing design, cementing, logging, acidizing, and hydraulic fracturing. Slide.

Petroleum Investigations
A, W, Sp. Library, conf., and lab. work.
Prereq.: 736.

Advanced Petroleum Engineering Technology
Sp. 2 cl.
Prereq.: 736 and 793.
Library research and seminar discussions of the most recent technical developments in petroleum engineering. Slide.

Petroleum Production and Oil Field Development and Operational Problems
Prereq.: Permission of instructor.
Examination and testing of petroleum and petroleum bearing rocks; economic interpretation and application to problems of primary and secondary recovery.

Research in Petroleum Engineering
Research for thesis or dissertation purposes only.
Pharmacology

Office: 214 Hamilton Hall, 1645 Neil Avenue.
PROFESSOR: MARKS (Acting Chairman); ASSOCIATE PROFESSORS: GARDIER and HOLLANDER; ASSISTANT PROFESSORS: FESCH, DAGHRMAJIAN, DANIELLS, ENGELMANN, GOULD, and LIEVEQUE.

600 General Pharmacology

A 2 cl., 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. Lecture.

601 Laboratory Methods in Pharmacology

Sp. 1 cl., 2 3-hr. labs.
Pre req.: 600.
Biological, chemical, electronic and mathematical techniques commonly employed in a pharmacology laboratory. Lecture.

610 Toxicology and Drug Identification

W. 1 cl., 2 3-hr. lab.
Pre req.: 600.

675 Introduction to Pharmacology

W. 2 cl., 1 3-hr. lab.
Pre req.: Chem. 647, 658 or equiv. or permission of instructor.
An introduction to pharmacology including discussion of the major classes of drugs, their effects on cells and methods of biological standardization. Lecture.

676 Individual Studies in Pharmacology

Pre req.: Permission of instructor.
Qualified students may avail themselves of the facilities of the department for conducting a minor investigation under the direction of a senior staff member.

700 Medical and Mammalian Pharmacology

W. 4 cl.
Pre req.: 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.

701 Medical and Mammalian Pharmacology

Sp. 4 cl., 3 lab. hrs.
Pre req.: 700.
Continuation of 700.

750 Seminar in Pharmacology

Pre req.: Permission of instructor.
Conferences on selected topics in pharmacology.

770 Clinical Pharmacology and Therapeutics

May.

793 Individual Studies in Pharmacology

1, 2, 3, months, offered all months except June.
Pre req.: Med. 3rd yr. standing or permission of instructor.
Cardiac arrhythmias; digitalis pharmacodynamics; neuropharmacology; endocrine pharmacology; advanced cardiovascular pharmacology; autonomic pharmacology. Marks.

820 Autonomic Pharmacology

A. 2 cl., lab. arr.
Pre req.: 600 or 701.
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.

821 Cardiovascular Pharmacology

W. 2 cl., lab. arr.
Pre req.: 600 or 701.
Modern concepts of the action of drugs on the heart and circulation. Lecture.

822 Neuroendocrine Pharmacology

Sp. 2 cl., hr., lab. arr.
Pre req.: 600 or 701.
Levels of interaction of the nervous and endocrine systems. Goldman.

823 Pharmacology Related to Anesthesia

A. 2 cl., lab. arr.
Pre req.: 600 or 701.
The pharmocodynamics of anesthetic agents and other drugs which modify the state of surgical anesthesia. Gardier.

845 Bioelectric Potentials

W. 5 cl., lab. arr.
Pre req.: Physiol. 301, 602 or equiv. or permission of instructor.
Methods of recording transmembrane potentials from cells; interpretation of cell potentials; effects of drugs on transmembrane potentials. Hollander.

851 Steroid Pharmacology

Sp. 2 cl., hr., lab. arr.
Pre req.: 600 or 701 or permission of instructor.
Pharmacology of steroids which affect special tissues, organs, or systems. Beech.

950 Research in Pharmacology

Research for thesis or dissertation purposes only.

A-183
Pharmacy

PROFESSORS: IFRASE (Denn), IRBEAL, ZBOEHR, IGUTH, L. E., HARRIS (Emeritus), XIELSON, and YTYE, ASSOCIATE PROFESSORS: 1KIER, 1GABRIS and 1WOLF; ASSISTANT PROFESSORS: 1EBLACK, 1DOSKOTCH, KNAPP, 1HATOLLAS, NOTARI, 1OLSON, 1AKOLOSKI and C. L. WILLIAMS (Emeritus); INSTRUCTOR ROGERS; CLINICAL INSTRUCTORS SISTER FLORENTINE and KLEINMANN.

502 Pharmaceutical Technique P 4
A. W. 3 cl., 2 2-hr. lab.
Prereq.: Chem. 551 or equiv.
The mathematics of pharmacy and the principles and techniques related to the compounding of solid dosage forms. Guth.

503 Pharmaceutical Technique P 3
Su, W. 2 cl., 2 2-hr. lab.
Prereq.: 502.
A continuation of 502 with emphasis on the liquid dosage forms. Guth.

504 Pharmaceutical Technique P 3
Sp. 2 cl., 2 2-hr. lab.
Prereq.: 502.
A continuation of 502 with emphasis on the semi-solid dosage forms. Guth.

505 Pharmacology for Nurses P 4
Sp. 4 cl.
Prereq.: Chem. 408 or 411.
A survey of the important drugs used in medicine and a consideration of their therapeutic applications. Some time is also devoted to reading prescriptions. Blake, Nelson, Tye, Wolf.

509 Drug Marketing P 3
A. 3 cl.
Prereq.: Econ. 406 or 506.
A study of the activities involved in the distribution of drug products from the producer to the consumer. Knapp.

512 Pharmacy Management P 3
W. 2 cl., 1 2-hr. lab.
Prereq.: 509.
A study of fundamental problems associated with planning, organizing, and controlling a retail pharmacy emphasizing case problems to illustrate the practical application of management principles. Knapp.

513 Pharmacy Management P 4
Sp. 2 cl., 2 2-hr. lab.
Prereq.: 512.

514 History of Pharmacy P 2
A. 2 cl.
Prereq.: 551.
A course designed to give the pharmacy student a deeper appreciation of the background of pharmacy and its development through the years. Knapp, Rogers.

521 Pharmacognosy P 5
Su, A. 4 cl., 1 3-hr. lab.
Prereq.: Chem. 553 or equiv.
A study of the history, source, identification, constituents, and medicinal preparations of some of the more important drugs of biological origin. Beidt, Doskotch.

522 Pharmacognosy P 4
W. 4 cl.
Prereq.: Chem. 551 or equiv.
A continuation of 521. Beidt, Doskotch.

530 Inorganic Pharmaceutical Chemistry P 3
W. 2 cl., 1 3-hr. lab.
Prereq.: Chem. 413 or equiv.
A systematic study of the elements, their compounds, and preparations containing these substances that have pharmaceutical application. Kier.

531 Inorganic Pharmaceutical Chemistry P 3
Sp. 3 cl.
Prereq.: 530.
A continuation of 530. Kier.

550 Pharmacy Survey P 1
A. 1 cl.
Lectures and discussions to acquaint the student with the profession of pharmacy and the many fields of interest and specialization within the profession. Parks.

551 Pharmacy Survey P 1
Sp. 1 cl.
A continuation of 550. Parks.

600 The Pharmacist and Public Health P 3
Sp. 3 cl.
Prereq.: Physical 507 or equiv., Microbiol. 607.
An introduction to public health stressing the pharmacist's role in the maintenance of the health of the community. Tye, Wolf.

601 Glandular Products P 3 G 3
Su, A. 3 cl.
Prereq.: 709 or permission of instructor.
Preparations, properties, standardization, and uses of medicinal products obtained from glands and other organs of animals, and their related compounds. Tye, Blake, Nelson, Wolf.

602 Biological Products P 3 G 3
W. 3 cl.
Prereq.: Microbiol. 607.

604 Organic Pharmaceutical Chemistry P 4
Su. (1st term), A. 4 cl.
Prereq.: Chem. 529 or equiv.
A study of the chemistry of organic pharmaceutical and medicinal agents. LaFidus, Kier.

605 Organic Pharmaceutical Chemistry P 4 G 4
Su. (2nd term), W. 4 cl.
Prereq.: 504 or equiv.
A continuation of 604. LaFidus, Kier.

606 Organic Pharmaceutical Chemistry P 3 G 3
Sp. 3 cl.
Prereq.: 605 or equiv.
A continuation of 605. LaFidus, Kier.

607 Pharmacology P 5
A. 5 cl.
Prereq.: Physical 422 or equiv. or permission of instructor.
Fundamental materia medica including a discussion of the more commonly used drugs and preparations, their pharmacology and therapeutic applications. Nelson, Blake, Tye, Wolf.
P 4

610 Drug Assay
A. 2 cl., 2 3-hr. lab.
Prereq.: 605 or equi.
The qualitative and quantitative examination of drugs and drug formulations. Kier, Olsen.

613 New and Non-Official Drugs
Sp. 3 cl.
Prereq.: Senior standing.
The pharmacy of the more commonly used new and non-official medicinals. Guth.

614 Bio-Pharmacy
Su, Sp. 4 cl., 1 3-hr. lab.
Prereq.: Chem. 552 or equi.
A study of pharmaceutical agents important in biochemical processes. Hope.

615 Professional Orientation
Sp. 1 cl.
Prereq.: Senior standing.
Discussions to focus attention on contemporary problems in pharmacy and to stimulate development of professional awareness and responsibilities. Parks.

619 Toxicology
A. 3 cl.
Prereq.: 708 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 poisons. Blake, Nelson, Tue, Wolf.

620 Cosmetic and Toilet Preparations
A, W. 2 cl., 1 3-hr. lab.
Prereq.: 504.
A fundamental study of various types of preparations, such as creams, lotions, dentifrices, powders, perfumes, and related substances. Guth.

621 Manufacturing Pharmacy
A. 1 cl., 2 3-hr. lab.
Prereq.: 504.
Courses dealing with the formulation and mechanical fabrication of a wide variety of pharmaceutical dosage forms. Kleinmann, Guth.

622 Manufacturing Pharmacy
W. 1 cl., 2 3-hr. lab.
Prereq.: 504.
A continuation of 621. Kleinmann, Guth.

623 Manufacturing Pharmacy
Sp. 1 cl., 2 3-hr. lab.
Prereq.: 504.
A continuation of 621. Kleinmann, Guth.

624 Physical Pharmacy
A. 2 cl., 1 3-hr. lab.
Prereq.: 504.
The application of physical chemical principles and laws to the preparation and study of pharmaceutical dosage forms. Sokoloski.

625 Physical Pharmacy
W. 2 cl., 1 3-hr. lab.
Prereq.: 624 or equi.
A continuation of 624. Sokoloski.

P G 3

626 Physical Pharmacy
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 625.
A continuation of 624. Sokoloski.

632 Special Problems
Su, A, W, Sp. cl., lab. arr.
Prereq.: Junior standing, cumulative point hour ratio of 2.5, and permission of instructor.
Repeatable to a maximum of 9 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.

640 Dispensing
A. 3 cl., 2 2-hr. lab.
Prereq.: Senior standing.
A course dealing with the fundamentals of prescriptions including the techniques, physical-chemical phenomena, and incompatibilities. Notari.

641 Dispensing
W. 3 cl., 2 2-hr. lab.
Prereq.: 640.

642 Dispensing
Sp. 2 cl., 2 2-hr. lab.
Prereq.: 641.

643 Hospital Pharmacy
A, W, Sp. 1 cl., 2 3-hr. lab.
Prereq.: 504.
Repeatable to a maximum of 6 cr. hrs.
Introduction to and clinical experience in hospital pharmacy under the supervision of a registered pharmacist in University Hospital, Mt. Carmel Hospital, or Grant Hospital. Lattolais, Sister Florentine, Kleinmann.

645 Pharmacy Seminar
A, W, Sp. 2 cl.
Prereq.: Senior standing or permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
A course dealing with the problems arising out of professional relations of the pharmacist with the physician, medical internes, nurses, laboratory technician, and the laity.

647 The Pharmacy of Metabolic Agents
Sp. 3 cl.
Prereq.: Senior standing.

650 Pharmaceutical Jurisprudence
Sp. 2 cl.
Prereq.: 513 or concur.
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. Knopp.

708 Pharmacology
W. 4 cl., 1 3-hr. lab.
Prereq.: 607 or equi.
Fundamental Materia Medica including a discussion of the more commonly used drugs and preparations along with their pharmacological and therapeutic applications. Nelson, Blake, Tue, Wolf.
COURSES OF INSTRUCTION

PHARMACY

700 Pharmacology
P 5
Sp. 4 cl., 1 3-hr. lab.
Prereq.: 708 or equiv.

711 Drug Assay
P 3
W. 2 cl., 1 3-hr. lab.
Prereq.: 610 or equiv.
A continuation of 610. Kier, Olson.

712 Pharmaceutical Analysis
P 5
Sp. 3 cl., 2 3-hr. lab.
Prereq.: 711 or equiv.
The use of specialized instruments in the assay and control methods of drugs and drug preparations. Kier, Olson.

714 Pharmacology of Newer Products
P 3
W. 3 cl.
Prereq.: 709.
A course covering the pharmacology of the more recent drugs and preparations and their therapeutic application. Nelson, Tyg., Wolf.

715* Sterile Products
P 3
W. 2 cl., 1 3-hr. lab.
Prereq.: 620 or equiv.
A course dealing with the formulation, preparation, and testing of sterile products including injections, bulk solutions, and topical preparations. Latiolais, Guth.

717 Microscopical Pharmacognosy
P 3
Sp. 3 3-hr. lab.
Prereq.: 532 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. Bedi, Droske.

718 Microscopical Pharmacognosy
P 3
Su, W. 1 cl., 2 2-hr. lab.
Prereq.: 717 or equiv.
Pharmaceutical applications of specialized microscopic instruments. Bedi.

725 Hospital Pharmacy and the Hospital Organization
P 3
A. 3 cl.
Prereq.: Senior standing, 643 or equiv., and permission of instructor.
A course dealing with the hospital organization and the relationship of the departmental components to the pharmacy. Latiolais.

730 Research Techniques and Instruments
P 3
A. 1 cl., 2 3-hr. lab.
Prereq.: 605 and permission of instructor.
Study and application of selected techniques and instruments useful in research in the pharmaceutical sciences. Droske.

805 Technology
G 3
W. 1 cl., 2 3-hr. lab.
Prereq.: 620 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. Guth.

806* Advanced Technology
G 2-3
Sp. 3-9 hrs. lab.
Prereq.: 805.
Repeatable to a maximum of 9 cl. 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. Guth.

807 Principles of Hospital Pharmacy
G 3
W. 3 cl.
Prereq.: 735.
A course dealing with the administrative and professional principles and concepts of, and trends affecting, hospital pharmacy. Latiolais.

808 Principles of Hospital Pharmacy
G 3
Sp. 3 cl.
Prereq.: 807.
A continuation of 807. Latiolais.

809 Product Development
G 3
Su. 1 cl., 2 3-hr. lab.
Prereq.: 620 or equiv.
Study of problems involved in formulation of suitable dosage forms and the relationship of physical, chemical, therapeutic, and organoleptic properties of medications to principles of formulation. Guth.

811 Advanced Pharmacy
G 3
Sp. 3 cl.
Prereq.: Chem. 682 or 670.
A study of the application of physical chemical principles to the design and development of fluid pharmaceutical dosage forms. Sokoloski.

812 Advanced Pharmacy
G 3
Su. 3 cl.
Prereq.: Chem. 682 or 673.
A study of the methods used to predict, determine, and improve the stability characteristics of medicinal agents in dosage form. Sokoloski.

825* Advanced Drug Marketing
G 3
W. 3 cl.
Prereq.: 609, Bus. Org. 700 or equiv.
Theoretical aspects of drug marketing with emphasis on policies and practices of the pharmaceutical manufacturer.

826 Seminar in Pharmacy Administration
G 3
Su. A. 3 cl.
Prereq.: 825, Bus. Org. 676, or equiv.
Repeatable 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.

833* Plant Drug Constituents
G 3
Su. 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. Bedi, Droske.

835 Advanced Pharmaceutical Chemistry
G 3
A. 3 cl.
Prereq.: 605 or equiv.
A study of the chemistry of synthetic organic medicinal agents with emphasis on the relation of structure to biologic action. Bope, Kier.

836 Advanced Pharmaceutical Chemistry
G 3
W. 3 cl.
Prereq.: 605 or equiv.
A continuation of 835. Bope, Kier.

845* Advanced Pharmaceutical Chemistry
G 3
W. 3 cl.
Prereq.: Chem. 843.
A study of the methods used in structure determination and synthesis of alkaloids. LaPiana.
846* Advanced Pharmaceutical Chemistry  G 3
Sp. 3 cl.
Prereq.: 845.
Repeatable to a maximum of 6 cr. hrs.
A continuation of 845 dealing primarily with steroidal hormones, glycosides, and antibiotics. Lacto.

850 Seminar  G 1
Round table discussion, oral and written reports dealing with recent advances in pharmacy.

851* Advanced Pharmacognosy  G 3
A. 3 cl.
Prereq.: Agr. Bio. 707 or Bot. 606 or permission of instructor.
A study of research involving biosynthesis of plant constituents of pharmaceutical interest. Beck.

852 * Medicinal Plant Propagation and Cultivation  G 3
Sp. 3 cl.
Prereq.: Bot. 606 or permission of instructor.
A study of the methods employed and problems involved in the propagation, cultivation, harvesting, and evaluation of medicinal plants. Beck.

853 Medicinal Plant Laboratory  G 2-3
Su, Sp. 6-9 hrs. lab.
Prereq.: 852 or permission of instructor.
Repeatable to a maximum of 12 cr. hrs.
A laboratory course dealing with fundamental principles and special problems involved in the planning and development of a medicinal plant garden. Beck.

870 Theories in Pharmacology  G 3
A. 3 cl.
Prereq.: 709 or equiv.
Orientation to graduate pharmacology. An introduction into theories of pharmacology and the research approach in pharmacology. Nelson, Tyre.

871 Screening Methods in Pharmacology  G 3
W. 1 cl., 2 3-hr. lab.
Prereq.: 870 or equiv.
Qualitative pharmacology covering the standard laboratory procedures and methods used in routine screening and laboratory evaluation of new drugs. Nelson, Tyre, Welf.

872 * Advanced Research Methods  G 3
Sp. 1 cl., 2 3-hr. lab.
Prereq.: 871 and permission of instructor.
The theory and practice of specialized pharmacological instruments. Tyre, Nelson.

880* Biological Standardization  G 3
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. Nelson, Tyre.

881 * Advanced Topics in Pharmacology  G 3
W. 3 cl.
Prereq.: 871 and permission of instructor.

890 Special Problems  G 1-5
Su, A, W, Sp. cl., lab. arr.
Repeatable to a maximum of 15 cr. hrs.
Individual investigation of problems in one of the areas below:
a. Pharmacy.
b. Pharmacy Administration.
c. Hospital Pharmacy.
d. Pharmaceutical Chemistry.
e. Pharmacognosy.
f. Pharmacology.

950 Research in Pharmacy  G 1-15
Research for thesis or dissertation purposes only.

Philosophy
Office: 10 University Hall, 216 North Oval Drive.
PROFESSORS NELSON (Chairman), T. EVANS, L. FOX, H. HIN- SHAW, and G. WILTZ. ASSOCIATE PROFESSORS REITNER (Emeritus), ASSISTANT PROFESSORS SANDERSON, GARNER, KIELKOPF, LINDENQUIST, KOLASCHMIL, ROSEN, and SEVERENS.

400 Types of Philosophy  U 3
Not open to students with credit for 401.
Essentials of the various types of philosophy; naturalism, pragmatism, dualism, idealism, mysticism.

401 Introduction to Philosophy  U 5
Not open to students with credit for 400.
The meaning and scope of philosophy, its typical problems and theories, its relations to the sciences, morality, and religion.

402 Introduction to Logic  U 5
Deductive and inductive logic; conditions of clear statement and valid reasoning; contradiction, definition, argument, fallacies; the methods by which theories and laws are established.

405 Introduction to Ethics  U 5
Examination of the ground for moral judgments; the nature of right and wrong, good and evil; adequate criteria for moral values.

406 Religious Questions  U 3
A.
Nature and significance of religion; an examination of the individual and social bases of religious experience.

510 Introduction to Social Ethics  U 5
Sp.
Not open to students with credit for 656.
Issues in ethical theory and their bearing on the problems of the nature of a good social order and of right social action.

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COURSES OF INSTRUCTION

PHILOSOPHY

515 Esthetics U 5
Su, W, Sp.
Prereq.: One course in Philos. or 15 cr. hrs. in Fine Arts or Mus.
Principles of aesthetics: interpretation of the creative activity of the artist, the work of art, and the contemplation and criticism of art objects. Weir, Brown.

531 Points of View in Ancient Philosophy U 3
Prereq.: Junior standing.
Not open to majors in Philos.
A study of the central points of view of Plato and Aristotle.

532 Points of View in Modern Philosophy U 3
Prereq.: Junior standing.
Not open to majors in Philos.
A study of two major philosophers, such as Locke and Kant.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600 AND 700
Not open to freshmen or sophomores. Unless otherwise indicated the prerequisites for 600 and 700 courses are either ten hours in philosophy and ten hours in natural or social sciences, or fifteen hours in natural science and fifteen hours in social science.

601 History of Ancient Philosophy U G 5
A.
Not open to students with credit for 501.
Not for graduate credit to students majoring in Philos.
Special attention is given to the Pre-Socratics, Plato, Aristotle, Stoicism, Epicureanism, Neo-Platonism.

602 History of Philosophy from Augustine to Hume U G 5
W.
Not open to students with credit for 502.
Not for graduate credit to students majoring in Philos.
The medieval period is dealt with briefly. Special attention is given to Descartes, Spinoza, Leibniz, Locke, Berkeley and Hume.

603 History of Philosophy from Kant through the Nineteenth Century U G 5
Sp.
Not open to students with credit for 503.
Not for graduate credit to students majoring in Philos.
Special attention is given to Kant, Fichte, Hegel, Schopenhauer, Nietzsche, and the Utilitarians.

604 Philosophy Since 1900 I U G 3
A.
Prereq.: 10 cr. hrs. of Philos.
Special attention is given to idealism, realism, and analytical philosophy.

605 Philosophy Since 1900 II U G 3
W.
Prereq.: 10 cr. hrs. of Philos.
Special attention is given to pragmatism, phenomenology, and existentialism.

607 American Philosophy U G 3
Sp.
Prereq.: 401 or 602, and 5 additional cr. hrs. in Philos.
The development of American philosophy, Background of puritanism, deism, and transcendentalism. Pragmatism, realism, naturalism, recent positivistic and analytical philosophy. Anderson.

609 Medieval Philosophy U G 5
Su, Sp.
Prereq.: 10 cr. hrs. of Philos. including 601 or 638 and 639.
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.

618 Philosophy in Literature U G 5
A.
Not open to students with credit for Eng. 618.
Philosophical problems as reflected in classics of literature, such as the Greek dramatists, Shakespeare, Voltaire, T. S. Eliot, Freest and Tolstoy.

630 Philosophy of Augustine U G 3
A.
Prereq.: 10 cr. hrs. of Philos. including 601.

631 Philosophy of Aquinas U G 3
Sp.
Prereq.: 10 cr. hrs. of Philos. including 601.
Analysis of the treatises on the existence of God, the nature of man, and law; consideration of Aristotelian influences in medieval controversies.

633 Philosophy of Locke and Berkeley U G 3
A.
Prereq.: 10 cr. hrs. of Philos. including 602.

634 Philosophy of Hume U G 3
A.
Prereq.: 10 cr. hrs. of Philos. including 602.

635 Philosophy of Descartes U G 3
A.
Prereq.: 10 cr. hrs. of Philos. including 602.

636 Philosophy of Spinoza U G 3
W.
Prereq.: 10 cr. hrs. of Philos. including 602.

637 Philosophy of Leibniz U G 3
Sp.
Prereq.: 10 cr. hrs. of Philos. including 602.

638 Philosophy of Plato U G 5
A.
Prereq.: 10 cr. hrs. of Philos. including 601.

639 Philosophy of Aristotle U G 5
W.
Prereq.: 19 cr. hrs. of Philos. including 601.

640 Post-Kantian German Idealism U G 3
Sp.
Prereq.: 10 cr. hrs. of Philos. including 603.
German philosophy as presented in writings of such thinkers as Fichte, Schelling, Hegel, and Schopenhauer.
642* Philosophy of James and Dewey  U G 3
Su.
Prereq.: 10 cr. hrs. of Philos.

646‡ Kant: Critique of Pure Reason  U G 5
W.
Prereq.: 603.
Not open to students with credit for 702.

647‡ Kant: Critique of Practical Reason and Critique of Judgment  U G 5
Sp.
Prereq.: 646.
Not open to students with credit for 703.

649 Symbolic Logic I  U G 4
A.
Prereq.: 402 or permission of instructor.
Development of the classical propositional calculus from both the matrix and the axiomatic points of view. Modal, multi-valued, weak, intuitionistic, propositional calculi.

650 Symbolic Logic II  U G 4
W.
Prereq.: 649 or permission of instructor.
Axiomatic development of the predicate calculus of first-order through proofs of consistency and completeness. Equality, restricted quantification, and descriptions.

652 Philosophy of Science  U G 3
Su, W.
Prereq.: 5 cr. hrs of Philos. and 10 cr. hrs. of science, or 20 cr. hrs. of science.
A study of the concepts and methods of science. The role of formal systems in the construction of theories.

653 Philosophy of Religion  U G 5
W.
Prereq.: 5 cr. hrs. of Philos.
A study of religious concepts and problems; the idea and nature of God, of man, their relation to the world and human destiny.

654 Conceptions and Methods of the Social Sciences  U G 3
W.
Prereq.: Philosophy 402 and 10 cr. hrs. in social science or permission of the instructor.
Philosophical assumptions of social science: nature of explanation (methodological) individualism, holism, functionalism; methods in natural and behavioral science; fact and value in social inquiry.

657* Philosophy of Mind  U G 3
Su, W. 3 cr.
Classical and contemporary approaches to problems; such as nature of mind, mind-body, other minds, intentionality, mental acts, reductionism.

661 Theory of Knowledge  U G 3
Sp.
Prereq.: 10 cr. hrs. of Philos.
A study of major epistemological problems; the possibility, origin, foundation, structure, methods, limits, and validity of knowledge. Hinshaw.

663 Problems in Metaphysics  U G 3
A.
Prereq.: 402 and 601, 602, or permission of instructor.
Philosophic methods and nature of metaphysics; categories, substance and process; causality and law. Nelson.

664 Problems of Metaphysics II  U G 3
W.
Prereq.: 653 or permission of instructor.
Metaphysical presuppositions of knowledge; problems of universals, monism and pluralism, space and time. Nelson.

665* Philosophy of History  U G 3
A.
Prereq.: 10 cr. hrs of Philos. and 10 cr. hrs. in social sciences.
The place of history in knowledge; theories of the nature of historical process. Plato, St. Augustine, Hegel, Marx, Spengler, and Toynbee will be considered. Hinshaw.

666‡ Philosophy of Language  U G 3
Sp.
Prereq.: 10 cr. hrs of Philos. including 649 or 650.
Semantics and language analysis; functions of language; modes of meaning, relation of linguistic structure to metaphysics.

671 Advanced Ethical Theory  U G 3
Sp.
Prereq.: 10 cr. hrs. of Philos. including 405.
Oldenquist.

701 Minor Problems  U G 2-10
Prereq.: Permission of the instructor.
Students ordinarily earn from 2 to 5 cr. hrs., but honor students may earn up to 10 cr. hrs.

720 Advanced Studies in Philosophy  U G 3-5
Prereq.: Permission of instructor.
Repeatable.
Topic for Autumn: Direct Knowledge in Ethics and Epistemology.
Topic for Winter: Freedom of the Will.
Topic for Spring: Linguistic Analysis and the Philosophy of Religion.

GENERAL PREREQUISITES FOR COURSES NUMBERED 800 AND 900
Unless otherwise indicated the prerequisites for 800 and 900 courses are acceptable foundation courses in history, logic, and ethics, or history of philosophy, and in some cases in all of these subjects.

807 Seminar in the Philosophy of Religion  G 3
A.

821 Seminar in Logic  G 3
Sp.

822 Seminar in Metaphysics  G 3
Sp.

823 Seminar in Theory of Knowledge  G 3
W.

824 Seminar in Ethics and Theory of Value  G 3
A.

825 Seminar in the History of Philosophy  G 3
Sp.

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PHILOSOPHY

826 Seminar in Philosophical Analysis G 3

827 Seminar in Aesthetics G 3
Sp.
Prereq.: 515 or equiv. or permission of instructor.

828 Seminar in Philosophy of Mathematics G 3
Sp.

829 Seminar in Philosophy of Science W.

830 Seminar in Induction and Probability Theory G 3
Sp.

950 Research in Philosophy G Arr.
Research for thesis or dissertation purposes only.

615 Motion Picture Photography U G 3
Sp. 2 cl., 2 lab. hrs.
Prereq.: 510 or 511 or 625 or permission of instructor.
Motion picture production in the 16 mm. field. Principles of motion picture cameras, photography, processing, scripting, editing, sound recording, and production planning. Drake.

625 Scientific Photography U G 3
A, W. 2 cl., 2-2-hour. lab.
Prereq.: Chem. 404, 405, 406 or equiv., 20 cr. hrs. in a science major.
Not open to students with credit for 511.
For students in physical and biological science who need a knowledge of photography as an aid to their scientific work. Applications of photography to science. Binau, Davis.

650 Advanced Photography U G 3
W. 2 cl., 2-2-hour. lab.
Prereq.: 511 or 625.
Continuation of Photog. 511 or 625, Binau.

699 Minor Problems in Photography U G 3-5
A, W, Sp. 4 to 8 lab. hrs.
Prereq.: Graduate standing, 6 cr. hrs. in Photog., and permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Use of departmental facilities for adding to the student's knowledge of a specially selected photographic problem pertaining to his major field. Staff.

Photography

Office: 12 Brown Hall, 190 West 17th Avenue.
PROFESSORS DAVIS (Chairman) and WAGNER; ASSOCIATE PROFESSORS BINAU and DRAKE; ASSISTANT PROFESSORS BALL and PIATT; and INSTRUCTOR.

511 Photography U 3
A, Sp. 2 cl., 2-2-hour. labs.
Fundamentals of photography, including cameras, emulsion characteristics, processing, filters, chemistry, and optics. Binau, Wilmeth.

603 Photography in Education and Communication Sp. 2-2-hour cl.
Prereq.: Graduate or 4th yr. standing and permission of instructor.
Photographic media in education and communication. Role of the photographic image in relation to educational theory. Development of photographic systems in educational and informational programs. Wagen.

605 Theory of Photography and the Moving Image U G 3
A. 2 2-hour cl.
Prereq.: Graduate or 4th yr. standing and permission of instructor.
A study of the development of the art and science of photography and its relation to related arts and sciences. The photographic origins of the still and motion picture. Wagen.

610 Application of Photographic Processes to Television U G 3
W. 2 cl., 2 lab. hrs.
Motion picture production for use in television. Film production planning, continuity, and photographic processes. Special problems in televising and relationship of film units to other station activities. Drake.

Physical Education

Office: Men's: 124 Physical Education Bldg., 337 West 17th Avenue.

PROFESSORS: LARKINS, HESS, TASHBROOK, BENNETT, CURRIE, HAYES, HIXSON, MATTHEWS, MOONEY, REITER, PERPE (Emeritus), SYDNER; ASSOCIATE PROFESSORS: EIGERS, HENDRIX, HALE, KARROW, KEPLER, IMAND, MONTANARO, STAHL, WIRTHWEIN; ASSISTANT PROFESSORS: BARTEL, BEEKMAN, CLARK, ERSING, FREDERICKS, HARTMAN, KLEINMAN, SINGER, TAYLOR, TRUSS, INSTRUCTORS: BEDECK, BEETHAM, BREINER, CARROLL, COATES, HARPER, O'BRIEN, OLSON, SARAKININ, SIMONIAN, STROBEL, and ASSISTANTS.

Women's: 201 Plummer Hall, 1760 Neil Avenue.

PROFESSORS: MORIY, TALLIRE, TALLENBAUGH, BERGER, GILMAN (Emeritus), RUFFET, SCOTT, STEIN (Emeritus), WATSON (Emeritus) and WOOD; ASSOCIATE PROFESSORS BAILEY, CRAFT, FOGLER and SCHRODER; ASSISTANT PROFESSORS: BLAIR, GAZETTE, HASKINS, HAY, HULL, LOGSDON, O'NEIL, RICKEY, WHEELER and WOOD; INSTRUCTORS: BOWERS, DAVENPORT, ELLIS, HERBOLD, HOUSE, HUXBELL, LILLY, OLSON, OWEN, TANDY and WOOD; and ASSISTANTS.

401 Physical Education U 1
Instruction in the techniques of play, rules, strategies, and the social behavior involved in sports and dance activities.

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403 Physical Education (Men) Su., A., W., Sp. 2 cl. Continuation of 403.
411 Physical Education Activities A. 5 2-hr. lab. Prereq.: By permission of chairman. Reqd. of majors in Phys. Ed. Open to others in place of Phys. Ed. 401, 402, or 403 for men, or Phys. Ed. 421, 422, or 423 for women. Dance majors should schedule D sections. Repeatable without credit.
These courses aim to develop knowledge, understandings, and skills in the basic activities appropriate to the teacher of physical education and dance education.
412 Physical Education Activities W. 5 2-hr. lab. See requirements for 411. Continuation of 411.
413 Physical Education Activities Sp. 5 2-hr. lab. See requirements for 411. Continuation of 412.
414 Physical Education Activities A. 5 2-hr. lab. Prereq.: By permission of chairman. Reqd. of majors in Phys. Ed. Open to women in place of 425, 435, or 427 by permission of chairman. Dance Majors should schedule D Sections. Repeatable without credit. Continuation of 413.
415 Physical Education Activities W. 5 2-hr. lab. See requirements for 414. Continuation of 414.
416 Physical Education Activities Sp. 5 2-hr. lab. See requirements for 414. Continuation of 415.
421 Physical Education (Women) Su. 2 cl. Not open to majors in Phys. Ed. Instruction in the technique, rules, strategy, and social behaviors of a sport or dance activity selected by the student from a wide range of offerings.
422 Physical Education (Women) Su., W. 2 cl. Continuation of 421.
424 The University Dance Group A, W., Sp. 1 cl., scheduled rehearsals. Prereq.: Admission by audition only. Repeatable to a maximum of 12 cr. hrs. The University Dance Group is a concert organization, dedicated to the study and performance of experimental and repertory dance works; three or more performances a year.
482 Supervision of Playground and Community Recreation Activities Sp. 2 2-hr. lab. Programming of recreational activities relative to community conditions. Overview of activities desirable for a broad, comprehensive program.
519 The Teaching of Basketball A, Sp. 3 cl., 2 1-hr. lab. Prereq.: Men. 412 or satisfactory evidence of skill in playing basketball. Not open to students with credit for 449. Study in the theory, strategy, and mechanics of directing basketball. Taylor.
520 Sports Officiating-Football A. 2 cl., 2-lab. hrs. Prereq.: Men. 416 or satisfactory evidence of playing experience in football. Students completing this course are eligible for certification to officiate football in the schools of Ohio. This course will include lectures, readings, class discussions, and field experience in the officiating of school and college football games. F.ixon.
521 Sports Officiating-Basketball W. 2 cl., 2-lab. hrs. Prereq.: 412 or satisfactory evidence of playing experience in basketball. Lectures, readings, class discussions, and field experience in the officiating of school and college basketball games. Reckman, Crafts.
538 Dance Notation I A. 2 cl., 2 1-hr. lab. Prereq.: 411D or permission of instructor. Fundamentals and principles of Labanotation. Wynn.
539 Dance Notation II W. 2 cl., 2 1-hr. lab. Prereq.: 538 or permission of instructor. Continuation of 538 with emphasis on reading and writing scores.
541 Theory and Practice of Elementary School Physical Education A. 2 2-hr. lab., 1 3-hr. school observation. Contribution of rhythmical, individual and group activities to the development of children. Stimulation of the creative process and adaptation of methods and materials. L.ogdon.
542 Physical Education for The Elementary School Child W. 4 1-hr. lab., 1 3-hr. lab. Prereq.: 541 for Women. Psychol. 407 for all students. Study of characteristics of the elementary school child with implications for physical education experiences. The selection, adaptation and teaching of appropriate activities are emphasized. For Men, Ashbrook, Breiner. For women, Logdon.
543 The Theory and Practice of Physical Education for Junior High School Youth (Women) U 3
Sp. 5 lab. hrs.
A study of the developmental needs of nearly adolescent youth. Emphasis is placed upon the adaptation of physical activities to meet these needs. Scott.

544 The Teaching of Track and Field U 2
W. 2 2-hr. cl.
Prereq.: Men. 412 or satisfactory evidence of skill in track and field events.
Study in the theory, methods and mechanics of coaching track and field and field. Snyder.

545 The Teaching of Football U 3
W. 2 cl. 3-lab. hrs.
Prereq.: Men. 416 or satisfactory evidence of skill in playing football.
Not open to students with credit for 446.
Study in the theory, methods, and mechanics of coaching football including fundamentals of play, offensive and defensive formations, organizations, practice periods, and educational values. Hayes.

547 The Teaching of Baseball U 2
W. 2 2-hr. cl.
Prereq.: 412 or satisfactory evidence of playing experience in baseball.
Not open to students with credit for 447.
Study in the theory, strategy, and mechanics of coaching baseball, including batting, base running and the playing of all positions. Karo.

548 Theory and Practice of Dance Education U 2
A, Sp. 1 cl. 3 lab. hrs.
Prereq.: 2 qtr. of Modern Dance or equiv.
Foundations for teaching and organizing courses of study in modern dance in high school programs of physical education. Laboratory problems, lectures, and readings. Elite.

549 The Teaching of Swimming U 2
W. (Women), Sp. (Men). 2 cl. 2-lab. hours.
Prereq.: Satisfactory evidence of skill in swimming.
Organization of water front activities in schools, camps and recreation centers. Methods of teaching swimming, life saving and canoeing. Bartels, Lilly.

550 Theory and Practice of Dance Education U 2
A, Sp. 1 cl. 4 lab. hrs.
Prereq.: 542 or equiv.
A continuation of 548 with emphasis on folk and ballroom forms of dances. Laboratory problems, lectures, and readings.

551 Directed Teaching Experience in Physical Education U 2
Su, A, W, Sp. 4 hr. lab.
Prereq.: Permission of departmental adviser.
Repeatable to a maximum of 6 qtr. hrs.
Opportunity is provided for assisting in the teaching of sport and dance activity classes.

550 Camp Counseling U 3
A. 2 cl. 7-day September workshop, Sp. 2 2-hr. cl.
Prereq.: Phys. Ed. major and minor students shall have completed the September workshop immediately preceding the qtr. of enrollment. Spring Qtr. section 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. Bailey and Mend.

576 Creative Physical Education for Elementary Teachers U 3
Su, A, W, Sp. 2 2-hr. lab.
Men and Women.
Not open to students with credit for 476, 541, 542.
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.

601 Principles of Football Coaching and Management U 3
Su. 3 cl.
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 coaching and controlling players and special problems of management. Hayes.

615 Problems in Intramural Sports U 2
Sp. 2 cl. hr.
A critical analysis of intramural sports programs. Problems of policy and administration of programs on the elementary, secondary and college levels will be studied. Bebusen.

616 The Administration of Interschool Athletics U 2
A. 2 cl.
Not open to students with credit for 540.
An introductory course in athletic administration, including scheduling contests, records, eligibility, contracts, management, facilities and equipment, budgets and finance, public relations, and awards. Hudson.

621 Principles of Physical Education U 5
A, Sp. 5 cl.
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 growth, personal resources and growth in social relationships. Oberreisser.

625 Evaluation in Physical Education U 3
Su, W. 2 cl. 1 5-hr. lab.
A critical study of methods in evaluating biological, social, and psychological outcomes for physical education. Mathews.

630 Adapted Physical Education U 3-5
A, Sp. 3 cl. 2 lab. hrs.—Men; 4 cl., 2-lab hrs.—Women.
Prereq.: 691 or equiv.
Organization and administration of individual physical education for typical or atypical students. Laboratory experiences in sports, swimming and exercise therapy for prevalent types of disabilities. Women—Wheeler, Men—Aubrey.

631 Theory and Practice of Modern Dance U 3
Sp. 2 cl. 3 lab. hrs.
Prereq.: Permission of instructor.
Foundations for teaching and organizing instructional and extra curricular programs of modern dance in schools and colleges. Laboratory problems, lectures, readings, and discussions. Akre.

632 Dance Composition U 3
A. 1-3 hr. cl. lab. arr.
Prereq.: Permission of instructor.
A study of composition based on elements of modern dance background and immediate sources of modern art. Laboratory problems with criticism, readings, films, and slides. Akre.
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>633 Dance Production</td>
<td>U 5</td>
<td>W. 1 2-hr. cl., 10 lab. hrs. Prereq.: Permission of instructor. A study of the production problems in staging dance for the theater. Lectures, readings, and discussions. Akre.</td>
</tr>
<tr>
<td>640 History of Physical and Health Education</td>
<td>U G 3</td>
<td></td>
</tr>
<tr>
<td>Su, W. 3 cl.</td>
<td></td>
<td>Not open to students with credit for Ed. 642. 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.</td>
</tr>
<tr>
<td>647 Physical Education for Secondary School Youth</td>
<td>U G 3</td>
<td></td>
</tr>
<tr>
<td>Su, W. 2 2-hr. cl., Women 3 2-hr. cl.</td>
<td></td>
<td>Prereq.: Satisfactory proficiency in 411-416 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. Crafts, Hendrix.</td>
</tr>
<tr>
<td>648 Physical Education for Senior High School Youth</td>
<td>U G 3</td>
<td></td>
</tr>
<tr>
<td>A, Sp. Men 2 cl., 3 lab; Women 3 2-hr. cl.</td>
<td></td>
<td>Prereq.: 411-416 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. Crafts, Haxom.</td>
</tr>
<tr>
<td>649 Outdoor Education and Camp Administration</td>
<td>U G 3</td>
<td></td>
</tr>
<tr>
<td>Su, Sp. 3 cl.</td>
<td></td>
<td>Prereq.: S 500 or permission of instructor. Introduction to the principles, status and administration of outdoor education and camping. Wooten.</td>
</tr>
<tr>
<td>650 Advanced Dance Composition</td>
<td>U G 4</td>
<td></td>
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<tr>
<td>A. 2-3-hr. cl., 1 2-hour cl.</td>
<td></td>
<td>Prereq.: 559, 632 or equiv. Choreographic problems of groups: duets, trios, quartets, quintets. Analysis of dance works of recognized artists through films and dance scores written in Lebanon. Blaine.</td>
</tr>
<tr>
<td>655 Public Recreation: Its Organization and Administration</td>
<td>U G 3</td>
<td></td>
</tr>
<tr>
<td>Sp. 3 cl.</td>
<td></td>
<td>Prereq.: Soc. 645 or equiv. Not open to students with credit for Soc. Work 655. Consideration of common patterns of organization of community recreation found in American cities, large and small, under municipal school and other auspices. Wooten.</td>
</tr>
<tr>
<td>657 History of Dance I</td>
<td>U G 3</td>
<td></td>
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<tr>
<td>A. 3 cl.</td>
<td></td>
<td>Prereq.: Anthro. 501 or 563 or equiv. Dance motivation from sympathetic magic in tribal societies; in mythic ritual and dance drama. Steff.</td>
</tr>
<tr>
<td>658 History of Dance II</td>
<td>U G 3</td>
<td></td>
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<tr>
<td>W. 3 cl.</td>
<td></td>
<td>Survey of dance from the early Christian church through the Baroque period. Steff.</td>
</tr>
<tr>
<td>659 History of Dance III</td>
<td>U G 3</td>
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<tr>
<td>Sp. 3 cl.</td>
<td></td>
<td>Development of Western dance in the nineteenth and twentieth centuries with emphasis on ballet and modern dance. Steff.</td>
</tr>
<tr>
<td>682 Organization and Administration of Physical Education</td>
<td>U G 5</td>
<td></td>
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<tr>
<td>Su, W. 5 cl.</td>
<td></td>
<td>Prereq.: 621 or equiv. Study of policies and procedures in the organization and administration of the physical education program. Mordy, Hess.</td>
</tr>
<tr>
<td>685 First Aid and Care of Injuries</td>
<td>U G 4</td>
<td></td>
</tr>
<tr>
<td>Su, A, Sp. 5 cl.</td>
<td></td>
<td>Prereq.: 10 atr. hrs. of Anat. and Physiol. 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. Biggs.</td>
</tr>
<tr>
<td>691 Kinesiology</td>
<td>U G 3</td>
<td></td>
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<tr>
<td>701 Minor Problems in Physical Education and Dance Education</td>
<td>U G 1-4</td>
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</tr>
<tr>
<td>Su, A, W, Sp.</td>
<td></td>
<td>Prereq.: Grad. or senior standing and permission of advisor. Not open to students with credit for 651. Investigation of selected professional problems.</td>
</tr>
<tr>
<td>799 Physical Education Workshop</td>
<td>U G 4</td>
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<tr>
<td>Su. 3 week workshop. Prereq.: Teaching experience or senior standing in Phys. Ed. and permission of instructor. A team approach to activity teaching in Physical Education with emphasis on instruction, methods, materials, resources, evaluation, inter-relationships, and others. Haxom.</td>
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<tr>
<td>802 Seminar in Physical Education</td>
<td>G 2</td>
<td></td>
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<tr>
<td>Su, W. 2 cl.</td>
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<tr>
<td>803 Seminar in Recreation</td>
<td>G 2</td>
<td></td>
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<tr>
<td>Su, Sp. 2 cl.</td>
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<tr>
<td>805 Physical Education in School and College</td>
<td>G 3</td>
<td></td>
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<tr>
<td>Su, A. 3 cl.</td>
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<td>Obersteifer.</td>
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<tr>
<td>810 Survey of Research in Physical Education</td>
<td>G 3</td>
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<tr>
<td>Su, W. 3 cl.</td>
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<tr>
<td>Mathews.</td>
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<tr>
<td>814 Seminar in the Role of Sports in Society</td>
<td>G 3</td>
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<tr>
<td>Sp. 3 cl.</td>
<td></td>
<td>Study of the significance of sports in society; and examination of the extent to which sports contribute to human welfare. Mordy.</td>
</tr>
<tr>
<td>816 Problems in Interscholastic and Intercollegiate Athletics</td>
<td>G 3</td>
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<tr>
<td>Su, W. 3 cl.</td>
<td></td>
<td>The relation of athletics to education; problems of athletic organization; eligibility; finances; current trends, and developments in management and purpose; public relations. Haxom.</td>
</tr>
</tbody>
</table>
COURSES OF INSTRUCTION

PHYSICAL EDUCATION

820 Problems in Physical Education  G 3
Advanced problems in physical education, individual or group participation.

820A Recreation  A

820B Adapted Physical Education  W

820C Curriculum in Physical Education  Su.

820D Physical Education in Higher Education  Su.

820E Physical Education in Secondary Education  Sp.

820F Physical Education in Elementary Education  W.


820H School Evaluation  W.

820I Administration  W.

823† Organic Science as Applied to Physical Education and Health Education  G 5
Su.
Prereq.: 10 hrs. of Physiol., 10 hrs. of Chem. and 10 hrs. of Biol. or equiv.
A systematic study of the integration of chemistry, biology, anatomy, physiology to the fields of physical education and health education. Ashbrook.

825 Methods of Research in Health Education and Physical Education  G 3
Su, A. 3 cl.
To develop some competency in professional writing and in the use of various research methods applied to health education and physical education. Mathews.

826 Supervision of Physical and School Health Education  G 3
A. 3 cl.
A study of the responsibilities and functions of the supervisor in city, county, and state school systems. Hixson.

846 Professional Preparation of Teachers in Physical and Health Education  G 3
Sp. 3 cl.
Not open to students with credit for 646.
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. Ness.

950 Research in Physical Education  G Arr.
Research for thesis or dissertation purposes only.

A-194

Physical Medicine

Office: Dodd Hall, 472 West 8th Avenue.
Professor Johnson (Chairman); Associate Professors Burkh, Hamilton, and Stow; Assistant Professors Guyton, Mitchell, Spiegel, and Woods.

500 Introduction to Physical Therapy  U 2
A. 2 cl.
A general orientation of physical therapy and its relation to medical services. Medical ethics, medical terminology, personal relationships, institutional contracts, and patient management. Woods.

501 Physical Therapy Arts  U 2
A. 2 cl., 1 1-hr. lab.
Prereq.: Admission to Phys. Ther.
Orientation to hospital organization, department administration, and medical-legal problems. Techniques: splints, bandaging, body mechanics. Introduction to the application of physical therapy in medical problems. Perry.

502 Massage  U 2
A. 2 cl., 1 3-hr. lab.
Prereq.: Admission to Phys. Ther., Physiol. 506 or concur.
History, application, physiological effects, indications, contraindications, of massage in medicine. Surface anatomy. 'oods.

503 Muscle Function Measurements and Tests  U 2
W. 1 cl., 2 2-hr. lab.
Prereq.: Admission to Phys. Ther., Physiol. 506 or concur.

510 Functional Anatomy  U 4
W. 2 cl., 3 1-hr. lab.
Prereq.: Admission to Phys. Ther.
The application of physical therapy techniques to osteology, anthropology, and myology. Mitchell.

600 Kinesiology in Physical Therapy  U 2
Sp. 1 cl., 3 1-hr. lab.
Prereq.: Admission to Phys. Ther.
Advanced physical therapy techniques with special emphasis on tests, measurements, and analysis of human motion. Mitchell.

602 Physical Therapy Procedures  U 3
A. 2 cl., 3 2-hr. lab.
Prereq.: Admission to Phys. Ther.
Theory, technique, demonstration, and practice in the use of physical agents in physical therapy including: thermotherapy, hydrotherapy, electrotherapy, ultrasonic therapy, Mitchell.

603 Neuromuscular Disease  U 2
W. 2 cl.
Prereq.: Admission to Phys. Ther.
Anatomy and physiology applied to the physical therapy techniques of treating neuromuscular diseases. Clinical presentation of neurological patients. Burk.
PHYSICAL MEDICINE

604 Medical Science U 4
W. 3 cl., 3 1-hr. lab.
Prereq.: Admission to Phys. Ther., 602.
Lectures and clinical presentation of patients in the medical science fields related to physical medicine, to include medicine, surgery, orthopedics, geriatrics, neurology, psychiatry, gynecology, obstetrics, dermatology, and roentgenology. Johnson.

605 Therapeutic Exercises U 4
Sp. 2 cl., 3 2-hr. lab. demons. and supervised clinical practice.
Prereq.: Admission to Phys. Ther.
Theory and technique of muscle re-education and application of exercise to medical, orthopedic, post-surgical, and neurological disorders, including patient teaching methods. Mitchell.

607 Physical Rehabilitation U 3
Sp. 2 cl., 2 2-hr. lab. demons.; field trips.
Prereq.: Admission to Phys. Ther.
Theory, techniques, and equipment used in the physical restoration of the disabled, including the relation of medical aspects to total patient concept of rehabilitation. Perry.

608 Physical Therapy Clinic U 3
Sp. 2 cl., 2 2-hr. lab.
Prereq.: Admission to Phys. Ther.
Coordination and summary practice of all physical therapy procedures, being determined by the physical disability and medical prescription. Perry.

609 Seminar U 1-2
A.  
Prereq.: Admission to Phys. Ther., permission of instructor.
Student participation in department medical seminars at which papers of current interest are presented by physicians and invited guests from related fields. Burk.

610 Seminar U 1-2
W.
Prereq.: 609.
Continuation of 609.

611 Seminar U 1-2
Sp.
Prereq.: 610.
Continuation of 610.

612 Problems in Physical Therapy U 1-3
Sp. 2 cl., 1 1-hr. lab.
Prereq.: Admission to Phys. Ther.
Survey and analysis of selected problems and research with the opportunity for students to extend their knowledge in some specialized subject in physical therapy. Woods.

613 Clinical Conference and Observation U 2
Prereq.: Admission to Phys. Ther., permission of instructor.
Therapeutic problems arising from clinical practice in the field, and the observation of surgical procedures on patients most likely to receive physical medicine and rehabilitation.

614 Clinical Practice in Physical Therapy U 18
Su, A, W, Sp. 5 8-hr. labs.
Prereq.: Admission to Phys. Ther., permission of instructor.
Clinical application of physical therapy techniques under supervision in physical medicine and rehabilitation departments of affiliated hospitals. Practice with assigned patients.

615 Agents Used in Physical Therapy U 3
W. 3 cl.
Prereq.: Admission to Phys. Ther.
Not open to students with credit for 601.
Heat, cold, light, water, electricity, sound, and exercise as used in the diagnosis and treatment of disease. Stow.

616 Effects of Agents Used in Physical Therapy U 3
Prereq.: Admission to Phys. Ther.
Not open to students with credit for 601.
Physiological effects of heat, cold, light, water, electricity, sound, and exercise, as used in the diagnosis and treatment of disease. Burk.

715 Medical Rehabilitation P 6
1 month, offered Oct., Feb.
Prereq.: Med. 4th yr. standing.
Ambulation aids, electrodiagnosis, prosthesis, physical and occupational therapy, social service, as related to acute and chronic diseases. Johnson.

735 Clinical Physical Medicine and Rehabilitation P 6, 12, 18
1, 2, or 3 months; offered any month.
Prereq.: Med. 3rd or 4th yr. standing and permission of instructor.

745 Biophysical Basis of Physical Treatment P 6, 12, 18
1, 2, or 3 months, offered any month.
Prereq.: Med. 3rd or 4th yr. standing, and 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, Nagi.

780 Individual Studies in Physical Medicine G 3-5
Prereq.: 735 and permission of instructor.
Minor investigations using electrodiagnostic techniques; biophysical, physiologic, and therapeutic effects of physical agents, and other medical rehabilitation techniques. Johnson, Stow, Nagi.

782 Residency in Physical Medicine P 15
12 months full time, beginning July 1.
Prereq.: Appointment as Resident; University Hospital.
Repeatabile to a maximum of 216 cr. hrs.
Rotation through physical medicine and rehabilitation clinical inpatient and outpatient services; consultative, supervisory and teaching responsibilities in clinics, conferences, seminars. Burke, Gatyton, Johnson, and Spiegel.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
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<tbody>
<tr>
<td>401</td>
<td>Nature of the Physical World</td>
<td>U 5</td>
<td>A unified elementary non-mathematical description of the physical universe for cultural value, emphasizing scientific method and current topics; Laboratory demonstration and telescopic observation. Not open to students with credit for Gen. S. 421.</td>
</tr>
<tr>
<td>402</td>
<td>Nature of the Physical World</td>
<td>U 5</td>
<td>Not open to students with credit for Gen. S. 432.</td>
</tr>
<tr>
<td>411</td>
<td>General Physics: Mechanics and Heat</td>
<td>U 5</td>
<td>Selected experiments in geometrical optics.</td>
</tr>
<tr>
<td>412</td>
<td>General Physics: Electricity, Magnetism, and Light</td>
<td>U 5</td>
<td>Selected experiments in physical optics.</td>
</tr>
<tr>
<td>413</td>
<td>General Physics: Modern Physics</td>
<td>U 5</td>
<td>Introduction to theory of heat with applications.</td>
</tr>
<tr>
<td>420</td>
<td>Descriptive Meteorology</td>
<td>U 5</td>
<td>Advanced theory of geometrical optics including thick lenses, types of mirrors, combinations of lenses and mirrors, apertures and aberrations in optical systems.</td>
</tr>
<tr>
<td>505</td>
<td>Intermediate Geometrical Optics</td>
<td>U 3</td>
<td>Introduction to diffraction; interference; and polarization phenomena. Applications in design and performance of optical instruments.</td>
</tr>
<tr>
<td>506</td>
<td>Intermediate Physical Optics</td>
<td>U 3</td>
<td>Introduction to the study of electric and magnetic fields; problem solving emphasized.</td>
</tr>
<tr>
<td>531</td>
<td>General Physics for Engineers and Physical Scientists: Mechanics</td>
<td>U 5</td>
<td>Not open to students with credit for 431.</td>
</tr>
<tr>
<td>532</td>
<td>General Physics for Engineers and Physical Scientists: Heat, Sound, Light</td>
<td>U 5</td>
<td>Not open to students with credit for 432.</td>
</tr>
<tr>
<td>533</td>
<td>General Physics for Engineers and Physical Scientists: Electricity, Magnetism</td>
<td>U 5</td>
<td>Not open to students with credit for 433.</td>
</tr>
<tr>
<td>535</td>
<td>Geometrical Optics Laboratory</td>
<td>U 2</td>
<td>Not open to freshmen or sophomores. Unless otherwise indicated, the prerequisites for 600 and 700 courses are Math 543 or 538 and Physics 532-552-553 or equivalent.</td>
</tr>
<tr>
<td>601</td>
<td>Intermediate Physical Mechanics</td>
<td>U G 3</td>
<td>Not open to graduate credit in Physics majors.</td>
</tr>
<tr>
<td>602</td>
<td>Concepts and Methods of Modern Physics</td>
<td>U 5</td>
<td>Introduction to the study of electric and magnetic fields; problem solving emphasized. Dickey.</td>
</tr>
</tbody>
</table>
610 Electron Physics U G 3
W, Sp. 3 cl.
Prereq.: 601 and 614 or equiv.
Physical phenomena and elementary theory of solids; binding and energy bands of solids; electrical, thermal and magnetic properties of metals and semi-conductors. Heer, Erickson.

612 Periodic and Transient Electric Currents
U G 3
Sp. 3 cl.
Prereq.: 601.
Study of response of circuits with constant parameters to both constant and variable voltages; electronic circuits and instruments used in physical research. Dickey.

614 Introduction to Modern Physics U G 3
Su, A, W, Sp. 3 cl.
Not open for graduate credit to Physics majors.
Intermediate mathematical treatment, including: fundamental particles; qualitative concepts of quantum theory and their history; emission and absorption processes; atomic and molecular structure. Nielsen.

615 Introduction to Nuclear Physics U G 3
A, W, Sp. 3 cl.
Prereq.: 601 and 614 or equiv.
Not open for graduate credit to Physics majors.
Properties of the atomic nucleus; disintegration processes; particles and photon emission; fission; fusion. Detection techniques for nuclear radiations. Energy levels and selection rules. Heer.

616 Advanced Physical Laboratory U G 3
Su, A, W, Sp. 2 2-hr. lab.
Prereq.: 412-413 or 532-533, Math. 538 or 543.
Repeatable to a maximum of 24 cr. hrs.
Experiments selected from: acoustics; atomic physics; electricity; magnetism; electron physics; electronics; heat, thermodynamics; nuclear physics; optics; solid state; spectroscopy; X-rays. Independent work emphasized. Jossem, C. Shaw.

634 Fundamentals of Radioactivity and Instrumentation U G 4
Su, A, W, Sp. 3 loc. and 1 3-hr. lab.
Prereq.: 2 qtrs. of college Physics or Chem. and 20 cr. hrs. of biological science or permission of instructor.
Not open to students majoring in Chem., Engineering, or Physics.
Descriptive treatment of atomic and nuclear structure; physical properties of radioactive nuclei; instrumentation; radiation hazards and safety; introduction to applications of radioactivity. Pooch.

637 Physics Seminar for In-Service Science Teachers U G 3
Su, 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. Riley.

638 Physics Seminar for In-Service Science Teachers U G 3
Su, W. 1 3-hr. cl.
Prereq.: 637.
Continuation of 637. Riley.

639 Physics Seminar for In-Service Science Teachers U G 3
Su, Sp. 1 3-hr. cl.
Prereq.: 638.
Continuation of 638. Riley.

641 Basic Principles and Recent Advances in Physics U G 5
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. Riley.

643 General Meteorology U G 3
W. 3 cl.
Prereq.: 15 cr. hrs. of natural science including one of following: Agron. 501, Bot. 402, Geog. 403, Geol. 402, Physics 412 or 533, Zool. 402.
Not open to students with credit for 510.
Study of atmospheric phenomena. Individual observation and prediction of weather events. J. Shaw.

645 Descriptive Acoustics U G 3
A. 3 cl.
Prereq.: Junior standing in Music, Speech, or Science Education.
Not open to majors in Physics.
Descriptive non-mathematical treatment of acoustics with applications to music and speech including: sources, propagation, reception, characteristics of sound; room acoustics; hearing; apparatus. Shau, Shaffer.

6481 Physics of the Upper Atmosphere U G 3
Sp. 3 cl.
Prereq.: 601.
The structure of the upper atmosphere as obtained from studies of the atmosphere, exosphere, aurorae, meteors, and use of rockets. J. Shaw.

701 Minor Problems in Physics U G 1-15
Prereq.: Satisfactory advanced courses in experimental and theoretical physics and permission of instructor. Repeatable.
A course designed to give a properly qualified student opportunity for independent reading, study, or lab. work in a specialized field of interest.

702 Kinetic Theory of Gases U G 3
Su, Sp. 3 cl.
Prereq.: 603, and Math. 601 and 611 or 608 and 609.
Not open to students with credit for 604.
Introduction to kinetic theory of gases with applications to physical systems. Daunt.

703 Thermodynamics U G 3
A. 3 cl.
Prereq.: 603 and Math. 601 and 611.
Modern treatment of topics in physical thermodynamics including entropy, specific heats, third law, phase, and lattice changes, surface phenomena; applications to low temperature phenomena. Daunt.

704 Thermodynamics U G 3
W. 3 cl.
Prereq.: 703.
Continuation of 703.

709 Wave Motion and Sound U G 3
A. 3 cl.
Prereq.: 601 and Math. 611.
Theory of wave motion; production, propagation and detection of sound waves; measurements and applications. C. Shaw.
711* Physics of Ionized Gases   U G 3
Sp.  3 cl.
Prereq.: 608 and 702.
Elementary processes and collective behavior in plasmas; analysis of ion orbits, many-particle systems, oscillations and stability; cosmic phenomena, laboratory plasmas, and the thermonuclear problem. C. Nielsen.

712 Fundamentals of Electricity and Magnetism   U G 3
A.  3 cl.

713 Electromagnetic Field Phenomena   U G 3
W.  3 cl.
Prereq.: 601, 712 and Math. 611.
An introductory course in Maxwell's theory of the electromagnetic field. Brown.

714 Electromagnetic Theory of Light   U G 3
Sp.  3 cl.
Prereq.: 606 and 713.

716 Introduction to Theory of Solids   U G 3
Sp.  3 cl.
Prereq.: 610.
Fundamental properties of solids with emphasis on conduction in metals and semiconductors. C. Shaw.

718 Modern Atomic Spectroscopy   U G 3
Su.  3 cl.
Prereq.: 601, 614.

719 Spectra and Structure of Molecules   U G 3
Su.  3 cl.
Prereq.: 601 and 614.
Experimental methods and theory of molecular spectra; relation of spectra to molecular structure. Rao.

720 X-ray Physics   U G 3
W.  3 cl.
Prereq.: 718.
Modern theory and experiment in X-ray emission, absorption, scattering, dispersion; application to solid state and nuclear physics. C. Shaw, Josten.

721 Fundamentals of Nuclear Physics   U G 3
W.  3 cl.
Prereq.: 718.
Topics in nuclear research; beta decay, shell structure, internal conversion, resonance, scattering, elementary particles, angular correlation, collision dynamics. Concurrent course in quantum mechanics recommended. Josten.

723 Nuclear Reactors and Neutron Physics   U G 3
Sp.  3 cl.
Prereq.: 615 and 702.
Neutron sources; scattering and capture of neutrons; nuclear fission; resonance phenomena; material damage; diffusion; power production. Pool.

726 Methods of Theoretical Physics   U G 3
Su.  3 cl.
Analytical course coordinating methods of dynamics of particles and systems of particles, electrical circuits, wave motion, etc.; preparation for quantum mechanics. Bell.

727 Methods of Quantum Mechanics I   U G 3
Su.  3 cl.
Prereq.: 601, 614, and 726, or equiv.
Introduction to Schrodinger and matrix techniques of quantum mechanics; perturbation methods; resonance; application to simple problems. Bell.

728 Methods of Quantum Mechanics II   U G 3
Sp.  3 cl.
Prereq.: 727.
Continuation of 727 with applications to more complicated problems; quantum mechanics of atoms and molecules; approximate methods. Bell.

730* Analysis of Physical Measurements   U G 3
Sp.  3 cl.
Prereq.: 601, 614, and 6 hrs. of advanced lab.
Nature of physical measurements; types of data and their analytical treatment; curve fitting; errors; applications of analytical methods to typical physical problems. C. Nielsen.

733 Nucleonic Measurements and Instrumentation   U G 3
A.  3 cl.
Prereq.: 2-3 hr. lab.
Prereq.: 615 and permission of instructor.
Not open to students with credit for 633. Repeatable to a maximum of 8 cr. hrs.
Nuclear measurements from the latest types of nuclear instruments; characteristic radiations of numerous radioactive sources. The neutron experiments center around a subcritical reactor. Pohl.

734 Nuclear Reactor Laboratory   U G 3
W.  3 hr. labs.
Prereq.: 733, 726 and permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
Neutron diffusion, neutron shielding, radioactivity production, pile oscillation, reactor control, buckling and other pile parameters; critical reactor will be operated by student. Pohl.

740 Introduction to Theoretical Physics   U G 3
A.  3 cl.
Prereq.: 601 and Math. 601.
Fundamentals of classical mechanics including transformation of reference frames; dynamics of particles and collisions; rigid rotators; Hamilton's principle. Lagrange's equations; vibration theory; special relativity; electricity; fluid dynamics; wave motion. Shafer.

741 Introduction to Theoretical Physics   U G 3
W.  3 cl.
Prereq.: 740.
Continuation of 740. Shafer.

742 Introduction to Theoretical Physics   U G 3
Sp.  3 cl.
Prereq.: 741.
Continuation of 741. Shafer.

805 Electromagnetic Field Theory   C 3
W.  3 cl.
Prereq.: 713 and Math. 721.
Electro- and magnetic-statics; Maxwell's theory of electrodynamics; general classical theory of emission, propagation, and absorption of electromagnetic waves; boundary value problems; relativistic electrodynamics. Prebus.

806 Electromagnetic Field Theory   C 3
Sp.  3 cl.
Prereq.: 805.
Continuation of 805. Prebus.
813 * Line Spectra and Atomic Structure  
A. 3 cl.  
Prereq.: 718, 727 or 818. 
Advanced treatment of theory and interpretation of atomic spectra including contemporary problems. Henshaw.

817 Quantum Mechanics  
A. 3 cl.  
Prereq.: 718, Math. 601 and 611, Physics 727 and 740 recommended.  
Advanced fundamentals course including: physical bases; Schrödinger, matrix and operational formulations; approximate methods; transformation theory; relativistic modifications; hole theory, etc. Korringa.

818 Quantum Mechanics  
W. 3 cl.  
Prereq.: 817.  
Continuation of 817, Korringa.

819 Quantum Mechanics  
Sp. 3 cl.  
Prereq.: 818.  
Continuation of 818, Korringa.

820 * Theoretical Nuclear Physics  
A. 3 cl.  
Prereq.: 721 and 728 or 818.  
Properties of nuclei; two-body problem; complex nuclei; interaction of radiation with nuclei; reaction theory; beta-decay, meson theory, and mesons; extremely high energy physics. Seigler.

821 * Theoretical Nuclear Physics  
W. 3 cl.  
Prereq.: 820.  
Continuation of 820, Seigler.

822 * Theoretical Nuclear Physics  
Sp. 3 cl.  
Prereq.: 821.  
Continuation of 821, Seigler.

823* Nuclear Spectroscopy  
Sp. 3 cl.  
Prereq.: 718, 727, 728 or 818.  
Advanced treatment of theory and interpretation of various aspects of nuclear spectroscopy including current topics. Jastram.

824 Statistical Mechanics  
W. 3 cl.  
Prereq.: 709, 737 or 818, and 740.  
Advanced treatment of fundamentals of classical and quantum statistical mechanics with application to contemporary problems. Korringa.

825 Statistical Mechanics  
Sp. 3 cl.  
Prereq.: 824.  
Continuation of 824.

833 * Theory of the Solid State  
W. 3 cl.  
Prereq.: 716, 725 or 818, and Math. 721.  
Modern theory of solid state including; classification of solids and theory of such physical properties as cohesion, specific heat, conductivity, and magnetism. Dauwet.

834 * Theory of the Solid State  
Sp. 3 cl.  
Prereq.: 833.  
Continuation of 833.

840 Advanced Dynamics  
A. 3 cl.  
Prereq.: 742 and Math. 681.  
Starts with Lagrange's equation and includes variational theorems, Hamilton's canonical equations, general transformation theory. Mills.

841 Advanced Dynamics  
Sp. 3 cl.  
Prereq.: 840.  
Continuation of 840. Selected topics in advanced dynamics. Mills.

843* Theory of Quantized Fields  
A. 3 cl.  
Prereq.: 819 and 840.  
The concepts and methods of quantum field theory, both as a fundamental description of physical interactions and as a method for use in certain relativistic problems. Mills.

844* Theory of Quantized Fields  
W. 3 cl.  
Prereq.: 843.  
Continuation of 843.

846 * Physics of Elementary Particles  
A. 3 cl.  
Prereq.: 721 and 819.  
Properties of elementary particles; theory of strong and weak interactions. Mills.

847 * Physics of Elementary Particles  
W. 3 cl.  
Prereq.: 846.  
Continuation of 846.

851* Advanced Molecular Spectra  
A. 3 cl.  
Prereq.: 718, 719, and 728.  

852* Advanced Molecular Spectra  
W. 3 cl.  
Prereq.: 851.  
Continuation of 851, H. Nielsen.

860 Advanced Topics in Physics  
Sp. 3 cl.  
Prereq.: Permission of instructor. Repeatable.  
An advanced treatment of some field of physics of current interest not presently covered in other courses. Topic to be announced for each quarter.

861 Advanced Topics in Physics  
W. 3 cl.  
Prereq.: Permission of instructor. Repeatable.  
Topic to be announced for each quarter.

862 Advanced Topics in Physics  
Sp. 3 cl.  
Prereq.: Permission of instructor. Repeatable.  
Topic to be announced for each quarter.
COURSES OF INSTRUCTION

PHYSICS

881 Seminar in Physics
Su, A. W., Sp. 1 3-hr. cl.
Prereq.: Acceptable specialized courses and permission of instructor.
Repeatable.
Seminar 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.

950 Research in Physics
Su, A. W., Sp.
Research for thesis or dissertation purposes only.

Physiological Chemistry

Office: 214 Hamilton Hall, 1645 Neil Avenue.
For related courses see Biology.

511 Physiological Chemistry
A. 3 cl., 1 3-hr. lab.
Prereq.: CHEM. 551 or permission of instructor.
Biochemistry of carbohydrates, lipids, proteins, enzymes; digestion, absorption, intermediary metabolism; biochemistry of blood and urine. Decor, Nuenke.

512 Physiological Chemistry
W. 3 cl., 1 3-hr. lab.
Prereq.: 511.
Continuation of 511.

601 Physiological Chemistry
A. 150 cl. or 6 lab. hrs.
Prereq.: MED. 1st yr. standing.

602 Physiological Chemistry
W. 75 cl. or 6 lab. hrs.
Prereq.: 601.
Continuation of 601. Experimental studies in biochemical control mechanisms in normal and pathological states including nutritional deficiencies.

603 Physiological Chemistry
Sp. 2 cl. 2 3-hr. lab.
Prereq.: 611.
Intermediary metabolism, specialized tissues, and other body fluids.

611 Physiological Chemistry
A. 3 cl., 2 3-hr. lab.
Prereq.: CHEM. 521, 522, 647, 648, 649, 650, or 655, 656, 657, 658, 659, 660, or equiv.
Chemistry of carbohydrates, lipids, and proteins. Wikoff, Decor, and Staff.

612 Physiological Chemistry
U G 5
W. 3 cl., 2 3-hr. lab.
Prereq.: 611.
Biochemistry of digestion, absorption, metabolism, and excretion. Wikoff, Decor, and Staff.

614 Biochemical Methods of Analysis
U G 5
(Food Analysis)
W. 2 cl., 1 3-hr. lab.
Prereq.: 611 or equiv.
The quantitative analysis of the proteins, fats, and carbohydrates. Special methods for the analysis of biological materials. Decor and Assistants.

619 Individual Studies in Physiological Chemistry
3, or 4 months, all months.
P 6, 12, 18, 24
Su, A. W., Sp.
Prereq.: 602, 612 or equiv. and permission of instructor.
Qualified students may avail themselves of the facilities of the department for conducting a minor investigation under the direction of a senior staff member.

632 Physiological Chemistry
P 6
Sp. 4 cl., 2 3-hr. lab.
Prereq.: DENT. 1st yr. standing. CHEM. 551, 553.
Chemistry of the carbohydrates, lipids, and proteins. Biochemistry of digestion, absorption, metabolism, and excretion. The tissues. Alben, Decor, Cornwell, McCluer, Nuenke, Richardson, and Assistants.

633 Physiological Chemistry (Human Nutrition)
P 2
A. 2 cl.
Prereq.: DENT. 1st yr. standing. 632.
The elements of human nutrition with a special emphasis on the relation of diet to dentistry. Brown.

702 Physical Methods in Biochemistry
G 3
W, Sp. 2 cl., 1 3-hr. lab.
Prereq.: 611, Physical Chemistry, or permission of instructor.
A practical and theoretical introduction to the use of the analytical ultracentrifuge, Tiselius electrophoresis, spectroscopy, chromatography and radioisotopes.

715 Biochemical Biography
U G 1
Sp. 1 cl.
Prereq.: 612.

720 A Biochemical Approach to the Study of Disease
P 6
Jan., May—1 month.
Prereq.: MED. 3rd or 4th yr. standing.
Subcellular organization, model systems in disease, injury and inflammation, toxic agents, deficiency states, enzymes, and disease, biochemical changes in growth. Passananti.

812 Seminar in Physiological Chemistry
G 2
Su, A. W., Sp.
Repeatable to a maximum of 8 cr. hrs.
Topic to be announced.

815 Seminar
A. W., Sp. 1 cl.
Prereq. or concurrent: 601 or 611 or equiv.
Repeatable to a maximum of 9 cr. hrs.
Required of all graduate students majoring in Physiol. Chem.

A-200
PHYSIOLOGICAL OPTICS

612 Introduction to Physiological Optics U G 5
A. 4 cl., 1 2-hr. lab.
Prereq.: 611.
Not for grad. credit to students majoring in Physiol. Opt.
Opt.
The motility of the eye; the structure and innervation of the extra-
circular muscles, the center of rotation and analysis and description
of eye movements. Wild.

613 Intermediate Physiological Optics U G 5
W. 4 cl., 1 2-hr. lab.
Prereq.: 612.
Monocular sensory mechanisms of vision; analysis and specification
of visual stimuli; photoreception and retina-acuiting transmission;
adaptation of photoreceptors; flicher; brightness discrimination;
and color vision. Wild.

614 Intermediate Physiological Optics U G 3
Sp. 3 cl.
Prereq.: 612.
Circulation and metabolism of the eye; intra-ocular pressure;
retinal system; movements and functions of the eyelids. Eller-
brook.

615 Intermediate Physiological Optics U G 5
Sp. 4 cl., 1 2-hr. lab.
Prereq.: 613.
Binoocular integration of hue and brightness; retinal correspond-
ences; visual perception of figure-ground relations; light, color,
illumination, size, shape, direction, distance, and motion. Fru.

620 Measurement and Specification of P G 4
Visual Stimuli
W. 3 cl., 1 2-hr. lab.
Prereq.: Optom 2nd yr. standing and 611.
Not for grad. credit to students majoring in Physiol. Opt.
Opt.
Light sources; diffusely transmitting and reflecting surfaces and
scattering of light by a medium; principles of photometry and
colourmetry as applied to visual stimuli. Wild.

701 Minor Problems in Physiological U G 1-15
Optics
Prereq.: Permission of department chairman.
Repeatabl.
A properly qualified student may perform a minor investigation
or add to his knowledge and technique. Fru, Ellerbrook, Hebbard.

715 Intermediate Physiological Optics P G 5
A. 4 cl., 1 3-hr. lab.
Prereq.: Optom 2nd yr. standing and 613.
Projection of visual impressions; the bincorporate, retinal correspond-
ence; binocular integration of hue and brilliance. Fru.

716 Intermediate Physiological Optics P G 5
Sp. 3 cl., 1-2 hr. lab.
Prereq.: Optom 3rd yr. standing and 723.
Visual perception of colors, illumination, figure-ground relations,
sizes, shape, direction, distance, motion, time and complex pat-
terns. Fru.

730 Principles of Lighting P G 5
A. 4 cl., 1 2-hr. lab.
Prereq.: Optom 4th yr. standing and 715.
The effect of the distribution of light in a given environment upon
efficiency, comfort and safety; selection and arrangement of
sources and light control. Fru.
COURSES OF INSTRUCTION
PHYSIOLOGICAL OPTICS

731 Vision in Industry
W. 5 cl.
Prereq.: Optom. 4th yr. standing and 716.
Visual testing in industry; relation of vision to performing a task; visual requirements for licenses; eye hazards and protection; compensation for loss of vision. F.r.

732 Vision in Schools
Sp. 3 cl., 6 hr. lab.
Prereq.: Optom. 4th yr. standing and 716.
Visual survey methods; the prevalence of visual anomalies and eye diseases in children; basic visual skills required in school and methods for their improvement. F.r.

801 Advanced Physiological Optics
A. 3 cl., 2 2-hr. lab.
Prereq.: 613.
The ocular image-forming mechanism; accommodation and pupil contraction, aberrations, stray light; ecstatic phenomena; shape, size, distortion; retinal illumination and blur.

802 Advanced Physiological Optics
W. 3 cl., 2 2-hr. lab.
Prereq.: 801.
Fixation disparity; photoreceptor chemistry and electrophysiology of photoreceptors; luminosity; color-mixture; retinal-cortical transmission; simultaneous contrast; visibility; adaptation; after images. F.r.

803 Advanced Physiological Optics
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. F.r.

950 Research in Physiological Optics
G Arr.
Research for thesis or dissertation purposes only.

Physics
Office: 312 Hamilton Hall, 1645 Neil Avenue.

PROFESSORS: LITTLE (Chairman), LANGERER, BOZLER, GRUBBS, HIATT, LESSLER, IMYERS, and ZAPFENSTEIN; ASSOCIATE PROFESSORS REMAN, BROWNELL, CALHOON, COULTER, HILFETZ, NISHIKAWARA, PIEPER, SMITH, STOW, and WEISS; ASSISTANT PROFESSORS TALLISON, BILLINGS, LIPSKY, MATHIES, PAUL, HETZLAF, and TOMASHEFSKI.

For related courses see Biology.

410 Introduction to Physiology
A, Sp. 4 cl. 1 2-hr. lab.
Prereq.: 1st or 2nd yr. standing, or permission of instructor.
Not open to students with credit for 508-507.
The organization and function of the body with consideration of the various organ systems. Calhoon.

A-202

506 Principles of Physiology
U 5
1 3-hr. lab.
Not open to students with credit for 410, 421, or 422.
The concepts and principles involved in the activities of muscles and nerves; central and peripheral nervous system; sense organs; secretion, digestion and motility of digestive tract; and energy and food metabolism. Angerer.

507 Principles of Physiology
U 5
1 2-hr. lab.
Not open to students with credit for 410, 481, or 482.
Continuation of 506. The concepts and principles involved in the functions of body fluids (blood, interstitial, cerebrospinal), heart and blood vessels, respiration, acid-base mechanisms, kidney and sweat glands, control of body temperature and integrative action of the endocrine organs. Angerer.

601 Advanced Mammalian Physiology
U G 5
A. 4 cl., 1 lab.
Prereq.: Inorganic and Organic Chem., Physics 411, 412, 413 or equiv., and 1 year Biol. Sc., or permission of department chairman.
Advanced physiology of muscle, nerve, central nervous system, special senses, digestion, and metabolism.

602 Advanced Mammalian Physiology
U G 5
W. 4 cl., 1 lab.
Prereq.: Inorganic and Organic Chem., Physics 411, 412, 413 or equiv., and 1 year Biol. Sc., or permission of department chairman.
Not for graduate credit to students majoring in Physiol. Advanced physiology of body fluids and excretion, circulation, respiration, body temperature regulation, and endocrine.

604 Advanced Physiology
P G 6
A. 4 cl., 2 lab.
Prereq.: Dest. 2nd yr. standing.
The cardiovascular system including blood, neuromuscular system, body fluids and excretion. Lestler, Lipsky and Staff.

605 Advanced Physiology
P G 6
W. 5 cl., 1 lab.
Prereq.: Dest. 2nd yr. standing and 604 or equiv.
The central nervous system and special senses, respiration, digestion, metabolism, the endocrine, and reproduction. Lestler, Lipsky and Staff.

623 Cellular and Comparative Physiology
U G 5
Sp. 4 cl., 1 lab.
Prereq.: 421, 422 or equiv., Zool. 401, 402 or equiv., Physics 411, 412, 413 or equiv., Chem. 551, 552 or 647, 648 or equiv. and permission of instructor.
Interactions between cells and environment in growth, differentiation, senescence, and death. The role of the nucleus, DNA, and RNA in the control of cellular function. Lestler, Angerer and Staff.

628 General Physiology (Physico-Chemical Biology)
U G 5
Sp. 4 cl., 1 lab.
Prereq.: 421, 422 or equiv., Zool. 401, 402 or equiv., Physics 411, 412, 413 or equiv., Chem. 551, 552 or 647, 648 or equiv. and permission of instructor.
Analyses of similarity among protoplasmic systems interpreted on known physical and chemical concepts and principles; where pertinent, the comparative viewpoint is considered. Angerer, Lestler and Staff.
630 Endocrinology U G 5
Sp. 4 cl., 1 lab.
Prereq.: 601 and 602, or permission of instructor.
A study of the functions of the thyroid, parathyroid, pituitary, adrenal, pancreas, gonads, and other organs with possible endocrine function. Brownell, Nishikawara and Staff.

635 Human Physiology P G 6
W. 5 cl., and labs.
Prereq.: Med. 1st yr. standing.
Neuromuscular system, reflexes, respiration, and special senses. Little.

636 Human Physiology P G 9
Sp. 5 cl., and labs.
Prereq.: 635.
Cardiovascular system, digestion, kidney, endocrine system, and central nervous system. Little.

645 * Principles of Biophysics U G 3
Sp. 3 cl.
Prereq.: 421-422 Elem. Physiol. or equiv. and 1 year of college Physics or permission of instructor.
A study of physical systems in relation to biological phenomena, with specific illustrations in the application of mechanics, heat, light, sound, electricity, hydraulics, etc. Coulter and Staff.

646 Radiation Biophysics U G 5
W. 5 cl.
Prereq.: 1 year each of college Biol., Math., Physics, and Physiol., and Chem. 601-602 or 611-612 or equiv.
Stable and radioactive isotopes; biological effects of ionizing radiation. Myers and Staff.

648 * Physical Instrumentation of Biologists U G 3
Sp. 1 cl., 2 lab.
Prereq.: Elem. Physiol. and 1 year college Physics or permission of instructor.
The theory and practical application of physical instruments used in biological studies, including elementary electronics. Coulter and Staff.

652 Principles of Physiology U G 5
W. 3 cl., 2-3 hr. lab.
Prereq.: Academic Year Science Institute students only, 15 hrs. Biol. Sci., 15 hrs. Chem., and/or Physics, and permission of instructor.
Not for credit to graduate students majoring in Physiol.
The nature and behavior of living organisms and their relationship to their environment with special consideration of the functions of vertebrate organ systems.

701 Minor Problems U G P 3-18
Su., A. W. Sp.
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.

725 Advanced Human Physiology G 6
W. 3 cl., and labs.
Prereq.: Graduate standing in Physiology, permission of Department Chairman.
Systematic study of the basic mammalian organ systems and their interactions will be presented. Little.

726 Advanced Human Physiology G 9
Sp. 5 cl., and labs.
Continuation of 725. Little.

740 Environmental Physiology G 3
A., W., Sp. 3 cl.
Prereq.: M.D. degree or graduate standing and 784, 785, and 786, or the equiv.
Repeatable to a maximum of 9 cr. hrs.
Study of the effects on man of stress factors in the gaseous, mechanical and electromagnetic environments and a consideration of the physiological aspects of protection against environmental stresses. Billings, Huitt, Dines.

807 Advanced Studies in Physiology G 3 to 5
Su., A. W. Sp.
Prereq.: 601 and 602 or equiv.
Quarter schedule of topics to be announced.
b. Cardiovascular and Renal Physiology. Little, Calhoon.
c. Aviation Physiology and Respiration. Huitt.
d. Digestion and Metabolism. Grubbs, Beman.
e. Physico-Chemical (General) Physiology. Angerer, Lexier.
h. A. Sensory Electrophysiology. Lipetz.

815 Seminar in Physiology G 2
Su., A. W. Sp.
Repeatable.

950 Research in Physiology G
Su., A. W. Sp.
Research for thesis or dissertation purposes only.

Polish
Office: 316 University Hall, 116 North Oval Drive.

601 * Polish U G 3
A. 3 cl.
Prereq.: Russ. 403 or 415 or permission of instructor.

602 * Polish U G 3
W. 3 cl.
Prereq.: 601.

603 * Polish U G 3
Sp. 3 cl.
Prereq.: 602.

604 * Intermediate Polish U G 3
A. 3 cl.
Prereq.: 603 or equiv.

605 * Intermediate Polish U 3
W. 3 cl.
Prereq.: 604 or permission of instructor.
Reading texts of moderate difficulty, conversation, simple compositions.
606 * Intermediate Polish
Sp. 3 cl.
Prereq.: 605 or permission of instructor.
Reading from modern Polish literature, practice in writing and speaking.

620 * Polish Literature in English
Translation
W. 3 cl.
Polish literature from the Medieval Period to 1864. The Medieval period, renaissance, baroque, classicism, romanticism. Emphasis on Kochanowski, Mickiewicz, Słowacki, Krasiński, Norwid.

621 * Polish Literature in English
Translation
Sp. 3 cl.

510 American State Government
Su, A, W, Sp. 5 cl.
Prereq.: I course in Pol. Sc.

530 International Tensions
A, W, Sp. 3 cl.
Prereq.: 2nd yr. standing.
Causes of international tensions and conflicts; international security organizations; basic issues in world politics. Lott and Staff.

595 Local Government in the United States
W. 3 cl.
County, municipal and special governmental districts comparatively treated; their legal status, political significance, governmental structures and functions; their relations with state and national governments.

599 Introduction to Political Science
A, W, Sp. 5 cl.
Not open to students with credit in Pol. Sc.
An introductory study of some important political ideas, institutions, problems and practices, including constitutionalism, democracy, authoritarianism, representation, political parties, and the legislative process. Lott and Staff.

POLITICAL SCIENCE

Office: 100 University Hall, 216 North Oval Drive.

PROFESSORS: HERSON (Chairman),IAUMANN, IFURNISS (Mershon Professor), HEIMBERGER (Emeritus), IHELMS, IAMANSFIELD, IRBIS, SPENCER, SNIPITZ, IWALKER; ASSOCIATE PROFESSORS:CHRISTOPH AND INEMZER; ASSISTANT PROFESSORS: HALE, IKETTLE, ILLOTT AND STEWART; LECTURERS: GLOSSER AND VORYS.

401 American National Government
Su, A, W, Sp. 5 cl.
Not open to students with credit for 507.
Introductory study of constitutional principles (federalism, civil liberty, judicial review); political processes (parties, elections, legislative process); problems of national policy in selected areas of interest. Hale and Staff.

507 Fundamentals of Government
Su, A, W, Sp. 5 cl.
Prereq.: Hist. 423.
A study of political ideas, institutions, processes and problems, presenting comparatively the leading types of government in the modern world. Spils and Staff.

508 Government of the United States
A, W, Sp. 5 cl.
Prereq.: I course in Pol. Sc.
An intermediate study of American national government, primarily for prospective majors in the social sciences, and for pre-law students. Helms.

509 Foreign Governments and Politics
A, W, Sp. 5 cl.
Prereq.: I course in Pol. Sc. or Hist. 423, or Hist. 401-402.
A comparative study of the fundamentals of the government systems of Great Britain, Russia, France, West Germany, Norway, Sweden, Canada, Japan, Latin America, and India. Christoph, Lott.

600 Contemporary Political Problems
Su, A, W, Sp. 5 cl. hrs.
Repeatable to a maximum of 10 cl. hrs.
Topics for 1965-66.

601 Introduction to Political Theory
U G 5
Su, Sp. 5 cl.
An inquiry into the major problems of political philosophy; the legitimacy of governments, forms and institutions, stability and change, freedom and control of power. Kettler, Spitz.

605 Principles of Public Administration I
A. 5 cl.
Basic problems of public administration; ends and means; the formulation of policy; organization and management; working methods of control; coordination and responsibility. Mansfield, Walker.

606 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. Walker, Mansfield.

607 American Municipal Government
A. 5 cl.
A study of municipalities in the United States, their social significance, governmental structure, and experience with government by council, mayor, commission, and manager. Walker.
| 609 | Government of Ohio | U G 3 | A. 3 cl. |
| 611 | Introduction to Jurisprudence | U G 5 | Su, W. 5 cl. |
| 612 | International Law | U G 5 | A, Sp. 5 cl. |
| 613 | Contemporary International Politics | U G 5 | Su, A. 5 cl. |
| 614 | Public Personnel Administration | U G 3 | Sp. 3 cl. |
| 615 | Administration of Justice | U G 5 | A. 5 cl. |
| 616 | American Constitutional Law | U G 5 | Su, W. 5 cl. |
| 618 | The National Government and the National Economy | U G 3 | Sp. 3 cl. |
| 623 | History of Political Theory: III, Contemporary Political Thought | U G 5 | W. 3 cl. |
| 624 | American Political Ideas | U G 3 | Su. 3 cl. |
| 625 | British Government and Politics | U G 5 | W. 5 cl. |
| 627 | Latin American Government and Politics | U G 5 | Sp. 5 cl. |
| 628 | Government of Western Europe | U G 5 | Sp. 5 cl. |
| 633 | Legislation | U G 3 | Sp. 3 cl. |
| 634 | Public Opinion and Political Processes | U G 5 | Sp. 5 cl. |
| 635 | American Political Parties and Pressure Groups | U G 5 | A. Sp. 5 cl. |
| 636 | The Soviet Union | U G 5 | A. Sp. 5 cl. |
| 637 | Soviet Foreign Policy | U G 5 | W. 5 cl. |
| 640 | The United States in World Affairs | U G 5 | Sp. 5 cl. |
| 649 | International Relations of the Far East | U G 5 | Sp. 5 cl. |
COURSES OF INSTRUCTION

POLITICAL SCIENCE

650 The Government and Politics of the Far East U G 5
  W. 5 cl.
Government institutions of China, imperial, republican, and communist. Constitutionalism vs. militarism, occupation reforms, and contemporary politics in Japan. The governments of the nearby east Asian countries.

651‡ Southeast Asia U G 5
  A. 5 cl.
Governments and politics of the Philippines, Indonesia, Indo-China, Malaysia, Thailand, and Burma; contemporary problems of this region in relation to world politics.

652 Regional Patterns in International Politics U G 3
  A. 3 cl.
Repeatable to a maximum of 15 cr. hrs.
Basic power concepts, political institutions, and international relations of the following major areas, in turn:

652A‡ The Far East
652B‡ The Middle East
652C‡ Central Europe
652D Latin America
652E‡ Africa
652F‡ The Soviet Union

Lott, Furniss, Nemser.

655 Presidential Leadership and the Presidency U G 3
  Su, W. 3 cl.
A study of presidential power and responsibility; the roles of the president; the policies of leadership; the presidency as an institution. Hale.

701 Minor Problems U G 1-5
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.

Introduction to National Security
(See National Security Policy Studies 702.)

Problems in National Security
(See National Security Policy Studies 703.)

705 Honors Courses U 3-5
  A.
Prereq.: 4th yr. standing and 40 cr. hrs. in social sciences, including 15 cr. hrs. in Pol. Sc., with a record of A in at least half of the Pol. Sc. courses and an average of B in the remainder. At least 2 qtrs. of the sequence 705-706-707 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.
A special topic is assigned to each student and results are tested by the requirement of papers and special examinations.

706 Honors Courses U 3-5
  W.
See prereq. for 705.

707 Honors Courses U 3-5
  Sp.
See prereq. for 705.

A-206

714 International Organization and Administration U G 3
  W. 3 cl.
An examination of the current system of international organization and its administrative aspects, with emphasis on the operations of the United Nations agencies. Lott.

730‡ Administrative Law U G 3
  W. 1 2-hr. cl.
Prereq.: 605, 606, 616 or equiv.
Powers and processes of administrative agencies; judicial review of administrative action. Menefield, Walker, Hale.

731 Methods of Governmental Research U G 3
  A, 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 techniques; presentation of results of research. Herson.

734 Comparative Political Parties U G 3
  Sp. 3 cl.
Prereq.: 635 and two courses in foreign governments or equiv.
An examination of the nature and role of political parties in modern societies by the use of the comparative method. Christoph.

735 Contemporary Political Problems U G 3-5
Prereq.: Senior standing and 15 cr. hrs. in Pol. Sc.
Topics for 1964-65:
W. Comparative Study of Local and Regional Government. Walker.
W. Theories and Schools of International Politics. Furniss.

736 The Policy Process U G 5
  W. 2-5 cl. hrs.
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. Casri studies in the policy process. Hale, Robinson.

737 Problems in Soviet Politics U G 3
  Sp. 3 cl.
Prereq.: 635 or 637.
An intensive examination of selected problems such as crises of succession, conflicts of pressure groups, Soviet policies in the United States, Sino-Soviet relations. Nemser.

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 courses listed may be repeated provided that no student shall earn more than ten hours of credit in any single course.

Seminar in National Security Research
(See National Security Policy Studies 801.)

805 Political Thought G 3-5
  A, W. Sp. 1 2-hr. cl.
Prereq.: Precious course work 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. Autumn Quarter, Hale; Winter Quarter, Kettler; Spring Quarter, Spits.
### Poultry Science

**401 Poultry Production**  
U 5  
A, W, Su. 3 cr., 2 2-hr. lab., 1-day field trip.  
An introductory course covering all phases of poultry production and marketing.

**501 Poultry Meat Production**  
U 3  
W. 3 cr.  
Prereq.: 401 or Zool. 401 or equiv.  
Broiler, turkey and waterfowl meat production. Stock rearing, feeding, management and marketing.

**503 Market and Hatching Egg Production**  
U 3  
W. 3 cr.  
Prereq.: 401 or Zool. 401 or equiv.  
Production, feeding, management and marketing of pullets and laying hens. Egg care, packaging, pricing and marketing.

#### Principles of Animal Improvement  
(See Dairy Science 530.)  
(Offered in cooperation with the Departments of Animal Sc. and For. Sc.)

**521 Poultry Plant Experience**  
U - 5  
Ten weeks practical experience including written report and completion of a special problem in an approved poultry plant.

#### Principles of Animal Nutrition  
(See Animal Science 530.)  
(Offered in cooperation with the Departments of Dairy Sc. and For. Sc.)

**613 Prevention and Control of Diseases of Poultry**  
G 5  
W. 3 cr., 2 2-hr. lab.  
Prereq.: 401 or Zool. 401 and Microbiol. 607 or equiv.  
Not open to students with credit for 513.  
Recognition of diseases of poultry and game birds, prevention and control measures. March.

**618 Poultry Products Technology**  
G 3  
A. 1 cr., 2 2-hr. lab.  
Prereq.: 15 hr. Chem., Zool. 401 or equiv., Microbiol. 607 or equiv.  

#### Poultry Marketing  
(See Agricultural Economics 621.)  
(Offered in cooperation with the Department of Poul. Sc.)

#### Nutrition and Feeding of Monogastric Animals  
(See Animal Science 930.)  
(Offered in cooperation with the Department of Poul. Sc.)
COURSES OF INSTRUCTION
POULTRY SCIENCE

701 Special Problems in Poultry Science
Prereq.: Permission of instructor.
The work must comprise some original research. A written report is required.

Genetics of Animal Populations
(See Dairy Science 720.)
(Offered in cooperation with the Departments of Animal Sc. and Poul. Sc.)

750 Seminar in Poultry Science

Current Topics in Animal Breeding
(See Dairy Science 820.)
(Offered in cooperation with the Departments of Animal Sc. and Poul. Sc.)
Advanced Studies in Nutrition
(See Animal Science 830.)
(Offered in cooperation with the Departments of Dairy Sc. and Poul. Sc.)

988 Interdepartmental Seminar in Nutrition and Food Technology
Sp.
(See under Interdepartmental Seminars.)

950 Research in Poultry Science
Research for thesis or dissertation purposes only.

Preventive Medicine
Office: B-107 Sterling Loving Hall, 300 W. Tenth Ave.
PROFESSORS LASHE (Chairman), DINMAN, Fancher, LEWIS, QUASHNOCK, ROBERTS, SHAPIRA, and THILITO; ASSOCIATE PROFESSORS FRAIOLA, KELLER, TIDGE, van GIERKE and WINTERFELDT; ASSISTANT PROFESSORS BERRY, BRILLINGS, CATTLE, CARR, HAY, KAMNITZ, LECOMET, RAY, RODGERS, SHAPIRO, WERNER, WYTHE, ZOLAND; INSTRUCTORS DAVIS, DINES, FREEDMAN, GOODLOE, GRANT, GRESHAM, GULLETT, HARDING, HYDE, JONES, KAUFMAN, LENTZ, LEUCHTER, LIEBER, LOVE, LUCE, McCONWAY, ORTH, PARKER, SCHEIDER, SCHWICKERT, SCOBIE, SHARP, STEIN, STUHRING, TOTMAN, SHEFSKI and WENBERG.

501 Introduction to Medical Dietetics
A, Sp.
Basic knowledge and experience in functional and sociological aspects of responsibilities of the Medical Dietitian. Lewis and Staff.

510 Introduction to Patient Food Service
Su. 3 cl., 12-hr. clinical study.
Prereq.: Home Ec. 440 or 549.
Principles and practice in food service and dietary care of the hospital patient. McConkey.

515 Quantity Food Preparation and Service
A. 2 cl., 3 1/2-hr. lab.
Prereq.: Home Ec. 549.
Application of basic principles of food preparation and service in selected types of quantity food service operations. Carbaugh.

516 Menu Planning and Food Procurement
W. 3 cl., 3 1/2-hr. lab.
Prereq.: 515.
Basic principles of menu planning and food procurement applied to selected types of quantity food service operations. Carbaugh.

517 Organization and Management in Quantity Food Service
Su. 2 cl., 8-hr. clinical study.
Prereq.: 516, Bus. Org. 686 or concur.
Principles and theories of personnel, production and financial management related to quantity food service. Hubbard.

595 Epidemiology
A, W. 2 cl.
Prereq.: Microbiol. 510.

601 Nutrition in Disease
Sp. 5 cl., 4-hr. clinical study.
Prereq.: 510, Home Ec. 610.
Causes, results and dietary management of alterations in nutritional processes. Sharp and Medical Staff.

602 Nutrition in Disease
Su. 5 cl., 4-hr. clinical study.
Prereq.: 601.
A continuation of 601.

618 Introduction to Public Health
W, Sp. 2 cl.
Prereq.: Nurm. 3rd yr. standing.
Consideration of community organization of health services on local, state, and national levels in relation to the health needs of contemporary society. Keller, Gresham.

620 Dietetics Administration
Sw., A, W, Sp. 4 cl., 32 hr. clinical study.
Prereq.: 517.
Application of management principles to the administration of hospital food service.

622 Therapeutic Dietetics
Sw., A, W, Sp. 4 cl., 32 hr. clinical study.
Prereq.: 602.
Identification, evaluation and solution of problems involved in performing functions of the dietitian in patient care.

624 Quantitative Methods in Medicine
P 2
Sp. 2-hr. cl.
Prereq.: Med. 1st yr. standing.
Principles of medical statistics and lab. exercises in analysis of papers in the medical literature, with reference to experimental design and numerical reasoning. Keller and Staff.
626 Teaching of Dietetics  U  5
A, W, Sp.  5 cl., 4 hr. clinical study.
Prereq.: Med. Dietetics senior standing.
Educational principles and practices as applied to the teaching responsibilities of the dietitians. Wenigberg.

627 Community Nutrition  U  3
A, W, Sp.  2 cl., 4 hr. clinical study.
Prereq.: 626 or permission of instructor, concur 626.
Public health nutrition programs and their services to the community, with particular reference to nutrition problems of special groups of the population. Scoibie and Keller.

628 Pediatric Nutrition  UG  2
Su.  3 cl.
Prereq.: Graduate or senior standing in Medical Dietetics and permission of instructor.
The nutrition of children. The influence of physical, psychological and social growth and development from infancy through adolescence. Stumbo and Pediatric Staff.

650 Seminar in Medical Dietetics  U  1
Sp.  2 cl.
Prereq.: Med. Dietetics senior standing.
Study of the development of dietetics as a profession, and of the responsibilities of the dietitian. Lewis.

718 Applied Nutrition  P  1
Prereq.: Med. 4th yr. standing.
A conference and demonstration course. Lewis and Staff.

735 Advanced Preventive Medicine  P  2
1 month, offered Oct., Feb.
Prereq.: Med. 4th yr. standing.
Ecology of health and disease in the modern community; environmental health; public health methods; medical nutrition; and biometric applications. Ashe.

739 Community Aspects of Medicine  P  2
A, W. 2 hr. cl.
Prereq.: Med. 4th yr. standing.
Organization and function of federal, state and local public health services and medical care programs, with reference to the physician's present and future relation to these services. Current concepts and studies in the ecology of human health and disease. Keller and Staff.

750 Epidemiologic Methods  G  3
Su.
Prereq.: Permission of instructor.
Principles of epidemiology with special emphasis on methods employed in current epidemiologic studies of chronic diseases. Keller and Staff.

753 Principles of Public Health Administration  P  6
1 month, offered all months except June.
Prereq.: Med. 3rd yr. standing.
Administration, organization, and function of Public Health agencies. Principles of sanitation, food inspection, immunization, and school health. Goodloe and Staff.

755 Seminar in Preventive Medicine  G  1 or 3
Prereq.: Med. 3rd yr. standing.
a. Selected topics in Occupational and Aviation Medicine. Ashe and Staff.
b. Selected topics in advanced nutrition. Lewis and Medical Staff.

760 Nutrition in Systemic Disease  G  3
W.
Prereq.: Med. senior standing or grad. standing in Nutrition or Medical Dietetics.
The physio-pathological background of systemic disease and the rationales of specific diets in their prevention and treatment. Lewis and Medical Staff.

761 Community Nutrition  G  3
Prereq.: Med. senior standing or grad. standing in Nutrition.
Methods of discovering problems in public health nutrition and practical application of nutrition information for improvement of nutritional status at various age levels. Scoibie.

780 Special Studies in Preventive Medicine
1, 2, 3 or 4 months; offered all months except June.
Prereq.: Med. 3rd yr. standing or graduate standing in Preo. Med.; permission of department chairman.
a. Aerospace Medicine
b. Biometrics
c. Clinical Environmental Medicine
d. Environmental Health
e. Epidemiology
f. Nutrition
g. Occupational Medicine

785 Minor Problems in Nutrition  or  UG  1-5
Dietetics
Prereq.: Graduate or senior standing in Medical Dietetics and permission of instructor.
Problems in various phases of nutrition or Medical Dietetics not included in current course offerings. Lewis and Staff.

810 Environmental Health Principles  G  1
Su. 1 hr. conf.
Prereq.: Resident standing in Aviation and Occupational Medicine.
Repeatable to a maximum of 4 cr. hrs.

820 Applied Toxicology In Aviation and  G  3
Occupational Medicine
A. 2 hr. conf. and hospital ward observations.
Prereq.: Resident standing in Aviation and Occupational Medicine.
Repeatable to a maximum of 9 cr. hrs.

Chemical and physical hazards of work and flying environments; experimental techniques; interpretation of toxicologic data; comprehensive survey of specific toxic agents; clinical aspects of intoxication. Ashe and Staff.
850 Advanced Preventive Medicine: G 3
Public Health
A. 2 2-hr. conf.
Prereq.: 750 or equiv. and 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.

851 Advanced Preventive Medicine: G 3
Industrial Hygiene
W. 3 conf. and lab.
Prereq.: 850, resident standing in Aviation and Occupational Medicine.
Engineering appraisal of environmental health hazards, sampling techniques, instrumentation and analytical methods; the industrial hygiene survey. Dimman, Roberts and Staff.

852 Advanced Preventive Medicine: G 3
Environmental Control
Sp. conf. and field exercises.
Prereq.: 850 and 851; resident standing in Aviation and Occupational Medicine.
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. Roberts and Staff.

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

899 Interdepartmental Seminar in Industrial Engineering G 1-5
Prereq.: Resident standing in Aviation and Occupational Medicine.
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.

950 Research in Preventive Medicine G Arr.
Research for thesis purposes only.

Psychiatry
Office: 171 Upham Hall, 473 West 12th Avenue.
PROFESSORS: PATTERSON (Chairman), HARDING, L. J., PALMER, and PASAMANICK; ASSOCIATE PROFESSORS: CORDON, FISCHER, GREEN, MICHAEL, MISSILDINE, PARKER, PINE, REITTIG, RISTINE, ASSISTANT PROFESSORS: ADDISON, BEAVER, BECHER, BUTCHER, Frank, GARDNER, GOLDMAN, GOVE, H. HARDING, HASS, KAESBLING, KARRAS, KING, KNOBLOCH, KNOFF, LIDHOLM, MCGUIER, MCGOUGH, NEW, SZENT-ZELTADEFF, ROND, STEVENSON, VEZOZLO, WEAHER, WEISS, and WEIHEL.

111 Electroencephalography G 2
A. W.
Repeatable to a maximum of 4 cr. hrs.
Interpretation and technique of obtaining recordings. Parker.

736 Dispensary Clinics in Psychiatry P 2
Su, A, W, T, Th.
Prereq.: Med. 4th yr. standing.

737 Clinical Psychiatry P 12
Prereq.: Med. 3rd or 4th yr. standing.
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.

782 Residency in Psychiatry P 18
12 months, full time, beginning July 1.
Prereq.: Appointment as Resident, University Hospital. Repeatable to a maximum of 816 hrs.
Rotation through in-patient and out-patient services in the diagnosis and treatment of psychiatric disorders of adults and children. Round conferences and individual supervision.

785 Seminars in Psychiatry G 1-2
Prereq.: M.M. resident in Psychiatry, and permission of chairman.
b. Research Methodology. Pasamantick and Staff.
c. Psychotherapy. Patterson and Staff.
d. Psychiatric Literature. Patterson and Staff.
e. Seminar in Child Psychiatry.

807 Clinical Psychiatry G 2
Repeatable to a maximum of 8 cr. hrs.
Current diagnostic and treatment methods of dealing with major psychiatric disorders. Patterson and Staff.

830 Individual Studies in Biological Psychiatry G 1-2
Prereq.: Med. 3rd or 4th yr. standing and permission of Chairman.
a. Electroencephalography in Psychiatry.
b. Experimental Psychology.
c. Learning and Motivation.
d. Neuroendocrinology and Other Correlates of Conditioned Reflexes and Emotions.
  Neuroendocrinology. Goldman.
  Neuroendocrinology. Liss.
  Neuroendocrinology. Resalaff.
  Physiological Psychology. Pasamantick.
  Biological Psychiatry. Patterson.
PSYCHOLOGY

404 Educational Psychology for Medical Personnel
Su, A, W, Sp. 5 cl.
Prereq.: 401 and Zool. 401.
Not open to students with credit for 407.

Human capacities, abilities, interests, individual differences and
total development through the life span. Aspects of learning and
personality of interest to medical personnel.

407 Educational Psychology
Su, A, W, Sp. 5 cl.
Prereq.: 401.

Not open to students with credit for 404.

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.

408 Mental Hygiene
A, W, Sp. 3 cl.
Prereq.: 401.

Not open to seniors.

Survey of the principles of mental hygiene. Social and emotional
adjustment, and personality in light of the principles of mental

411 Psychology of Effective Student Adjustment
Su, A, W, Sp. 5 lab. hrs.
Credit does not count toward graduation.

The psychological principles of effective learning and performance
in college. The psychological problems involved in the transition
from control of adults to self-management. Schmidt and Staff.

504 General Psychology; Sensation and Perception
A, Sp. 3 cl.
Prereq.: 3rd yr. standing and/or concurs. 508.

Subject matter and methods of psychology as a life science, with
special reference to problems of sensory intensity, the sensory dis-
tribution functions, and perceptual functions. Howell, Goldstein,
Raisler.

505 General Psychology: Motivation and Action
A, W, 3 cl.
Prereq.: 3rd yr. standing and/or concurs. 508.

A behavioristic presentation of experimental work on learning and
motivation. Erickson, Miles.

506 General Psychology; Learning and Thinking
W, Sp. 3 cl.
Prereq.: 3rd yr. standing and 505.

The principles developed in 505 are extended to complex human
behavior, especially verbal. Laue, Johnston.

507 Genetic Psychology
Su, A, W, Sp. 3 cl.
Prereq.: 401 or 433.

The facts of human development with some phylogenetic perspec-
tive. Topics cover physical and mental development, innate
tendencies, mental states, and personality development. Clark,
Johnson, Wolf.

508 Quantitative Methods in Psychology
A, W, Sp. 5 cl.
Prereq.: 401 or 403.

Methods of measurement in psychology, procedures used in
expressing behavior in terms of quantity, the significance of
quantity in the study of human traits. Erickson.
521 Social Psychology U 3
Su, A, W, Sp. 3 cl.
Prereq.: 506.
The influence of group processes, organizational variables, and culture upon the social modification of basic drives, attitudes and language. Brock, Ostrom.

541 Psychology of Abnormal Behavior U 3
Su, A, W, Sp. 3 cl.
Prereq.: 10 cr. hrs. in Psychol.
A consideration of the symptomatologies, etiologies and therapies of the major neuroses and psychoses with special emphasis on psychoanalytic theories and methods. Joy, Moshier.

581 Advising Freshman Students U 1-4
A.
Prereq.: Permission of instructor.
Repeatable to a maximum of 4 cr. hrs.
Mature student assistants of freshmen will have actual experience in advising younger students concerning their scholastic and social orientation and personal development. Godfrey, Studentlant.

601 Experimental Psychology U G 2
A, W, Sp. 1 cl., 2 lab. hrs. arr.
Prereq.: 504, 505, and 506, or permission of instructor.
The experiments are selected both for general and cultural values and for preparation for technical research in experimental psychology.

605 Physiological Psychology U G 3
W. 3 cl.
Prereq.: 402 or 403.
Some physiological correlates of psychological phenomena. The properties of integrated organ systems, with emphasis upon the characteristics of their elements. Psychosomatic abnormalities will be considered. Meyer, Raisler.

606 Advanced Physiological Psychology U G 3
Sp. 3 cl.
Prereq.: 605.
Further physiological correlates of psychological phenomena. Sensory and motor processes will be special topics. Meyer, Raisler.

608 Elementary Statistical Methods U G 4
Su, A, W, Sp. 2 cl., 2 2-hr. labs.
Prereq.: Math 417 or equiv., or permission of instructor.
Introduction to statistics and application to psychological and educational research. Rationale, computation, and interpretation. Luceau, Toint, Wherry, Nagler, Erickson, Fotheringham.

609 Exceptional Children: General Survey U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 10 cr. hrs. in Psychol.
Exceptional children and their problems including intellectual deviant, the partially sighted and hard of hearing children with speech problems, other physically handicapped and emotionally disturbed. Cassidy and Staff.

610 Adolescence U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 407 or 402.
A study of the outstanding characteristics of the adolescent boy or girl, the educational and social problems arising at this period, and means for dealing with the problem. Horrock, Clark.

611 The Intellectual Deviate U G 3
Su, W. 3 cl.
Prereq.: 609 or permission of instructor.
Theories and concepts of mental retardation, slow learners, intellectually gifted. Caution, diagnosis, and treatment of social, personal, and educational problems of children so labeled. Cassidy, Hulsman, Amer.

613 Mental and Educational Tests U G 3
Su, A, W. 2 cl., 1 lab. hr.
Prereq.: 402 or 407.
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. Horrock, Furst.

615 Psycho-Educational Diagnosis and Treatment U G 3
1 cl., 4 lab. hrs.
Prereq.: Permission of instructor. Sections A and B prereq. to C, D and E.
For Section E, 682. Sections E and F each repeatable to a maximum of 9 cr. hrs.

615A A. Binet-type Tests. Theory, development and use of Binet tests. Introduction to interviewing and writing of psychological reports. Smith.

615B W. Wechsler. Intelligence Scales for Children and Adults. Theory, development and use of the wechsler scales. Smith.


615D A. Developmental Diagnosis, Theory and use of scales for evaluating sensory, motor, social and language development. Smith.


622 Delinquent Children U G 3
Sp. 3 cl.
Prereq.: 13 cr. hrs. including 609, or permission of instructor.
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. Horrock.

623 Engineering Psychology U G 3
A. 3 cl.
Prereq.: 504 or 508 or equiv., and 15 cr. hrs. in Psychol. or 5 cr. hrs. in Psychol. and 9 cr. hrs. in engineering courses on time and motion study, quality control, or machine design.
Application of methods and techniques from experimental psychology to problems of equipment design for human use; the design, operation and management of man-machine systems. Goldstein.
626 Psychology of Learning UG 4
A. 4 cl.
Prereq.: 402 or equiv.
The principles that underlie the discovery, fixation, and retention of new modes of human behavior. Emphasis is placed on theoretical formulation of the necessary conditions of learning and forgetting. Wickens.

627 Performance Theory UG 3
W. 3 cl.
Prereq.: Permission of the instructor.
Human information processing in the continuous and in the discrete cases. Decision theory and servo-theory as applied to the human operator of complex man-machine systems. Goldstein.

628 Principles and Economy of Learning UG 3
A. 3 cl.
Prereq.: Grad. standing or 10 cr. hrs. in Psychol.
The psychological principles involved in the practical control of learning activities, especially the more complex forms as seen in school and in industrial training. Johnson.

629 Systematic Psychology UG 3
A. 3 cl.
Prereq.: 25 cr. hrs. in Psychol, including 504, 508, 601 and 608 or equiv.
Scientific method in psychology. A consideration of scales of measurement, the use of models and problems of psychophysics. Ostrom.

631 Differential Psychology UG 3
W. 3 cl.
Prereq.: 508 or 608, or equiv. and permission of instructor.
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. Johnson.

632 The Psychology of Speech UG 3
W. 3 cl.
Prereq.: 10 cr. hrs. in Psychol. and 10 cr. hrs. in Speech.
Descriptive and experimental studies of speech processes and activities. Learning, personal and social adjustments, vocal and visible symbolism, language and semantics, thinking, Speech behavior patterns. Knowler.

633 The Psychology of the Audience UG 2
Sp. 2 cl.
Prereq.: 679 and 10 cr. hrs. in Speech or permission of instructor.

635 Psychology of Advertising UG 3
W. 2 cl.
Prereq.: 10 cr. hrs. in Psychol.
The psychological principles involved in effective advertising, notably attention, memory and action, with the contributory factors of association, feeling, instinct, suggestion, and reasoning. Naylor.

636 Educational Disability UG 3
Su, A. 3 cl.
Prereq.: 689, 688, and permission of instructor.
An overview of theory and practice including causes, diagnostic procedures, remediation, and instructional materials. Huelsman.

637 Industrial Psychology UG 3
Sp. 3 cl.
Prereq.: 10 cr. hrs. in Psychol.
Industrial training; effective work methods; equipment design; environmental factors; fatigue, monotony and accidents; morale. Goldstein.

639 Psychology and Industrial Personnel UG 3
A. 3 cl.
Prereq.: 10 cr. hrs. in Psychol.
The application of psychology to problems of personnel. Selection and placement of employees by tests of intelligence and special ability. Trade tests, job analysis, and rating scales. Goldstein.

640 Educational and Vocational Guidance UG 3
Su, W. 3 cl.
Prereq.: 402 or 407.
Theory and techniques of appraisal of individual characteristics as related to the formulation of future educational and vocational plans. Fletcher, Stewart.

644 Techniques of Human Motivation UG 3
Sp. 3 cl.
Prereq.: 10 cr. hrs. in Psychol.
The techniques of optimizing human motivation. The incentive values of environmental patterns. Napier.

646 Contemporary Viewpoints in Psychology W. 3 cl.
Prereq.: 10 cr. hrs. in Psychol.
A consideration of the development of modern scientific psychology from its roots in the school of the nineteenth century to its contemporary status. Meyer.

648 Prejudice and Personality UG 3
A. 3 cl.
Prereq.: 521.
Social psychological theories of group conflict. Personality dynamics in prejudice. Approaches to the reduction of intergroup hostility.

650 Minor Problems UG 1-15
Prereq.: 10 cr. hrs. in Psychol. and permission of instructor.
By permission of the chairman of the department and the Director of the Bureau of Educational Research and Service, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.
Investigation of minor problems in the various fields of psychology.

655 Comparative Psychology UG 3
A. 1 cl., 2 2-hr. lab.
Prereq.: 504, 505, 506, or 20 hrs. in Psychol, or Zool, including 605 or equal. and permission of instructor.
Principles of animal behavior, with emphasis upon the contributions of zoology and B. F. Skinner. Lawson.

659 Counseling Psychology: An Introduction UG 3
Su, A, W. 3 cl.
Prereq.: 10 cr. hrs. in Psychol.
A course designed for students who are interested in counseling and personnel work. Discussion of counseling psychology, counseling, and testing. Schmidt, Stewart.
663 Psychology of Childhood U G 3
A, W, Sp. 3 cl.
Prereq.: 402, 403, or 407.

666 Studying the Individual Child U G 2-3
A, W. Lab. hrs.
Prereq. or concurs: 610 or 663; and permission of instructor, or 507 or Home Ec. 501.
Repeatable in the following quarter 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 various social situations (using tests where appropriate); coordination of information obtained from records and interviews and a weekly report. Thompson, Wolf.

667 Psychology of Music U G 3
W. 2 cl.
Prereq.: Permission of instructor.
Psychological factors in musical learning, memorization, rhythm, harmony, form, tone color, interpretation, dictation, and music talent. Feldman.

670 Psychological Problems of Adult Life U G 3
Sp. 3 cl.
A survey regarding changes in capacity for learning through adulthood and old age, in interests, emotions, psychological problems of work, adult education, leisure. Horrock, Clark.

671 Principles of Treating the Problem Child U G 3
Su, W. 3 cl.
Prereq.: 13 cr. hrs. in Psychol. 609, or permission of instructor.
Methods used in dealing with behavior and personality problems of children. Amsel.

674 Psychological Study of Individuals and Groups U G 3
A, W, Sp. 3 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
Basic concepts and techniques of personnel work in the student living center. Stewart.

676 Advanced Educational Psychology U G 3
Su, A, W. 3 cl.
Prereq.: 402 or 407 or permission of instructor.
A course in advanced educational psychology, giving a critical appraisal of the implications for education of modern psychological findings. Furst, Clark.

677 Experimental Social Psychology U G 4
A, W, Sp. 2 cl., 4 lab. hrs.
Prereq.: 521 or equiv., 608 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 influence upon the individual. Ostrom.

678 Psychology of Personality U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 10 cr. hrs. in Psychol.
Not open to graduate students in Psychol.
A theoretical approach to the problems of personality development, measurement and functioning. Emphasis is given to a critical evaluation of the major theories of personality. Joy, Barker, J. Kelly, Mosher.

679 Psychology of Public Attitudes U G 3
Su, W, Sp. 3 cl.
Prereq.: 551 and 508 or equiv.
Attitude organization and change. Study of the determinants of attitude. Ostrom.

680 Educational Tests and Measurements U G 3
Sp. 3 cl.
Prereq.: 4th yr. or grad. standing and permission of instructor.

683 Psychology of Reading U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 402 or 407.
Psychological analysis of the reading process. The relationship of this to teaching and remedial methods. Discussion of remedial reading techniques. Huelman, Robinson.

6871 Psychology of Vision U G 3
3 cl.
Prereq.: 504 or permission of instructor.
Phenomena, methods, and theory in all areas of current visual research; provides a foundation in sensory psychology as exemplified in vision. Howell.

689 Occupational Information U G 3
Su, A. 3 cl.
A survey of the development, significance, and use of occupational information in counseling and personnel work. Schmidt.

690 Mental Hygiene for Professional Workers U G 3
Su, Sp. 3 cl.
Prereq.: 402 or 407.
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. Zaporozky, Stenzel, Schmidt.

695 Clinical Psychology U G 3 or 5
Sp. 3 cl., 2 optional lab.
Prereq.: 13 cr. hrs. in Psychol., 3 cr. hrs. at 600 level.
Discussion of the field of clinical psychology, its methods, its problems and its use in guidance, education, hospitals, industry, and other areas. Mosher.

National Security Policy Studies
(See National Security Policy Studies 702, 703.)

700 Honors Course U G 3
A, W, Sp. 3 cl.
Prereq.: Permission of the 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. Lawson, Reitler.

703 Special Topics in Psychology U G 3
Su, W, Sp. 3 cl.
Prereq.: 15 cr. hrs. in Psychol. at 600 level or above and permission of instructor.
The topics will vary from quarter to quarter and will be announced at least one month in advance.
704 Tests and Measurements in Speech U G 3
Sp. 3 cl.
Prereq.: 608.
Procedures in developing, using, and evaluating tests in speech education, radio and television, theatre, speech and hearing disorders, and general communication. Fotheringham.

713 Laboratory in Psychological and U G 2
Educational Measurement
A. Sp.
4 lab. hrs.
Prereq.: 613 or 680 and permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
A laboratory practicum in the construction and validation of psychological measuring instruments with particular emphasis upon measures of achievement and inter-personal relations. Cook, Wolf.

718 The Psychology of Group Therapy U G 2
W, Sp. 2 cl.
Prereq.: 671 or permission of instructor.
Primarily for students who may use psychological group methods in professional work. General principles of group therapy and specific methods with children and adults described and evaluated. Kelly.

782 Laboratory in the Psychology of U G 3
Campus Groups
A, W, Sp. 1 cl., 6 lab. hrs.
Prereq.: 674 and 681.
Experience in the advisement of campus organizations and in services to special student groups is paralleled with continuous discussion of psychological principles and appropriate technique. Stewart.

788 Laboratory in Industrial Psychology U G 3
1 cl., 4 lab. hrs.
Prereq.: 608 or equiv. and permission of instructor.
Repeatable in different sections to a maximum of 12 cr. hrs.
788A Attitude and Morale Scales
A.
Naylor.
788B Industrial Testing
788C Job Analysis and Evaluation
Sp.
Shortle.
788D Merit Rating

802 Seminar in Experimental Psychology G 2
W, Sp. 2 cl.
Prereq.: Permission of instructor.
Wickens, Meyer, Lawson, Briggs, Miles, Howell.

803 Seminar in Educational Psychology G 2
Sp. 2 cl.
Prereq.: Permission of instructor.
Horrocks, Thompson, Cook.

804 Seminar in Psychological Measurement G 2
2 cl.
Prereq.: Permission of instructor.
a. Analysis of Psychological Integration
b. The Measurement of Cognitive Functions
W.
Furst.
c. The Scaling of Interpersonal Responses

PSYCHOLOGY

805 Contemporary Psychological Literature G 1
Meyer, Wickens, Lawson.

806 Seminar in Clinical and Abnormal G 2 or 4
Psychology
Prereq.: Permission of instructor.
Two sections, A and B may be offered in any one qtr.
Kelly, Barker, Fischer, Mosher.

807 Seminars in Industrial Psychology G 2
2 cl.
Prereq.: Permission of instructor.
a. Consumer Behavior and Marketing Research
b. Criterion Development
W.
Prury.
c. Leadership and Organizational Values
A.
Shortle.
d. Motivation and Morale
A.
Naylor.
e. Selection and Placement Theory
W.
Naylor.
f. Training Methods and Devices
W.
g. Current Practices and Trends
W.
Shortle.

810 Psychological Problems in Higher G 2
Education
A. 2 cl.
Designed to give graduate students preparing for college teaching positions contact with current educational research regarding the psychological problems they will encounter. Burnett, Johnson.

811 Advanced Theoretical Psychology G 4
Sp. 4 cl.
A description and evaluation of the major advanced psychological behavior theories. Wickens.

812 Advanced Social Psychology G 3
A. 3 cl.
Prereq.: 55 cr. hrs. in Psychol. including 621, and 624 or 626 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. Brook.

813 Seminar in Social Psychology G 3
3 cl.
Prereq.: Permission of instructor.
a. Contemporary Attitude Theory and Research.
b. Social Structure and Personality
W.
c. Systematic Theory in Social Psychology
A.
Brook.
d. The Psychology of Social Movements
W.
e. Current Research Trends
W.

814 Intermediate Statistical Methods G 4
A. 2 cl., 2-3 hr. labs.
Prereq.: 608 or equiv., or permission of instructor.
Principles and techniques for deriving statistical equations; their modification to handle special cases. Clarifying assumptions and their application. Erickson.
815 Seminars in Psychological Statistics 2 cl.
Prereq.: Permission of instructor.
a. Analysis of Variance W.
   Lawson.
c. Factor Analysis A.
   Wherry.
   Erikson.
e. Non-Parametric Statistics A.
   Wherry.
f. Prediction Statistics Nayler.
g. Current Practices and Trends W.

816 Correlational Analysis 4 cl.
Prereq.: 825 or permission of instructor.
Techniques and rationale of using quantitative and qualitative data for prediction. Test and battery analysis and validation. Nayler.

818 Theories of Personality 3 cl.
Prereq.: Advanced work in personality and social psychol. and permission of instructor.
A critical consideration of the theories of personality structure and origin. Barker, Muenter.

819 Machine Programming for Psychological Research 2 cl., 1 lab.
Prereq.: 818 and Math 590 or equiv. 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.

821 Psychology of Counseling 4 cl.
Prereq.: 13 cr. hrs. in Psychol.
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. Robinson, Schmidt.

822 Seminar in Counseling Psychology 2 cl.
Prereq.: Permission of instructor.
Pepinsky, McNair, Fletcher, Schmidt, Stettcr.

823 Advanced Counseling Psychology 3 cl.
Prereq.: 853.
A survey and critical analysis of literature and research regarding effects of sequence of work activity, vocational exploration, and career development. Pepinsky, Fletcher.

824 Psychological and Child Study Services in the Public Schools 3 cl.
Prereq.: Permission of instructor.
Professional problems in school psychology. Cassedly, Smith, Hulsman.

825 Methodological Foundations of Experimental Psychology 5 cl.
Prereq.: Definition of psychological concepts, formulation and testing of hypotheses, theory, construction and formulation of empirical generalization with reference to design of psychological experiments. Briggs, Lawson.

827 Administrative Aspects of Student Personnel Work 2 cl.
Prereq.: Permission of instructor.
Advanced graduate students have the opportunity of relating principles and concepts of student personnel administration to operating procedures on the campus. Steuart, Machmuller.

829 Intermediate Statistical Methods 3 cl.
Principles and techniques for deriving statistical equations; their modification to handle special cases. Clarifying assumptions and their application.

830 Advanced Statistical Methods 3 cl.
Techniques and rationale of using quantitative and qualitative data for prediction. Test and battery analysis and validation.

831 Advanced Experimental Laboratory 3 to 15 cl.
Prereq.: Permission of instructor.
Repeatability at 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. Meyer, Briggs, Lawson, Wickens.

832 Beginning Practicum in Counseling 3 cl.
Prereq.: 821, 822, and permission of instructor.
Repeatability at a maximum of 6 cr. hrs. (Prior credit for 821A will count against this total.)
Supervised practice in assisting college students in their adjustment to college. Emphasis on diagnosis and treatment. Special help is given in interviewing procedures. Fletcher, Robinson, Schmidt.

833 Advanced Practicum in Counseling 3 cl.
Prereq.: 823, 832, and permission of instructor.
Repeatability to 9 cr. hrs. (Prior credit for 823A, D, or E will count against this total.)
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. Fletcher, Pepinsky, Robinson, Schmidt, Walker.

834 Counseling and Therapy as Social Institutions 3 cl.
A review of diverse counseling and therapeutic practice as belief and ritual, with emphasis upon their manifest and latent functions in American Society. Pepinsky.
838 Practicum in Developmental Psychology G 3-9
Prereq.: 2nd yr. grad. standing in Psychol., 840, 854, and permission of instructor.
Repeatable to a maximum of 9 cr. hrs.

840 Theory of Human Development G 3
A. 3 cl.
Critical consideration of human development. The meaning of development, the methods of investigation, and the units of measurement will be emphasized. Horrocks.

841 Advanced Psychology of Motivation G 3
W. 3 cl.
Prereq.: 26 cr. hrs. in Psychol. including 505 or 628 or equiv. 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. Miles.

842 Neuropsychology G 3
A. 3 cl.
Prereq.: 843.
Relationships between events within the nervous system and the processes of learning, motivation, memory and perception in the higher vertebrates and man. Meyer.

843 Psychophysiology of the Special Senses G 3
Sp. 3 cl.
Prereq.: 606 or 657 or permission of instructor.
A survey of the basic physiology of the senses and the peripheral nervous system. Emphasis is upon receptor mechanisms and neural coding processes. Howell.

844 Advanced Comparative Psychology G 3
W. 3 cl.
Prereq.: 655.
Contemporary literature in comparative psychology. Meyer, Miles.

845 Perception G 3
Sp. 3 cl.
Prereq.: 504 and 601 or permission of instructor.
Basic problems and phenomena of perception and their theoretical interpretations. Miles.

851 Seminars in Developmental Psychology G 2
2 cl.
Prereq.: Permission of the instructor.
c. Development of Social Attitudes and Research Values.
d. Cultural Influences on Human Development. W. Horrocks.

852 Counseling Diagnostics G 3-5
W. 3 cl., 2 opt. lab. per.
Prereq.: 608, 613, and 821, and (for laboratory) permission of the instructor.
Theory and application of interview data, observed behavior, test results, and biographical information as a basis for diagnosis in counseling and evaluation. Fletcher.

853 History and Systems of Psychology G 3
A. 3 cl.
Prereq.: 16 cr. hrs. in Psychol.
Development of psychology from the philosophical antecedents to its present status as a science and a profession. Assignments in original sources as far as possible. Meyer, Howell.

854 Interaction of Developmental Learning Functions G 2
W. 2 cl.
Prereq.: 663 and 628 or 629 or equiv.
Relation of empirical data on imprinting, sensory and motor deprivation, and environmental extensions upon theoretical constructs designed to integrate such data. Thompson.

855 Theory of Test Construction and Use G 3
Sp. 3 cl.
Prereq.: 613 or 640 or equiv.
Review of major approaches including traditional mental test theory, achievement theory, and decision theory in relation to constructing and use of various types of tests. Furr.

861 Clinical Psychology G 3 to 5
A. 3 cl., 2 optional lab.
Prereq.: Permission of instructor.
Introduction to the theory and use of clinical methods in psychology including interviewing, observation of free behavior, case documentation, professional problems, and individual testing. Designed for first-year graduate students. Fischer.

862 Psychopathology G 3 to 5
W. 3 cl., 2 optional lab.
Prereq.: Permission of instructor.
Personality disturbances and their clinical manifestations. Moher.

863 Psychodynamics G 3 to 5
Sp. 3 cl., 1 optional lab.
Prereq.: Permission of instructor.
Survey of personality theories, particularly those related to methods of psychological treatment. Laboratory involves cases in children's clinics, mental hospital or school system. Kelly.

864 Psychodiagnosis G 3 to 5
A. 3 cl., 2 optional lab. per.
Prereq.: Permission of instructor.
Theory and use of psychodiagnostic tests. Laboratory includes administration, scoring, and interpretation of projective tests. Kelly.

865 Advanced Psychological Clinic G 2-13
Lectures: A, W. 2 cl. (Repeatable to a maximum of 13 cr. hrs.)
Practicums: A, W, Sp. 3 cl. (Repeatable to a max. of 9 cr. hrs.)
Prereq.: Permission of instructor.
Student may not receive credit for more than 2 Practicums of one type.
Theory and practice of psychotherapy. Offered in connection with community services of Psychology Clinic. Two practicums: Type A, advisory services, and Type B, treatment services. Kelly, Barker.
COURSES OF INSTRUCTION

PSYCHOLOGY

880 Supervised Field Experience in Psychology
   Prereq.: Psychol. 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 Department of Psychology. 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.

G 1-15

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

950 Research in Psychology
   Research for thesis or dissertation purposes only.
   G Arr.

Radiology

Office: University Hospital, 410 West 10th Avenue.
PROFESSORS JNelson (Chairman), MOLLAR, and JPOPORE; ASSOCIATE PROFESSORS CHRISTOFORIDIS and FREIMANIS; ASSISTANT PROFESSORS DUNBAR, HAEBR, NIEBEL, and SOW.

740 Radiological Diagnosis in Clinical Medicine
   P 6, 12, 18, 24
   1, 2, 3, or 4 months, offered all months except June, July, Aug.
   Prereq.: Med. 3rd and 4th yr. standing.

Participation in diagnostic radiology; special seminars and clinics; optional research project. Nelson.

750 Radiology, Advanced
   P 1
   1 month, offered Oct., Feb.
   Prereq.: Med. 4th yr. standing.

Clinical clerkship in the Department of Radiology, University Hospital; instruction in radiation therapy and film reading techniques.

780 Individual Studies in Radiology
   P 6, 12, 18 or 24
   1, 2, 3, or 4 months, offered all months except June, July, Aug.
   Prereq.: Med. 3rd or 4th yr. standing.

Graduated participation in diagnostic and therapeutic radiology. Optional research project by 8 cr. hrs. in 780.

828 Residence in Radiology
   P 18
   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.

950 Research in Radiology
   Research for thesis purpose only.

G Arr.

Romance Linguistics

Office: 116 Derby Hall, 154 North Oval Drive
PROFESSORS IBABCOCK (Chairman), IRULATKIN, SGRIFIN, and SCHUTZ (Emeritus).

701 Minor Problems in Romance Linguistics
   U G 1-5
   A. W. Sp.
   Prereq.: Permission of instructor.

822 Seminar in Romance Linguistics
   G 3-5
   Sp.
   Prereq.: Permission of instructor.

847 Romance Linguistics I
   G 5
   W. 5 cr.
   Prereq.: Permission of instructor.
   Not open to students with credit for 647.
   A general survey of the development of the Romance languages and an introduction to the basic materials and techniques of investigation. Griffin.

848 Romance Linguistics II
   G 5
   Sp. 5 cr.
   Prereq.: 847 or permission of instructor.
   Not open to students with credit for 648.
   Topics and problems, both synchronic and diachronic. Special attention to the minor Romance languages. Griffin.

Rural Sociology

Office: Department of Agricultural Economics and Rural Sociology
103 Agricultural Administration Building, 2120 Ffyre Road.
PROFESSORS JSMITH (Chairman), JH. L. BAKER, JBAUMER, JDAVST, JDAVAN, JREYN, JREEMAN, JITTERLY, JOM (Emeritus), and JERITZ, (Emeritus). ASSOCIATE PROFESSORS JBAILEY, JF. H. BAKER, JGLOSTER, JCMIT, JDOUGAN, JMCARRICK, JMCDONALD, JMCMAN, and JMAUDTS, JEMT, JOKINS, JVT, and JTWILL; ASSISTANT PROFESSORS JFARR, JBOTTM, JCARPENTER, JZELL, JARON, JFADDIE, JPOLO, JREWE, and JWALKER.

405 Introduction to Rural Sociology
   U 5
   A, W, Sp. 5 cr.
   Not open to students with credit for Sociology 401, 507 or 511.
   Principles of society, major social institutions and social change. Emphasis on social changes in rural life, rural organizations, population and family living. McCam, Mitchell.

506 Rural Leadership
   U 3
   Sp. 1 5-hr. cl., 1 2-hr. lab.
   Basic principles and practices in the development of effective leadership in organization programs. Mitchell.
Advanced Rural Sociology
W. 5 cl.
Prereq.: 405 or Soc. 401 or 507 or 511 or permission of instructor.

An advanced course on rural society dealing with fundamentals in rural social institutions and organizations, rural social change and nature of rural social systems. Manganese.

Rural Social Organization
A. 2 cl., 1-2 hr. lab.
Prereq.: 405 or Soc. 401, 507, 511 or permission of instructor.

Covers elements of social organization, functions of formal and informal social systems, process of making decisions in communities. Analysis of actual rural community is made. Mitchell.

The Rural Family
Sp. 4 cl.
Prereq.: 405 or Soc. 401, 507, 511 or permission of instructor.

Not open to students with credit for 611. Structure and functions of contemporary rural families in a sociological perspective with emphasis upon changes affecting family life in rural America with causes and consequences. Manganese.

Diffusion of Information on Agricultural Technology
Sp. 3 cl.
Prereq.: 405 or Soc. 401, 507, 511 or permission of instructor.

The process by which new ideas diffuse to the farmer and homemaker. Emphasis on the role of group influence, professional agricultural workers, and adoption leaders. Rogers.

Rural Sociology of Developing Societies
W. 3 cl.
Prereq.: 3rd yr. standing and 10 cr. hrs. of Rur. Soc., and/or Soc. or permission of instructor.

Sociological principles applied to analysis of present social systems and institutions of developing nations for students preparing for foreign service with rural societies. Rogers.

Special Problems
Su., A. W., Sp.
Prereq.: 8 cr. hrs. in Rur. Soc. or Soc. and permission of instructor.

Eligible students plan and conduct an analysis of a special sociological problem not included in regular courses.

Advanced Seminars in Rural Sociology
A. W., Sp.
Prereq.: Permission of instructor.

Topics will be announced by the department prior to registration time each quarter.

The fields of study are as follows:
- Population Problems
- Rural Family
- Rural Health
- Rural Leadership
- Rural Community and Institutions
- Community Development
- Diffusion of Technology
- Research Methods in Rural Sociology
- Social Organization and Administrative Problems
- Sociology of Foreign Areas
- Rural Church
- Farmer Organizations

Research in Rural Sociology
Su., A. W., Sp.

Research for thesis and dissertation purposes only.
506 Russian Composition
W, Sp. 2 cl.
Prereq.: 404 or permission of instructor.
Practice in simple writing.

507 Intermediate Conversation
U 3
Sp. 3 cl.
Prereq.: 505 or permission of instructor.

508 Review Grammar and Composition
U 2
Sp. 2 cl.
Prereq.: 508 or permission of instructor.
Review of Russian grammar, composition on assigned topics, practice in translation.

516 Intermediate Intensive Russian
U 5 or 10
Su, W. 10 cl.
Prereq.: 403, 415 or permission of chairman.
The equat. of 404: 505, 506. Students with credit for 404 may, with permission of the chairman, register for 5 cr. hrs. instead of 10 cr. hrs. The course must be taken in its entirety. Register before May 12.

517 Study Tour of the USSR
U 15
Su, Sp. 15 cl., 1st term; 2nd term in USSR.
Prereq.: Minimum of 35 to maximum of 35 cr. hrs. of Russian or equiv. and permission of departmental 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.

575 Introduction to Russian Literature, The Early Classics: Romanticism, the Nature School, Early Realism
U 3
A. 3 cl.
Prereq.: 404 or permission of instructor.
Conducted in Russian.
Readings from representative authors such as Pushkin, Lermontov, Gogol, Turgenev, Sil'bozorn.

576 Introduction to Russian Literature, The Russian Realists
U 3
W. 3 cl.
Prereq.: 404 or permission of instructor.
Conducted in Russian.
Readings from representative authors such as Turgenev, Dostoevsky, Tolstoy, Goncharov, Sil'bozorn.

577 Introduction to Russian Literature, Impressionism, Critical Realism, Symbolism, Socialist Realism
U 3
Sp. 3 cl.
Prereq.: 404 or permission of instructor.
Conducted in Russian.
Readings from representative authors such as Chekhov, Gorky, Bunin, Blok, and Sholokhov, Sil'bozorn.

609 Advanced Reading, Conversation, and Composition
A. 3 cl.
Prereq.: 10 hrs. of 500 level course in Russian, including 505, 506, 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. Oulanoff.

610 Advanced Reading, Conversation, and Composition
G 3
W. 3 cl.
Prereq.: 609 or permission of instructor.
Oulanoff.

611 Advanced Reading, Conversation, and Composition
G 3
Sp. 3 cl.
Prereq.: 610 or permission of instructor.
Oulanoff.

620 Russian Literature in English
U G 5
Translation: From Pushkin to Turgenev
A. 4 cl.
Not open to students with credit for 613.

621 Russian Literature in English
U G 5
Translation: From Dostoevsky to Blok
W. 4 cl.
Not open to students with credit for 614.
Reading and analysis of Crime and Punishment, War and Peace, The Goloujov Family, as well as short stories and plays by Chekhov, Gorky, Bunin, Bely, and Andreyev. Tsuarg.

622 Russian Literature in English
U G 5
Translation: Soviet Literature
Su, Sp. 4 cl.
Not open to students with credit for 616.
A survey of Soviet Russian literature from 1917 to the present. Reading of representative authors such as Fadeyev, Leonov, Fedin, Sholokhov, and Pasternak. Oulanoff.

650 * Dostoevsky
U G 5
Su. 3 cl.
Prereq.: 9 cr. hrs. in literature courses at the 600 level. Given in English but undergraduate majors in Slavic will do prescribed portions of the reading in the original. Critical analysis of the major novels and shorter works. The intellectual and literary development of Dostoevsky. Sil'bozorn.

651¢ Tolstoy
U G 5
W. 3 cl.
Prereq.: 9 cr. hrs. in literature courses at the 600 level. Given in English but undergraduate majors in Slavic will do prescribed portions of the reading in the original. Analysis of all major works including the novels, plays, stories, and important polemical works. Sil'bozorn.

652¢ Chekhov
U G 3
Sp. 3 cl.
Prereq.: 9 cr. hrs. in literature courses at the 600 level. Given in English but undergraduate majors in Slavic will do prescribed portions of the reading in the original. Critical analysis of the major plays and the most significant stories of the later period. Oulanoff.

653 * Russian Drama
U G 3
A. 3 cl.
Prereq.: 9 cr. hrs. in literature courses at the 600 level. Given in English but undergraduate majors in Slavic will do prescribed portions of the reading in the original. Emphasis on period from 1850 to present day. Ostrovsky, Chekhov, Gorky, Andreyev, Blok, and Soviet writers Lenonov and Kataev. Oulanoff.
654 * Turgenev                        U G 3
W.  3 cl.
Prereq.: 9 cr. hrs. in literature courses at the 600 level.
Given in English but undergraduate majors in Slavic will do prescribed portions of the reading in the original.
Reading of the major novels, plays and short stories. A study of novelistic technique. Oulonoff.

670 * Pushkin and His Time            U G 3
Sp.  3 cl.
Prereq.: 575-577 or permission of instructor.
Analysis of Eugene Onegin as poetry and an encyclopedia of the times. Social, political, cultural trends in the 1820's and 1830's. Romantic Poets. Oulonoff.

690  Russian for Research             G O
W.  2 cl.
Prereq.: Graduate standing.
Basic Elements of Russian grammar.

691  Russian for Research             G O
Sp.  2 cl.
Prereq.: Graduate standing and 403, 415, or 690.
Reading of texts in special fields.

GENERAL PREREQUISITES FOR COURSES
NUMBERED 700
700 courses are designed primarily for graduate students but
linguistics courses 720-730 are open to students enrolled in 609, 610, or 611 or by special permission of the instructor. Literature
courses are open to students enrolled in 609, 610, or 611, who
have completed at least one course in the group 650-670.

720  History of the Russian Language  G 3
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. Lehiste.

721  The Structure of Russian         G 3
Sp.  3 cl.
A structural analysis of Modern Russian. Essential for those
intending to teach Russian or become translators. Lehiste.

7221* Russian Phonetics                G 5
A.  3 cl.
Prereq.: 507, and 575-577, or permission of instructor.
The sounds, stress, rhythm, and intonation of Russian. Lectures
and practical work in the Listening Center. Lehiste.

760  Russian Literature to 1650        G 3
W.  3 cl.
Emphasis on literature of the Kievan period. Silbojors.

761  Russian Literature 1650-1800       G 3
Sp.  3 cl.
The baroque period, classicism and sentimentalism. Emphasis on
the classical period of the 18th century. Silbojors.

770  Russian Poetry from Tiutchev to    G 3
the Symbolists
Sp.  3 cl.
Tiutchev, Fat, Nakrasov, and the Civic poets, Merezhkovsky,
Briusov, Balmont, Bely, and Blok. Silbojors.

810  Old Church Slavonic                G 5
A.  5 cl.
Study of the earliest recorded Slavic language. Reading and
linguistic interpretation of original documents. Robinson.

811†*  Readings in Old Russian         G 5
W.  3 cl.
Reading of texts from the medieval period including both Old
Church Slavonic texts and the later Old Russian texts. Lehiste.

840  Seminar in Russian Literature to 1917  G 3-5
W., Sp.  2 cl.
Tuaroec, Oulonoff, Silbojors.

850  Seminar in Soviet Literature       G 3-5
A.  2 cl.
Oulonoff.

Serbo-Croatian

Office: 316 University Hall 316 N. Oval Dr.

601 * Serbo-Croatian                    U G 3
A.  3 cl.
Prereq.: Russ. 403 or 415 or permission of instructor.

602 * Serbo-Croatian                    U G 3
W., 3 cl.
Prereq.: 601 or permission of instructor.

603 * Serbo-Croatian                    U G 3
Sp., 3 cl.
Prereq.: 602 or permission of instructor.

604†* Intermediate Serbo-Croatian      U G 3
A., 3 cl.
Prereq.: 603 or equiv.
Reading of simple Serbo-Croatian texts from the 19th century.

605†* Intermediate Serbo-Croatian      U G 3
W., 3 cl.
Prereq.: 604 or permission of instructor.
Reading texts of moderate difficulty, conversation, simple com-
positions.

606†* Intermediate Serbo-Croatian      U G 3
Sp., 3 cl.
Prereq.: 605 or permission of instructor.
Reading from modern Serbo-Croatian literature, practice in writ-
ing and speaking.
Courses of Instruction
Slavic Languages and Literatures

Slavic Languages and Literatures
Office: 316 University Hall, 215 North Oval Dr.

530† Slavic Languages and Cultures   U 5
A. 4 cl.
Taught in English.
Historical distribution contemporary situation language policies of Slavic nations; interaction of Slavic cultures and their congenerics and neighbors; mutual impact of Slavic languages and cultures. Krader.

617† Slavic Literature in English   U G 3
Translation: From the Beginning through Romanticism
W. 3 cl.
The epic tradition, renaissance, baroque literature, classicism, pre-romanticism, and romanticism, the great Slavic literary awakening. Tuareg.

618† Slavic Literature in English   U G 3
Translation: From Realism and Symbolism to World War II
Sp. 3 cl.
Emphasis on development of the novel and drama in Czech, Polish, and Ukrainian literature: Capek, Hasek, Sienkiewicz, Remy, Franko, and Ukrainka. Tuareg.

701 Minor Problems in Slavic   G 2-10
Prereq.: Permission of the department chairman. Repeatable.
Epp, Sibatidis, Tuareg, Krader, Lehiste.

730 An Introduction to the Slavic Languages   G 3
A. 3 cl.
A general survey of all the Slavic languages and their common features. Robinson.

731† History of South Slavic Languages   G 5
W. 3 cl.
Prereq.: Good command of Russian 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. Lehiste.

732† History of the West Slavic Languages   G 5
W. 3 cl.
Prereq.: Good command of Russian and acquaintance with a second Slavic language or permission of instructor.
Polish, Czech, Slovak, Polishian, Kashub, and Sorbian, with special emphasis on Polish and its relation to the other West Slavic Languages. Lehiste.

820 Seminar in Slavic Linguistics   G 3-5
A, W, Sp. 2 cl.
Selected topics in Old Church Slavonic, Old Russian, Modern Russian, and Comparative Slavic Linguistics. Lehiste, Robinson.

830† Seminar in Slavic Literature   G 5
W. 2 cl.
Selected topics from Medieval and Modern Literature.

880 Bibliography and Method   G 3
W. 2 cl.
Required of all Ph.D. candidates. Recommended for M.A. candidates. To acquaint graduate students with the tools, problems, and methods of linguistic and literary research.

950 Research in Slavic   G Arr.
Research for thesis purposes only.

Social Work
Office: 306 Stillman Hall, 1407 N. College Rd.
PROFESSORS: THIMP (Director), CORNELL, LIVINGSTON, and RECKLESS; ASSOCIATE PROFESSORS: BEHLING, CRYMES, DAYKIN, HAMILTON, MUELLER, NICHOLS, PRINCE, SCHNEIDERMAN, SISSON, and STELLMAN; VISITING ASSISTANT PROFESSORS: ENDEKOVIC, BUK, ICUNINGHAM, IGOOD, HAYWARD, HOLMES, ILONGO, PALMER, PANTALOS, RINDFLEISCH, and ZUPANCIC.

511 Social Investigation and Social Statistics   U 5
Su, A, W, Sp. 3 cl. 2-3 hr. lab.
Prereq.: Soc. 401 or 407 or 507 or equiv.
Not open to students with credit for 638 or 639.
Introduction. History of survey research; principles of science; planning studies; interviewing; coding and tabulating; elementary statistics. Laboratory instruction in calculating, card punching, sorting and tabulating equipment. Cornell, Cymes, Behling.

590 Health and Welfare Needs and Resources   U 3
Su, A, W, Sp. 3 cl.
Prereq.: Soc. 401, 407, 507 or equiv.
Development of health and welfare service. Significant changes in attitudes toward needs of people. Responsibilities and programs of the federal government for health and welfare. Livingston.

600 Health and Welfare Needs and Resources II   U 3
A, W, Sp. 3 cl.
Prereq.: 511 and 558.
Not open to students with credit for 688.
Function and programs of state and local governments and voluntary agencies. Attention given to problems of aged, unemployed, disabled and handicapped children, and other special groups. Livingston, Sisson.

601 Health and Welfare Needs and Resources III   U 3
A, W, Sp. 3 cl.
Prereq.: 600 or equiv.
Not open to students with credit for 688.
Study of voluntary and governmental agencies and services involved in the orderly development, administration, financing, and coordination of health and welfare services. Stellman.
SOCIAL WORK

621 Principles of Probation and Parole U G 3
W. 3 cl.
Prereq.: 600, Anthrop. 501, Soc. 685 or equive.
Not for graduate credit to students in Social Work.
A study of how offenders are placed and supervised on probation and parole. Daspkin.

627 Juvenile Delinquency and Its Treatment U G 3
A, Sp. 5 cl.
Prereq.: 600, Anthrop. 501, Soc. 625 or equive.
Not for graduate credit to students in Social Work.
Juvenile Delinquency as a social problem. Methods of treatment and prevention, including juvenile courts, clinics, probation, parole, correctional institutions, child placement, and recreational programs. Daspkin.

637 Social Implications in Rehabilitation U G 3
A, Sp. 3 cl.
Prereq.: 601 and 10 cr. hrs. of Psych. or equive.
Not open to students with credit for 510.
Not for graduate credit to students in Social Work.
The significance of disability and employability in their social, medical, and industrial applications; rehabilitation as a process; current concepts. Hamilton.

650 Principles of Group Leadership U G 3
A, W, Sp. 3 cl.
Prereq.: 600, Psychol. 402 or 10 cr. hrs. of Psychol. or Soc.
Not for graduate credit to students in Social Work.
Examination of principles of group leadership. Understanding group purposes and behavior. Use of program media. Records of actual experiences used as illustrative material. Longo.

659 Social Work Aspects of the Individual and His Family U G 4
A, W, Su. 4 cl.
Prereq.: Soc. 600, Psychol. 402 or equive.
Not for graduate credit to students in Social Work.
Dynamics of the interpersonal relationships of the family from social worker's point of view. Emphasis upon the individual's role from infancy through older years. Sisson, Pantelas.

661 The Individual and the Social Agency U 4
Prereq.: 601 and 659 or Nurs. 530 or Ed. 505.
Not for graduate credit to students in Social Work.
The study and evaluation of social and environmental and psychological conditions as they affect the individual in his use of social welfare resources. Sisson, Holmes.

675 Social Welfare Observation and Experience U 3-8
Su, A, W, Sp. Social Agency Assignment and 1 1-2 hr. seminar.
Prereq.: 600 and 659, major standing in Social Welfare and permission of instructor.
Repeatable to maximum of 15 cr. hrs.
Individualized and supervised observation and experience in selected social welfare agencies and institutions. Comprehensive report by student and agency supervisor required. Staff.

679 Legal Aspects of Social Work U G 3
A, Sp. 3 cl.
Prereq.: 601 and 10 cr. hrs. of Soc.
Not for graduate credit to students in Social Work.
Law as a means of social control. Study of case, statute, and constitutional law most frequently involved in social work practice. Legal aid. Livingston, Daspkin.

696 Case Studies in Public Social Services U 3
W. 3 cl.
Prereq.: 601 and 661.
Not for graduate credit.
Critical analysis of representative public service cases and practical interpretation of agency policies. Attention given to family budgeting and standards for health and decency. Livingston, Susan.

698 Senior Seminar in Social Welfare U 3
Su, A, W, Sp. 1 2-hr. cl. with 1 hr. arr.
Prereq.: 661.
A critical examination of social problems, issues and trends and their implication for social welfare policies, programs and practices. Livingston.

699 Special Problems U 1-5
Prereq.: Social Welfare 3rd or 4th yr. standing, 601, and permission of instructor.
Repeatable to a maximum of 10 cr. hrs.
Individual or group study projects on problems and services in selected area of social welfare. Report required.
.a. Services to Individuals.
b. Group Services.
c. Social Welfare Analysis.
d. Other Areas.

701 Social Welfare Policy and Services I G 3
A. 3 cl.
Social welfare as a social institution. Its development, philosophical bases and relation to societal changes. Livingston, Hayward.

705 Dynamics of Behavior for Social Work I G 3
A. 3 cl.
Prereq.: Social Work grad. standing.
Dynamic interaction of physical, intellectual, emotional, spiritual, and social influences which affect human social functioning in pre-adolescent years. Prince, Mueller.

706 Dynamics of Behavior for Social Work II G 3
W. 3 cl.
Prereq.: Social Work grad. standing. 705.
Not open to students with credit for 827.
Dynamic interaction of physical, intellectual, emotional, spiritual and social influences which affect human social functioning from adolescence through old age. Prince, Mueller.

708 Dynamics of Behavior for Social Work III G 3
Sp. 2 cl., 1 2-hr. seminar.
Prereq.: Social Work grad. standing. 706, 725 or concur.
Not open to students with credit for 827.
Psycho-dynamic understanding of neuroses, psychoses and other developmental deviations in human social functioning relevant to social work practice. Knepp, Wood.

709 Social Welfare Policy and Services II G 3
W. 3 cl.
Prereq.: 701.
Not open to students with credit for 844.
Development of social welfare policy and its expression through governmental and voluntary agency programs and services. Special focus upon income maintenance. Livingston, Hayward.

712 Interpretation of Social Work G 2
S. 2 cl.
Prereq.: Social Work grad. standing. 730.
Communication, interpretation and public relations in social work. Theoretical and practical aspects of methods, processes and principles of interpretation. Posey.

A-223
COURSES OF INSTRUCTION
SOCIAL WORK

713 Social Casework I G 2
A. 2 cl.
Prereq.: Social Work grad. standing. 701 concur.
Not open to students with credit for 616.
Introduction to the social casework method: basic elements in the
casework process; study, diagnosis and treatment; application to
practice. Prince, Schneiderman, Hayward.

714 Social Casework II G 3
W. 3 cl.
Prereq.: Social Work grad. standing. 713.
Not open to students with credit for 617.
Continued study of the social casework method with emphasis
upon the process of psychosocial diagnosis and how it deter-
mines treatment aim. Good, Hayward, Schneiderman.

720 Research Methods in Social Work I G 3
Sp. 2 cl., 1 2-hr. lab.
Prereq.: Social Work grad. standing. 713.
Not open to students with credit for 680.
Designed to prepare students to do social work research. Case,
statistical and survey methods are discussed. Cornell, Cranes.

721 Research Methods in Social Work II G 3
A. 2 cl., 1 2-hr. lab.
Prereq.: Social Work grad. standing. 720.
Not open to students with credit for 681.
Designed to give facility in the use of appropriate methods of
analysis and interpretation of statistical data and their applica-
tion to social work research. Cornell, Cranes.

725 Medical Aspects of Social Work G 2
Sp. 2 cl.
Prereq.: Social Work grad. standing. 701.
Not open to students with credit for 822.
Presentation of medical knowledge about disease and disability,
emphasizing symptoms, diagnosis, treatment, and convalescent
care. The social implication of disease and disability is stressed.
Burk, Elkus.

729f Rehabilitation I G 3
W. 3 cl.
Prereq.: 701, 705 or equiv. and permission of instructor.
Not open to students with credit for 822.
Integration of medical and extra-medical services in rehabilita-
tion, with emphasis on the understanding of the problems of
vocational adjustment of the handicapped. Hamilton.

730 Community Organization for G 2
Social Welfare I
W. 2 cl.
Prereq.: Social Work grad. standing. 701, 705 or equiv.
Not open to students with credit for 830.
Function of social worker in developing effective community
social welfare programs. Principles and methods of determining
community needs and stimulating community effort toward im-
proved program development. Leedy, Cohn, Stellman.

731 Community Organization for G 3
Social Welfare II
S. 3 cl.
Prereq.: Social Work grad. standing. 730.
Values, assumptions and social science propositions underlie
planned and consciously effected change in the interest of social
welfare. Stellman.

763 Social Group Work I G 2
A. 2 cl.
Prereq.: Social Work grad. standing. 711 or concur.
Principles and concepts. Worker's role in enabling members of
a group to use group experience for personal growth and develop-
ment of social responsibility. Longo, Bendekovic.

764 Social Group Work II G 3
W. 3 cl.
Prereq.: Social Work grad. standing. 763.
Not open to students with credit for 864.
Role of worker in effecting group and program processes toward
meeting individual member needs and group objectives. Longo,
Bendekovic.

775 Agency Laboratory Experience I G 3-8
Prereq.: Social Work 1st yr. grad. standing.
Arranged by the student's faculty advisor. 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 responsi-
bilities with recipients of agency services. Staff.

801 Special Research Problems G 1-5
Su, (either term or qtr.). A, W, Sp.
Prereq.: Social Work grad. standing and permission of
instructor.
Repeatable to a maximum of 15 cr. hrs.
Assigned reading or individual research, informal conferences, and
written reports. Registration to be followed by letter indicating
field of social work as listed.

a. Corrections.

b. Social Group Work.
c. Social Work Administration.
d. Social Work Research.
e. Social Casework.
f. Community Organization.
g. Rehabilitation of the Handicapped.
h. Psychiatric Social Work.
i. Other Areas.

802 Area Seminars in Social Work G 1-4
Prereq.: Social Work 2nd yr. grad standing.
Organized seminars by areas of social work practice. Registration
to be followed by letter indicating area.

a. Corrections.

b. Social Group Work.
c. Social Work Administration.
d. Social Work Research.
e. Social Casework.
f. Community Organization.
g. Rehabilitation of the Handicapped.

819f Social Work in Multi-Professional G 2
Settings
Sp. 2 cl.
Prereq.: 713 and 763.
Basic factors involved in social work diagnosis and treatment.
Deals with differential coordination of client's needs, social work-
er's abilities, agency's purpose and limitations. Prince Hayward.

823 Social Casework III G 3
Sp. 3 cl.
Prereq.: Social Work grad. standing. 714.
Continued study of social casework method with emphasis upon
differential psychosocial diagnosis and casework treatment. The
function of casework is multi-professional services. Mueller,
Sisson, Schneiderman.

824 Social Casework IV G 3
A. 3 cl.
Prereq.: Social Work grad. standing. 823.
The understanding and application of dynamic principles of
family interaction in casework treatment. Sisson, Prince, Mueller.

826 Social Casework V G 3
W. 3 cl.
Prereq.: Social Work grad. standing. 824.
The dynamic worker-client relationship in casework treatment of
individual and families with severe interpersonal problems. Sisson,
Prince, Mueller.
837 Planning Social Welfare Services  G 4
   W. 4 cl.
   Prereq.: Social Work grad standing, 731.
Financing welfare services. Planning and conducting fund raising campaigns and budgeting. Problems of planning, specialized services. Designing and adjustment of programs to meet welfare needs. Stellman.

843 The Administration of Social Work Agencies  G 3
   W. 3 cl.
   Prereq.: Social Work grad standing, 834 or 867 or 881.
An introduction to the basic factors in the administration of social agencies. Livingston.

851 Social Welfare Policy and Services III  G 3
   Sp.
   Prereq.: Social Work grad standing, 700 and 843.
Analysis and critical evaluation of social welfare policy and issues. Role of the profession in affecting policy. Shimp.

852 Supervision in Social Work  G 2
   Sp. 2 cl.
   Prereq.: Social Work grad standing, 843.

857 Seminar in Social Work Research I  G 3
   A. 3 cl. One field project.
   Prereq.: Social Work grad standing, 720, 721 or equiv. and permission of instructor.
Evaluation of problems in planning and administration of social work research projects. Cornell, Crymes and Staff.

858 Seminar in Social Work Research II  G 3
   W. 2 cl. One field project.
   Prereq.: Social Work grad standing, 857 or equiv. and permission of instructor.
Evaluation of methods and findings of selected studies in the various fields of social work. Cornell, Crymes and Staff.

859 Seminar in Social Work Research III  G 3
   Sp. 2 cl. One field project.
   Prereq.: Social Work grad standing, 858 or equiv. and permission of instructor.
Evaluation of research related to substantive issues in social work—movement, role of social worker, prediction, brief service, multi-problem family, trend. Cornell, Crymes.

862 Seminar in Psychiatric Applications in Social Work  G 2
   W. 2 cl.
   Prereq.: Social Work grad standing, 708.
Psychiatric understanding relevant to treatment of more severe problems of emotional disturbance.

865 Social Group Work III  G 3
   Sp. 3 cl.
   Prereq.: Social Work grad standing, 764.
Role and professional intervention of the worker in the particularizing of group members. Nichols, Longo.

866 Social Group Work IV  G 3
   A. 3 cl.
   Prereq.: Social Work grad standing, 865.
Critical study of contemporary social group work practice. The group as a means and context for therapeutic experience. Nichols.

867 Social Group Work V  G 3
   W. 3 cl.
   Prereq.: Social Work grad standing, 866.
Critical study of contemporary social group work practice. Focus upon differential intervention in special purpose groups. Longo, Bendekovic.

870 Seminar on Methods of Social Work in Corrections  G 3
   A. 3 cl.
   Prereq.: Social Work grad standing, 823, 865 or 731.
Analysis of selected problems and issues in social work in the field of corrections. Daghin.

875 Agency Laboratory Experience II  G 6-15
   Prereq.: Social Work 2nd yr. grad standing and 775.
   Repeatable to a maximum of 26 cr. hrs.
Application of social work theory in selected social agency settings. Joint direction and evaluation by agency staff and faculty.

881 Community Organization for Social Welfare III  G 3
   A. 3 cl.
   Prereq.: Social Work grad standing, 731.
Role of professional worker in setting goals. Evaluation of community effort in building balanced programs. Effects of national agencies on local programs. Stellman.

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

950 Research in Social Work  C Arr.
   Research for thesis or dissertation purposes only.

Sociology

Office: 113 Hagerty Hall, 2775 S. College Rd.

401 Introductory Sociology  U 5
   Su, A, W, Sp. 5 cl.
   Not open to students with credit for 410, or 507, or 511, or 678, or 406.
A study of the fundamental concepts of sociology and an introduction to the analysis of social problems. Cumber.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Instructor(s) &amp; Notes</th>
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<tbody>
<tr>
<td>402</td>
<td>Social Trends and Problems</td>
<td>U 5</td>
<td>Su, A, W, Sp. 5 cl. Prereq: 5 cr. hrs. of Soc. or equiv. with permission of instructor. Not open to students with credit for 410 or 511. Analysis of recent social trends and contemporary social problems. Dins and Staff.</td>
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<tr>
<td>505</td>
<td>The Sociology of Urban Life</td>
<td>U 5</td>
<td>A, W, 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. Jonasen, Schurman, Cleaver.</td>
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<td>506</td>
<td>Race Problems in the United States</td>
<td>U 3</td>
<td>A, W, Sp. 3 cl. Prereq: 5 cr. hrs. in Soc. Not open to students with credit for 604. The cultural background, distribution, and adjustments of selected racial and ethnic groups in the United States. Vander Zanden.</td>
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<tr>
<td>507</td>
<td>Fundamentals of Sociology</td>
<td>U 5</td>
<td>Su, A, W, Sp. 3 cl. Prereq.: Hist. 423. Not open to students with credit for 401, 410, or 511. A study of the nature of society and the factors affecting its development, culture, personality, groups and institutions; selected social problems. Staff.</td>
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<tr>
<td>510</td>
<td>The Standard of Living</td>
<td>U 4</td>
<td>Sp. 4 cl. Prereq.: 5 cr. hrs. in Soc. or equiv. with permission of instructor. A consideration of the content of the various standards of living in American society, their economic and social significance. Problems in family budgets and retail buying.</td>
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<td>518</td>
<td>Social Implications of Low Income</td>
<td>U 3</td>
<td>W. 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 concomitant social participation.</td>
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<td>520</td>
<td>Factors in Successful Marriage</td>
<td>U 3</td>
<td>Su, A, W, Sp. 3 cl. An understanding of a successful married life. Types of problems faced by dating and married couples and the methods whereby they may be dealt with successfully. Clarke, Dyne, Cloward.</td>
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<td>530</td>
<td>Types of Sociological Inquiry</td>
<td>U G 5</td>
<td>Su, A, W, Sp. 3 cl., 2 2-hr. lab. Prereq.: 5 cr. hrs. in Soc. or equiv. with permission of instructor. Not open to students with credit for 684. Introduction to sociological research techniques, methodological approaches, and relevant quantitative procedures. Hall.</td>
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<tr>
<td>562</td>
<td>Social Change</td>
<td>U 3</td>
<td>A, W, Sp. 3 cl. Prereq.: 5 cr. hrs. in Soc. or equiv. with permission of instructor. Not open to students with credit for 662. Recent social changes, especially in Western civilization and the United States. Types of societies in historical perspective. Requirements of a good society. Zych.</td>
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<tr>
<td>600</td>
<td>The Modern Family</td>
<td>U G 4</td>
<td>Su, A, W, Sp. 4 cl. Impact of modern culture upon the family, including size of family, member relationships, economic problems, divorce, desertion, and status of women. Opler, Clarke, Kruhen.</td>
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<tr>
<td>601</td>
<td>Types of Family Organization</td>
<td>U G 4</td>
<td>W. 4 cl. Prereq.: 600. Analysis of family organization in various societies and groups; problems of comparative study.</td>
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<td>620</td>
<td>Sociological Interpretation of Modern Values</td>
<td>U G 5</td>
<td>Sp. 5 cl. Prereq.: 401 or 507. The identification, classification, and measurement of values; values in relation to personality, social structure, and social problems; analysis of selective evaluative interpretations of contemporary society.</td>
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<tr>
<td>621</td>
<td>Contemporary Soviet Society</td>
<td>U G 5</td>
<td>W. 5 cl. Prereq.: 10 cr. hrs. in Soc. and 15 cr. hrs. in other social sciences or permission of instructor. Organization, development, and problems of the Communist Party, the collective farm, the school, professional occupations, economic planning, and other contemporary Soviet institutions.</td>
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<td>623</td>
<td>Collective Behavior and Social Movements</td>
<td>U G 3</td>
<td>A, W, 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.</td>
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<td>624</td>
<td>Culture Patterns and Personality</td>
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<td>Prereq.: 622 or Psychol. 521 or equiv.</td>
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<td></td>
<td>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.</td>
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<td>625</td>
<td>Criminology</td>
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<td>Su, A, W, Sp.  5 cl.</td>
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<td>The nature, variation, and causes of crime and delinquency. Studies of criminal liability, criminal careers, and organized racketeering. Dinits, Eynon, Reckless.</td>
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<tr>
<td>626</td>
<td>Penology</td>
<td>U G 5</td>
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<td>Prereq.: 625</td>
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<td>The treatment of adult offenders in detention and incarceration; short and long term institutions. Field trips required.</td>
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<td>627</td>
<td>Sociological Aspects of Mass Communication</td>
<td>U G 3</td>
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<td>W.  3 cl.</td>
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<td>Selective analysis of communicators, contents, audiences, and effects of mass media. Research procedures, findings, and theoretical formulations, drawn primarily from studies of popular culture. Quaintelli.</td>
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<td>629</td>
<td>General Sociology</td>
<td>U G 4</td>
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<td>A.  4 cl.</td>
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<td>A critical examination of the more fundamental ideas and concepts of modern scientific sociology. Wareby.</td>
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<td>630</td>
<td>Sociological Research Methods</td>
<td>U G 3</td>
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<td>Su, A, W.  3 cl.</td>
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<td>Prereq.: 400, 407, 410, or 507, and a course in elementary statistics.</td>
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<td>Not open to students with credit for 705 or 800.</td>
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<td>638</td>
<td>Population Dynamics and Social Change</td>
<td>U G 3</td>
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<td>Prereq.: 10 cr. hrs. of Soc. or equiv. and permission of instructor.</td>
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<td>Not open to students with credit for 704.</td>
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<td>Changes in size, composition and distribution of populations, the dynamics underlying them, and their social consequences.</td>
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<td>643</td>
<td>Analysis of Small Groups</td>
<td>U G 4</td>
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<td>A.  4 cl.</td>
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<td>Prereq.: 10 cr. hrs. in Soc. and permission of instructor.</td>
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<td>Analysis of group structure and processes; examination of roles, interpersonal structure, leadership; observation of groups in laboratory and non-laboratory settings.</td>
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<tr>
<td>644</td>
<td>Sociology of Complex Organizations</td>
<td>U G 3</td>
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<td>Prereq.: 10 cr. hrs. in Soc. or permission of instructor.</td>
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<td>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. Hess.</td>
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<td>645</td>
<td>Work and Leisure in Mass Society</td>
<td>U C 4</td>
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<td>Sp.  4 cl.</td>
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<td>An analysis of current relationships between work and leisure, emphasizing social implications of increased leisure time, and changing conceptions of work and leisure. Clarke.</td>
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<tr>
<td>648</td>
<td>Religious Institutions in Modern Society</td>
<td>U G 3</td>
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<td>A, Sp.  3 cl.</td>
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<td>The social role of religious institutions and beliefs, with particular reference to the United States; the relation between religion and other aspects of society. Dyck.</td>
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<tr>
<td>650</td>
<td>Medical Sociology</td>
<td>U G 3</td>
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<td>Prereq.: 10 cr. hrs. in Soc. or equiv. and permission of instructor.</td>
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<td>An analysis of the sociological factors in illness and health, as well as the role of medicine and the health professions in modern society. Nagi, Fletcher.</td>
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<tr>
<td>660</td>
<td>Development of Sociological Thought</td>
<td>U G 5</td>
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<td></td>
<td>A, W, Sp.  5 cl.</td>
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<td>Prereq.: 15 cr. hrs. in Soc. or equiv.</td>
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<td></td>
<td>A survey of major concerns and conceptions in sociology in relation to their social-historical setting, from 1800 to the present time. Krohn.</td>
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<tr>
<td>663*</td>
<td>Social Control</td>
<td>U G 3</td>
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<td></td>
<td>Sp.  3 cl.</td>
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<td></td>
<td>A theory of social control and analysis of selected cases of social control. Text, class reports, projects.</td>
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<tr>
<td>668*</td>
<td>Development of Social Thought</td>
<td>U G 4</td>
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<td>A.</td>
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<td>Prereq.: 10 cr. hrs. in Soc. or equiv. and permission of instructor.</td>
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<td></td>
<td>A sociological analysis of Western ideas on social relations before the advent of the social sciences.</td>
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<tr>
<td>676</td>
<td>Social Stratification</td>
<td>U G 4</td>
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<td>W, Sp.  4 cl.</td>
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<td></td>
<td>Class distinctions as phase or social differentiation. Origin and characteristics of social classes. Significance for modern society of class consciousness, class struggle, and social mobility. Dyck.</td>
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<td>677</td>
<td>Social Organization in a Changing World</td>
<td>U G 4</td>
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<td>A.  4 cl.</td>
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<tr>
<td>678</td>
<td>The School and the Community</td>
<td>U G 3</td>
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<td>Su, W.  3 cl.</td>
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<td></td>
<td>The school as a social institution in the American community. The sociological importance of community structures, processes, and problems in determining school-community relationships. Jonaassen.</td>
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<tr>
<td>680</td>
<td>Social Orientation of Children</td>
<td>U G 4</td>
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<td></td>
<td>Su. (1st term). W.  4 cl.</td>
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<td>700</td>
<td>Special Problems</td>
<td>U G 1-4</td>
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<td>Prereq.: 10 cr. hrs. in Soc. Permission of instructor.</td>
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<td></td>
<td>A Sociological Theory</td>
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<td></td>
<td>B Social Organization and Planning</td>
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<td>C Medical Sociology</td>
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<td>D Criminology and Penology</td>
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<td>E Sociology of Education</td>
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<td></td>
<td>F Race Relations</td>
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</tbody>
</table>
G Social Psychology
H The Family
I Research Methodology
J Urban Sociology
K Undergraduate Seminar on Contemporary Sociological Issues
L Unclassified

Introduction to National Security  G 3
A (See National Security Policy Studies 702.)

Problems in National Security  G 3-5
W. (See National Security Policy Studies 703.)

706 Methods of Social Measurement  U G 3
A, Sp. 3 cl.
Prereq.: 630 or Soc. Work 720.
Not open to students with credit for 896.
Approaches and techniques in the development and testing of social measurement instruments.

707 Problems in the Design of Sociological Research  U G 3
A, W, Sp. 3 cl.
Prereq.: 505 or equ. or permission of instructor.
Repeatable to a maximum of 9 cr. hrs. Individual sections may not be repeated.

Topics:
A A. Development and Verification of Sociological Theory
B W. Experimental Research Methods
C Sp. Advanced Analysis of Sociological Data

714 Sociological Analysis of the Community  U G 3
Sp. 3 cl.
Prereq.: 505 or 614 or equ. or permission of instructor.
Methods, techniques, sources of data and objectives of community analysis.

725 Control and Prevention of Crime and Delinquency  U G 3
A. 1 2-hr. cl. One field project.
Prereq.: 625.
Analysis of the operational effectiveness of special measures and programs pointed toward the control and prevention of crime and delinquency. Reckless.

Seminar in National Security Research  U G 3-5
Sp. (See National Security Policy Studies 801.)

808 Practicum in Sociological Research  G 3
W, Sp. 3 cl.
Prereq.: 706 and 3 cr. hrs. in 707.
Supervised practical experience in the independent execution of sociological research, the application of appropriate analytical techniques, and preparation of research reports.

811 Seminars in Social Organization  G 3
Prereq.: Two courses in social organization and permission of instructor.
A critical examination of selected theoretical and research problems in organizations functioning in the areas listed below.
A. Systems of Community Organization.
W. Small Groups; Educational Organizations.
Sp. Health Organizations.

864 Advanced Criminology  G 3
Sp.
Prereq.: 625.
A critical study of the most important aspects of criminology. Reckless, Epmon.

865 Contemporary Sociological Theory  G 3
Sp.
Prereq.: 650 or equ. or permission of instructor.
A critical examination of problems and issues central to recent developments in sociological theory. Krohn.

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

900 Seminars in Sociology  G 1-4
Fields of specialization are listed under the description of 706. Registration in 900 should be followed by an alphabetical letter indicating the field of the seminar.

950 Research in Sociology  G Arr.
Research for thesis or dissertation purposes only.

Spanish

Office: 116 Derby Hall, 154 North Oval Drive.
PROFESSORS HABCOCK (Chairman), HGRIFIN, ROGERS, and TSCHOLBERG, ASSOCIATE PROFESSORS JARMITAGE, TRFOSCH, and LÖVELUCK (Visiting); ASSISTANT PROFESSOR ANGELO.

401 Elementary Spanish  U 5
Su, A, W, Sp. 5 cl.
May not be taken concurr. with French 401-402, Italian 401-402. Not open to students who are not eligible to take Engli. 416. Credit in 401 will be counted toward graduation only if followed by successful completion of 402, or if taken after successful completion of the fourth regular university course in another foreign language. Successful completion of 401, 415 and 416 fulfills language requirements.

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.

402 Elementary Spanish  U 5
Su, A, W, Sp. 5 cl.
Prereq.: 401.
May not be taken concurrently with French 401-402, Ital. 401-402.
The elements of Spanish grammar with abundant oral and written exercises. Development of conversational skill. Reading, vocabulary building, attention to Spanish idioms.

403 Intermediate Spanish  U 5
Su, A, W, Sp. 5 cl.
Prereq.: 402.
Continuation of Spanish grammar, attention to idioms. Reading of short stories, plays and novels.

A-228
404 Intermediate Spanish
Su, A, W, Sp. 5 cl.
Prereq.: 403.
Reading of Spanish plays, short stories, and novels. Emphasis on
oral practice and Spanish idioms.

407 Reading of Spanish
G O
Su, A, W, Sp. 3 cl.
Prereq.: Graduate standing.
The fee for this course will be the same as that for a
three-hour credit course.
Designated primarily for students who have had no formal prep-
aration in Spanish and who wish to acquire a reading knowledge.

410 Elementary Spanish Conversation and Composition
A, W, Sp. 5 cl.
Prereq.: 404.
Course conducted in Spanish.
Intensive practice in oral and written Spanish, based on texts
and periodicals concerned with contemporary Spain and Spanish
America. Grammar and idiom review.

415 Elementary-Intermediate Spanish for Selected Students
W. 5 cl.
Prereq.: Grade of A in 401 and permission of department.
Successful completion of 401-415-416 fulfills language
requirements and satisfies prereq. for 500 courses.

416 Elementary—Intermediate Spanish for Selected Students
Sp. 5 cl.
Prereq.: 415.
Successful completion of 401-415-416 fulfills language
requirements and satisfies prereq. for 500 courses.
Continuation of 415.

517 Introduction to Modern Spanish Literature
A, W, Sp. 5 cl.
Prereq.: 404.
Reading and discussion of important modern works.

518 Review Grammar and Composition
A, Sp. 3 cl.
Prereq.: 410.
Review of Spanish grammar; composition on assigned topics and
practice in translation.

519 Spanish Pronunciation
W, Sp. 2 cl.
Prereq.: 410.
Abundant practice with corrective exercises. Some attention to
problems of teaching pronunciation. Berns.

521 Intermediate Spanish Conversation and Composition
A, Sp. 2 cl.
Prereq.: 410.
Vocabulary building, practice in speaking Spanish, conversation
and composition dealing with aspects of Spanish life.

522 Intermediate Spanish Conversation and Composition
W, 2 cl.
Prereq.: 410.
Vocabulary building, practice in speaking Spanish, conversation
and composition dealing with aspects of Spanish and Spanish
American life. Froesch, Farino.

531 Prose Fiction and Essays
A, Sp. 5 cl.
Prereq.: 517.
Reading and discussion of various types of modern prose fiction
and essays. Loveluck.

532 Drama and Poetry
W. 5 cl.
Prereq.: 517.
A selection of plays and poems representing the principal move-
ments and tendencies of the modern period. Babcock.

570 Spanish Literature in English Translation
A. 5 cl.
Not open to Spanish majors.
Selection of major works in Spanish literature in English trans-
lation from the early Renaissance period to the present. Babcock.

605 Advanced Composition and Conversation
Su, Sp. 3 cl.
Prereq.: 518 and 521 or 522.
This course is conducted in Spanish. Its subject matter will be
for the most part the history, customs, and manners of Spain
and Spanish America. Berns.

607* The Spanish Novel of the Nineteenth Century
A. 4 or 5 cl.
Prereq.: 517 and 521 or 532.
A study of the development of the modern Spanish novel with
particular attention to the works of Pérez Galdós.

608* Contemporary Spanish Fiction
A. 3 cl.
Prereq.: 517, 531 or 532.
A study of Spanish narrative prose from the generation of '98 to
the present time.

610 Modern Drama
W. 3 cl.
Prereq.: 517 and 531 or 532.
A survey of European drama at the beginning of the century
and a detailed study of the Spanish dramatists from Benavente to
Alonso Sastré. Froesch.

611* Drama of the 16th and 17th Centuries
W. 5 cl.
Prereq.: 517 and 531 or 532.
An intensive study of a limited number of plays of the represen-
tative dramatists of the 16th and 17th centuries.

612 Poetry the 16th and 17th Centuries
W. 5 cl.
Prereq.: 10 cr. hrs. in Spanish literature at the 500 level.
Major poets and movements of the 16th and 17th centuries.

6131* Prose of the 16th and 17th Centuries
S. 4 or 5 cl.
Prereq.: 517 and 531 or 532.
Selected prose works by major Renaissance and Baroque authors.
Loveluck.

A-229
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>614</td>
<td>Cervantes</td>
<td>U G 5</td>
<td>4 or 5 cl.</td>
<td>An intensive study of Don Quixote. Loveluck.</td>
</tr>
<tr>
<td>617</td>
<td>Modern Spanish Syntax</td>
<td>U G 5</td>
<td>5 cl.</td>
<td>Systematic study of Spanish grammar with composition and other exercises based on contemporary authors. Modern tendencies in syntactic analysis.</td>
</tr>
<tr>
<td>620</td>
<td>Spanish Phonetics</td>
<td>U G 5</td>
<td>4 cl., hrs., 1 hr. lab.</td>
<td>A detailed analysis of the phonological structure of Spanish and a contrastive comparison with English. Practical problems of pronunciation and teaching are stressed. Griffin.</td>
</tr>
<tr>
<td>623</td>
<td>Spanish Translating</td>
<td>U G 3</td>
<td>3 cl.</td>
<td>Translations from Spanish to English and from English to Spanish.</td>
</tr>
<tr>
<td>631*</td>
<td>Romanticism in the Hispanic World</td>
<td>U G 3</td>
<td>3 cl.</td>
<td>A study of dramatists, poets, novelists, and essayists designed to bring out the literary unity of the Hispanic world in the Romantic period.</td>
</tr>
<tr>
<td>637*</td>
<td>Spanish American Literature through Romanticism</td>
<td>U G 5</td>
<td>5 cl.</td>
<td>A study of the chronicles and main trends in colonial Spanish American literature. Works of Inca Garcilaso, Sor Juana and Alarcón will be included. Friesch.</td>
</tr>
<tr>
<td>638*</td>
<td>Spanish American Literature since Romanticism</td>
<td>U G 5</td>
<td>5 cl.</td>
<td>The advent of “americanismo literario,” a study of the romantics and the schools that followed up to “modernismo.” Friesch.</td>
</tr>
<tr>
<td>639</td>
<td>Contemporary Spanish American Fiction</td>
<td>U G 3</td>
<td>3 cl.</td>
<td>The development of narrative prose in Spanish America from 1920 to the present. Loveluck.</td>
</tr>
<tr>
<td>640 °</td>
<td>The Generation of 1898</td>
<td>U G 3</td>
<td>3 cl.</td>
<td>Readings in fiction, poetry and the essay from such authors as Unamuno, Azorín, Valle-Inclán, Baroja, A. Machado and J. R. Jiménez.</td>
</tr>
<tr>
<td>641 °</td>
<td>Contemporary Hispanic Poetry</td>
<td>U G 5</td>
<td>5 cl.</td>
<td>Currents of Spanish and Spanish American poetry from Rubén Darío to the present time.</td>
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</table>

**Spanish Literature**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>645</td>
<td>Spanish Literature</td>
<td>U G 5</td>
<td>5 cl.</td>
<td>Prereq.: 517 and 531 or 532. Repeatability to a maximum of 15 cr. hrs.</td>
</tr>
<tr>
<td>705</td>
<td>Honors Course in Spanish</td>
<td>U 3-10</td>
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<td>Conference, library or phonetics laboratory arr. Prereq.: 4th yr. standing with a record of A in at least half of the Spanish courses and an average of B in the remainder, and permission of the department. This course offers undergraduates with special aptitudes a greater opportunity to do independent study than is possible in the ordinary course.</td>
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<tr>
<td>706</td>
<td>Honors Course in Spanish</td>
<td>U 3-10</td>
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<td>Continuation of 705.</td>
</tr>
<tr>
<td>729</td>
<td>History of the Spanish Language</td>
<td>U G 3</td>
<td>3 cl.</td>
<td>Prereq.: M.A. candidacy or permission of instructor. A survey from Roman times to the present with emphasis on cultural and social factors. The relation of language to literature. Scholberg.</td>
</tr>
<tr>
<td>730</td>
<td>Introduction to Medieval Literature</td>
<td>G 3</td>
<td>3 cl.</td>
<td>Prereq.: M.A. candidacy or permission of instructor. Selected readings in Spanish poetry and prose from the beginnings to the end of the sixteenth century, partly in modernized versions. Scholberg.</td>
</tr>
<tr>
<td>731</td>
<td>Introduction to Methods in the History and Criticism of Literature</td>
<td>G 5</td>
<td>5 cl.</td>
<td>Prereq.: M.A. candidacy or permission of instructor. Selected readings in basic literary history, criticism, and theory, with practice in the use of standard bibliographical aids to scholarship. Loveluck.</td>
</tr>
<tr>
<td>806</td>
<td>Old Spanish II</td>
<td>G 3</td>
<td>3 cl.</td>
<td>Prereq.: 805. A continuation of Old Spanish I, with attention to syntax, vocabulary and dialectology. Griffin.</td>
</tr>
<tr>
<td>816</td>
<td>Seminar in Spanish Literature</td>
<td>G 2-5</td>
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<td>Prereq.: Permission of instructor.</td>
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</table>
Speech

Office: 205 Derby Hall, 154 North Oval Drive.

PROFESSORS: J. EAGER (Chairman), 1. BLACK, 1. BOWEN, 1. FOTHERINGHAM, 1. HARDING, 1. HODGKIN, 1. HULL, 1. IRWIN, 1. KNOWLER, 1. LYNCH, 1. MALL, 1. McDOWELL, 1. MOSER, 1. SCHLAGER, 1. SUMMERS (Emeritus), and WILEY.

ASSOCIATE PROFESSORS: 1. BROOKS, 1. DEWEY, 1. EYING, 1. GOFF, 1. KUHL, 1. LEWIS, 1. MONAGHAN, 1. RILEY, 1. ISCHRECK, and 1. STROMSTAD.

ASSISTANT PROFESSORS: 1. BRANNON, 1. CRAWFORD, 1. KRE-PEAU, 1. GLANCY, 1. MORROW, 1. NIEKE, 1. RITTER, and 1. TUCKER.

401 Effective Speaking U 5
Su, A, W, Sp. 5 cl.
The principles of effective speaking. Preparation and presentation of informative and persuasive speeches. The speech processes with emphasis on speech as a thinking process. Knowler and Staff.

402 Group Discussion U 5
Su, A, W, Sp. 5 cl.
Designed to develop the attitudes, skills, and knowledge of methods favoring effective participation in discussion by conferences, committees, and other small groups. Tucker and Staff.

404 Speech for International Students U 5
A, W, Sp. 5 cl.
Often taken in conjunction with Eng. 406.
Assignment to both English and the appropriate Speech 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. Black, Goff.

410 Personal Speech and Hearing Rehabilitation U O or 3
Su, A, W, Sp. 5 cl.
Credit shall not count toward graduation.
For students with speech or hearing disorders.
Repeatable.

410A Articulation
410B Voice
410C Stuttering
410D Impaired Hearing
410E Foreign Dialect

Goft, Stromat, Irwin, Moser, Wallace, Asp.

416 Introduction to Speech U 2
This course is designed for students who wish to have a broad overview and understanding of the field of speech. Brooks and Staff.

417 Voice and Diction U 2
Su, A, W, Sp. 3 cl.
Repeatable.
Introductory study of the principles of a satisfactory speaking voice. Designed for the student concerned about the adequacy of his speech. Black, Moser, Irwin, Goft.

425 Introduction to Radio and Television U 2
A, Sp. 2 cl.
History of broadcasting; Orientation to development of critical appreciation and understanding of the role and influence of broadcasting in American Life. Mall.

430 Introduction to Theatre U 3
Su, A, W, Sp. 4 cl.
A study of the theatre with emphasis upon its cultural and social influences in our society. Creese, Bowen, Glancy, Ritter.

470 Argumentation and Debate U 5
A, W, Sp. 5 cl.
Prereq.: 401.
Principles of reasoned discourse and their application to controversial issues. Rieker.

501 Principles of Effective Speaking U 3
A, W, Sp. 3 cl.
Prereq.: 3rd or 4th yr. standing.

502 Rhetoric of American Issues U 3
A, W, Sp. 3 cl.
A study of selected American orators, their speeches, and the audience reactions on significant issues during 1850-1920. Harding.

504 Speech Functions and Responsibilities of the Teacher U 3
Su, A, W, Sp. 3 cl.
A study of speech and hearing deviations commonly found in classrooms and of the teacher’s role in an improvement program. Schlagar and Staff.
### COURSES OF INSTRUCTION

#### SPEECH

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
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<tr>
<td>505</td>
<td>Fundamentals of Oral Interpretation</td>
<td>U 5</td>
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<td>SU, A, W.</td>
<td>5 cl.</td>
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<td>Introductory course to develop understanding and appreciation of literature through the oral re-creation of literary materials and critical listening. Brooks.</td>
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<tr>
<td>506</td>
<td>Persuasion</td>
<td>U 3</td>
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<td>A, W, Sp.</td>
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<td>Analysis of the motivations which lead to belief and action of individuals and audiences. Studies in the techniques of achieving persuasive purposes. Fortheringham.</td>
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<tr>
<td>508</td>
<td>The Speech Situation</td>
<td>U 2</td>
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<td>A study of oral communication as a social process in terms of speaker-listener relationships. Fortheringham.</td>
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<td>509</td>
<td>Personal Speech Effectiveness</td>
<td>U 2</td>
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<tr>
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<td>A, W, Sp.</td>
<td>2 cl.</td>
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<td></td>
<td>Not open to students with credit for 517.</td>
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<tr>
<td></td>
<td>Development of heightened speech effectiveness for students planning work in professions requiring special speech skills. Special attention to reading effectiveness, phrasing, emphasis, pronunciation and enunciation. Ridley and Staff.</td>
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<tr>
<td>511</td>
<td>Parliamentary Law</td>
<td>U 2</td>
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<td>2 cl.</td>
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<td>521</td>
<td>Acting I</td>
<td>U 3</td>
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<td>SU, A, W, Sp.</td>
<td>2 2-hr. cl. (Su, 3 2-hr. cl.).</td>
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<tr>
<td>522</td>
<td>Acting II</td>
<td>U 3</td>
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<td>SU., 3 2-hr. cl. W, Sp.</td>
<td>2 2-hr. cl.</td>
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<tr>
<td></td>
<td>Characterization and scene study for stage, radio, and television. Glancy, Ayers.</td>
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<tr>
<td>5251*</td>
<td>Stage Make-Up</td>
<td>U 1</td>
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<td>W. 1 3-hr. lab.</td>
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<td>Fundamentals of stage make-up for straight and character roles. Crepeau.</td>
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<tr>
<td>541</td>
<td>Elementary Stagecraft</td>
<td>U 3</td>
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<tr>
<td></td>
<td>A, W, Sp.</td>
<td>2 cl.</td>
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<tr>
<td></td>
<td>Basic aspects of stagecraft for theater and television. Dewey.</td>
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<tr>
<td>545</td>
<td>Play Production</td>
<td>U 3</td>
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<tr>
<td></td>
<td>SU. A, Sp.</td>
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<tr>
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<td>Principles of mounting and staging a play including the theories of play selection and analysis. Schreck, Lewis.</td>
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<tr>
<td>560</td>
<td>Radio and Television Speech</td>
<td>U 3</td>
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<td>A, W, Sp.</td>
<td>5 cl.</td>
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<td></td>
<td>Speaking in the radio or television situation; basic training in preparation and presentation of radio and television talk and interview materials. Riley, Monaghan.</td>
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<tr>
<td>565</td>
<td>Introduction to Radio and Television</td>
<td>U 3</td>
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<tr>
<td></td>
<td>Production</td>
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<tr>
<td></td>
<td>W, Sp. 5 cl.</td>
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<td></td>
<td>Prereq.: 560 or equiv.</td>
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<tr>
<td></td>
<td>Basic concepts and elements in the production of radio and television programs. Mall, Monaghan.</td>
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<tr>
<td>566</td>
<td>Broadcasting Laboratory Practice</td>
<td>U 1</td>
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<tr>
<td></td>
<td>Prereq.: 560 or equiv.</td>
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<td></td>
<td>Repeatable to a maximum of 5 cr. hrs.</td>
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<tr>
<td></td>
<td>Experience in presentation of radio and television programs under broadcasting conditions. Staff.</td>
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<tr>
<td>571</td>
<td>Radio and Television Program</td>
<td>U 2</td>
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<tr>
<td></td>
<td>Departments</td>
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<td></td>
<td>W. 3 cl.</td>
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<td></td>
<td>Prereq.: 560 or permission of instructor.</td>
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<td></td>
<td>Not open to students with credit for 571.</td>
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<tr>
<td></td>
<td>Organization and functions of station program departments; staff requirements, traffic, music library organization, and continuity department operations. Mall.</td>
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<tr>
<td>580</td>
<td>Bases of Speech Production</td>
<td>U 3</td>
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<tr>
<td></td>
<td>A, W, Sp.</td>
<td>3 cl.</td>
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<tr>
<td></td>
<td>An analytical study of speech, particularly an orientation to the psychological, neurological, physiological, physical, genetic, phonetic, sociological, linguistic and semantic aspects of speech production. Mahafey, Stroman.</td>
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<tr>
<td>585</td>
<td>Introduction of Phonetics</td>
<td>U 3</td>
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<tr>
<td></td>
<td>Su, W, Sp.</td>
<td>3 cl.</td>
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<td>Prereq.: 580 recommended.</td>
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<td></td>
<td>The International Phonetic Alphabet as applied to American speech. Analysis of the physiological positions and movements involved in the production of English speech sounds. Black.</td>
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<tr>
<td>590</td>
<td>Speech Development in Children</td>
<td>U 3</td>
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<td></td>
<td>Su, W, Sp.</td>
<td>3 cl.</td>
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<tr>
<td></td>
<td>Language growth from the first vocalization to the expression of abstract thought. Deviations from the normal patterns are noted. Goff, Brannon.</td>
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</tbody>
</table>

### ACADEMIC CREDIT FOR EXTRA-CURRICULAR ACTIVITIES

University Speech Activity groups are open to all students in the University. Students enroll and receive credit toward any undergraduate degree for a total of six quarter credit hours in Speech A and B. To enroll in Speech Activities programs students should observe the following pre-registration before the close of registration for any quarter: for tryouts to forensics activities, see Mr. Rieke; for tryouts for theatre activities, see Mr. Dewey.

Do not register for these courses without written permission of the instructor. Students accepted for the Forensic Activity group will register for Speech A; those accepted for the Theatre Activity group will register for Speech B.

#### A
- **Forensic Activities**
  - SU, A, W, Sp. A minimum of 3 hrs. of group participation each week.
  - Repeatable to a maximum of 6 cr. hrs.

#### B
- **Theatre Arts**
  - Repeatable to a maximum of 6 cr. hrs.

### GENERAL PREREQUISITES FOR COURSES NUMBERED 600 AND 700

Not open to freshmen or sophomores. Unless otherwise indicated the prerequisites for 600 and 700 courses are either thirty quarter hours in net more than two allied subjects, or ten hours in each allied subject plus ten hours in Speech. Five hours each from the 401-402 and 410-417 sequences are advisable.

### 601 The Forms of Public Address
- **U G 5**
- **Su, A. 3 cl.**
- The organization, style, and delivery of speeches for special occasions. Roestetter, Harding.
603 Group Thinking and Conference Leadership
A, Sp. 5 cl.
The methods and procedures employed in setting up conferences and in leading conferences and committee discussion. Tucker.

610 Advanced Argumentation and Debate
Sp. 5 cl.
Prereq.: 470.
History of the theories of formal argument with study of representative examples or oral argumentation. Rickes.

617 Problems of American Phonetics
Su. 3 cl.
Prereq.: 585.
The chief problems treated are: phonetic alphabets and dictionaries, research in dialect, and phonetic analysis. Black.

620 Ancient Rhetorical Theory
W. 3 cl.
A study of the contributions of early Greek and Roman speech teachers and theorists. Harding.

621 British Rhetorical Theory
Sp. 3 cl.
The contributions of British speech teachers and theorists from the Renaissance to the present. Hostetler.

623 British Speakers and Speech Making
Sp. 3 cl.
Prereq.: 621.
Analysis and criticism of leading British speeches from the Renaissance through World War II. Harding.

624* American Speakers and Speech Making
Sp. 3 cl.
Prereq.: 621.

626 Advanced Acting
Su, W. 2 2-hr. cl.
Prereq.: 522 or equiv.
Advanced study of the theories of acting as related to historical and contemporary developments. Bouam.

627 Stage Design
Su, A. 1 cl., 3 hrs. lab.
Prereq.: 541 or concur.
Principles of design as applied to dramatic production. Crepeau.

629* Stage Lighting
Su, Sp. 2 cl., 1 3-hr. lab.
Prereq.: 541.
Theories in the illumination of stage productions and the creation of aesthetic effects. Dowey.

631 History of the Theatre
A. 3 cl.
Prereq.: Engl. 550 or 555; Engl. 670 recommended.
Greek, Roman, Medieval and Commedia dell'arte Theatre. McDowell.

632 History of the Theatre
Su, Sp. 3 cl.
Prereq.: Engl. 550 or 555; Engl. 670 recommended.

633 History of the Theatre
W. 3 cl.

The Psychology of Speech
(See Psychology 632)

The Psychology of the Audience
(See Psychology 633)

641 History of Stage Costume
Su, W. 2 2-hr. cl.
Prereq.: 621 or concur.
History of costume from the Egyptian period through the 19th century. Crepeau.

646 Stage Direction
W. 3 1-hr. cl.
Theories and principles of play direction. Schreck.

651 Modern Theatre Styles
A. 3 cl.
Prereq.: Engl. 670 or equiv.
Realistic and non-realistic styles in the modern theatre. Schreck.

652 Broadcast Programs and Audiences
A, Sp. 3 cl.
Broadcast program types, requirements of effective structure, listener characteristics and preferences in relation to program selection and listener attention. Meli.

654 Writing for Radio and Television
A, W. 3 cl.
Prereq.: 652, Engl. 505 or equiv.
Writing of continuing non-dramatic radio and television programs of types presented on local stations. Riley, Lynch.

663 Television Drama
Sp. 3 cl.
Prereq.: 10 cr. hrs. in radio, television, theatre or dramatic literature.
Analysis of dramatic program types and scripts; study of their historical background and social significance; writing of original scripts. Riley.

670 Radio and Television Program Planning
Su, A, W. 3 cl.
Prereq.: 652.
The planning of new programs for radio and television, to the formal stage. Replanning programs already on the air, for increased effectiveness. Lynch, Meli, Monaghan.

A-233
672  Television Programming  U G 3  
A. 3 cl.
Prereq.: 659.
Critical analysis and evaluation of television programs and program forms; factors considered in the over-all scheduling of programs on television stations. Lynch.

677  Anatomy and Physiology of the Ear and Vocal Mechanisms  U G 5  
A, Sp. 3 cl.
The structure and functions of the speaking and hearing mechanisms. Stromata.

678  Hearing and Speech  U G 3  
W. 3 cl.
Prereq.: 682 or equiv. and Physics 645.
Theoretical concepts and supporting data of the process of hearing with particular reference to the reception of speech. Black.

682  Introduction to Audiology  U G 3  
Su, A, W. 3 cl.
Prereq.: 10 cr. hrs. in Speech and Psychol.
Introduces the student to the study of aberrant hearing. Information on prevalence, causes, types, and effects of impairments of hearing. LaGouguie.

683  Speech Reading  U G 3  
Su, W. 5 cl.
Prereq.: 550, 585, 682.
Study of major theories of speech reading. LaGouguie, Moser, Wallace.

684  Speech Reading Clinic  U G 2 or 3  
A, W, Sp. 5 cl.
Prereq.: 683.
Repeatable one time.
Clinical application of principles studied in 683. Stromata, Wallace.

688  Audimetry: Principles and Practices  U G 3  
Su, W, Sp. 3 cl.
Prereq.: 682.
Study of the functional tests of hearing including individual and group screening and threshold tests. LaGouguie.

689  Theories of Language Development of the Deaf  U G 3  
A. 3 cl.
Prereq.: 550, Psychol. 600.
Study of the communicative processes of acoustically handicapped individuals: symbolism, meaning, syntax. Brannon.

690  The Pre-School Deaf Child  U G 3  
Su. 3 cl.
Prereq.: 590, Ed. 611, 650.
Study of the problems of communication of the deaf child. Brannon.

693  Theories of Speech Development of the Deaf  U G 3  
W. 3 cl.
Prereq.: 580, 585, 689.
Study of the development of speech under conditions of minimum auditory stimulation and acoustic feedback. Brannon.

694  Speech Disorders Survey  U G 3  
Su, A, Sp. 3 cl.
Prereq.: 580, 585, and 590.
Introduces the student to the study of disorders of speech. Information on prevalence, causes, types, and effects. Moser, Schlinger.

695  Speech Pathology I  U G 3  
Su, W. 3 cl.
Prereq.: 677, 694.
Consideration of the deviant voice and articulation that accompanies cleft palate, cerebral palsy, maxillo-facial injuries, and other physical disabilities. Moser.

696  Speech Pathology II  U G 3  
Sp. 3 cl.
Prereq.: 694 and 10 cr. hrs. in Psychol.
Consideration of psychological aspects of speech disorders, including stuttering and psychogenic disabilities. Irwin.

697  Clinical Principles of Speech Therapy  U G 2-5  
Su, W. (A) 3 cl., (B) 2 cl.
Prereq.: 694.
A study of the examination, diagnosis, and correction of speech disorders. Irwin.

697A  Study of Theories and Practices in Speech Therapy  U G 3  
Prereq.: 417, 695, 697 or permission of instructor. 
Repeatable one time.
Clinical application of the principles studied in 697. Irwin.

700  Minor Problems in Speech  U G 1-5  
Su, A, W, Sp. Cons., library and lab. work.
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.
Tests and Measurements in Speech Education  
(See Psychology 704)

705  Areas and Techniques of Research  U G 3  
in Speech  
Su, A. 3 cl.
Prereq.: 55 cr. hrs. in Speech.
A review and critical commentary on typical methods of research in each of the principal areas of graduate research in speech. Research reports. Knowler.

710  Contemporary Speeches  U G 3  
W. 3 cl.
Analysis of important speeches delivered since World War II. Harding.

727  Period Scene Design  U G 3  
W. 2 cl., 3 hrs. lab.
Prereq. or concurs.: 637 and 631, 633, 633.
Advanced study in the aesthetics of stage design related to major historical periods. Crepeau.

735  Theatrical Criticism  U G 5  
Sp. 5 cl.
Prereq. or concurs.: one of the following: Engli. 676, or 677, or 670.
Critical theories from the Greek to the modern period with particular reference to the influence of the theorists, church, state, and press. McDowell.
740 * Theater Organization and Management  
W. 3 cl.
Organization and management of the school, college, church, and community theaters. Gleason.

741 Costume of Period Drama  
UG 2
Sp. 1 cl., 3 hrs. lab.  
Prereq.: 641 and 631, 632, 633 or concur.
An intensive study of the design factors requisite to the successful costuming of the plays of major historical periods. Crepeau.

743 Children's Theatre  
UG 3
Su, A. 3 cl.  
Prereq. or concur.: 646.
Directing and producing plays for children. Lewis.

745 Advanced Theater Direction and Production  
UG 5
Sp. 3 2-hr. cl.  
Prereq.: 646.
Advanced theory of play direction in the educational theater. Class members will produce a modern or an historical play for public presentation. Bowen.

760 Radio and Television Program Policies  
UG 3
Sp. 3 cl.
Standards applied by networks and stations; effect on program standards of FCC regulatory activities, court decisions, and industry codes. Riley and Staff.

764 Advanced Writing for Television  
UG 2
Sp. 3 cl.  
Prereq.: 654 or equiv. and 732.
Advanced course in writing of program continuities for television in format form, partial script form and complete script form. Mall.

765 Television Production and Direction  
UG 3
Su, A, W. 2 cl., 1 3-hr. lab.  
Prereq.: 10 cr. hrs. in radio-television courses, including 585 or equiv.
Introduction to the art of television production; experience in the direction of short program units. Lynch, Monaghan.

766 Advanced Television Production and Direction  
UG 2
W, Sp. 4-6 lab. hrs.  
Prereq.: 765 and permission of instructor.  
Repeatable to a maximum of 4 cr. hrs.
Advanced theories and techniques of television production and direction; experience in producing and directing longer program units. Lynch and Staff.

775 Hearing Aids and Auditory Training  
UG 3
W. 3 cl.  
Prereq.: 682, 688.
Operational principles of individual and group amplification systems for those with hearing impairments. Stromata.

776 Hearing Aids and Auditory Training Practicum  
UG 2-3
Sp. 3 cl.  
Prereq.: 775.  
Repeatable one time.
Clinical application of principles studied in 775. Stromata.

778 Experimental Phonetics  
UG 3-5
Sp. 3 cl., 2 2-hr. labs.  
Prereq.: 585, 678 or permission of instructor.  
Repeatable to a maximum of 8 cr. hrs.
A study of laboratory investigations of phonetic problems as they are related to functional speech. Black.

811 Curricular and Instructional Adjustment for the Deaf Child  
UG 3
Su, Sp. 3 cl.  
Prereq.: 690, Ed. 715.
Laboratory projects directed toward the development of language, silent reading, lip-reading among deaf children. Brannom.

815 Advanced Clinical Practice in Speech, Hearing and Instruction of the Deaf  
UG 1-15
Su, A, W, Sp. 1 cl., 3 clinical hrs. for each hour of credit per week.  
Each practicum 1-2 hrs. per qtr., repeatable to a maximum of 8 cr. hrs.  
Include letter with number on schedule card.
a. Diagnosis and Appraisal in Speech Pathology  
Su, W.  
Prereq.: 698, 699, and 10 hours of psychology, or permission of instructor.  
Irwin.
b. Stuttering  
Prereq.: 696 and 10 hrs. in Psychol., or permission of instructor.  
Stromata, Asp.
c. Cleft Palate and Laryngeal Speech Disorders  
Su, A, W.  
Prereq.: 685, 6850C or permission of instructor.  
Moser, Schlanger.
d. Cerebral Palsy and Aphasia  
Prereq.: 695, 6850K or permission of instructor.  
Moser, Schlanger.
e. Foreign Accent  
Prereq.: 585 or permission of instructor.  
Black, Goff.
f. Voice  
Prereq.: 697 or permission of instructor.  
Moser, Irwin.
g. Articulation  
Prereq.: 697 or permission of instructor.  
Goff.
h. Parent Education and Counseling  
Prereq.: 684 and 10 cr. hrs. of psychol. or permission of instructor.  
Irwin, Goff.
i. Aural Rehabilitation  
Prereq.: 684, 6850R or permission of instructor.  
Black, Stromata, Wallace.
j. Diagnostic Audiology  
Prereq.: 688, 880F or permission of instructor.  
Black, La George, Stromata.
k. Speech Reading and Auditory Training of the Deaf  
Prereq.: 781 or permission of instructor.  
Black, Crawford, Stromata.

Seminars in Education  
(See Education 800)
Seminar in Public Address
Repeatability.
a. The rhetoric of Cicero.
   Su (1st term).
   Hostetler.
b. The rhetoric of Quintilian.
   Su (2nd term).
   Harding.
c. The Scottish Rhetoricians.
   A.
   Harding.
d. The rhetoric of Plato and Aristotle.
   A.
   Hostetler.
e. Public Address in the Early National Period (1787-1861).
   W.
   Hostetler.
 f. Cicero as a Stylist.
   W.
   Harding.
g. Medieval and Renaissance Rhetoric.
   Sp.
   Hostetler.
h. John Quincy Adams and the Boylston Chair.
   Sp.
   Harding.

Seminar in Theatre
Repeatability.
a. Advanced Technical Practice.
   Su (1st term).
   Deeway.
b. The Commedia dell’arte: Research activities in the
   Italian popular comedy of the Renaissance.
   Su.
   McDowell.
c. 19th Century Theatre Iconography: studies in the
   British and American Theatre based on pictorial
   evidence.
   A.
   McDowell.
d. The Development of Dramatic Art: Classical
   through Renaissance.
   A.
   Ritter.
e. History: The Theatre of the U.S. before WWII
   based on original documents from the OSU
   collection.
   W.
   Morrow.
f. The Development of Dramatic Art: 17th and 18th
   centuries.
   W.
   Ritter.
g. The American Musical and its Production.
   Sp.
   Crespoon.
h. The Development of Dramatic Art: 19th and 20th
   centuries.
   Sp.
   Ritter.
i. The Service Course in Theatre.
   A, W.
   Bowen.
Surgery

Office: University Hospital, 410 W. Tenth Ave.

PROFESSORS ROBERT ZOLLINGER (Chairman); JAILLON, CLAYTOWNS, CURTISS, TELLIOTT, HAMELBERG, HAVENER, MINTZ, IKLASSNEN, OWINTER, AND IR. WIL- LIAMS, ASSOCIATE PROFESSORS ANDREWS, BOLES, KINSELLA, BING- LINGER, ASSISTANT PROFESSORS ARNOLD, BABER, BING- HAM, COBLEMAN, DAVISON, DURAN, PURSE, FUSCO, GARRISON, HAMILLON, HARDING, HEYDENIGER, KRE- GUTHIER, HAMILTON, IRVING, LACER, LESLIE, LIPPEL, MILLER, MORGAN, HARVEY, PUPPEL, RANALD, DABROWSKI, F. SMITH, R. SMITH, WELCH AND ZOK.

715 Clinical Surgery
Prereq. Med. 3rd yr. standing.
The student serves as a clinical clerk in the inpatient and outpatient departments of the General Surgical Service. He is instructed in total patient care.

720 Individual Studies in Surgery
1, 2, 3, or 4 months.
Prereq.: Permission of instructor.
A. Anesthesia research. 4 months, offered July, Oct.
B. General Surgery. 1, 2 months, offered all months except June.
C. Neurosurgery. 2 months, offered all months.
D. Orthopedics. 2, 3, 4 months, offered all months.
E. Pediatric surgery. 2 months, offered all months.
F. Urology. 2, 3, 4 months, offered all months.

730 Group Studies in Surgery
1, 2, 3 months.
Prereq.: 715, 736.
A. Anesthesia. 2 months, offered July, Sept., Nov., Jan., Apr.
B. Anesthesia, Pharmacology. 1 month, offered Jan.
C. Anesthesia, anesthesiology. 1 month, offered Mar.
D. Emergency room. 1 month, offered all months except June.
E. Neurosurgery. 1 month, offered all months except June.
F. Orthopedic. 1 month, offered all months except June.
G. Pediatric surgery. 1 month, offered all months except June.
H. Pediatric surgery, preceptorship. 2 months, offered all months except June.
J. Surgical laboratory. 3 months, offered Sept., Dec., Mar.
K. Thoracic surgery. 1 month, offered all months except June.
L. Thoracic surgery-cardiovascular. 1 month, offered all months except June.
M. Urology. 1 month, offered all months except June.
COURSES OF INSTRUCTION

SURGERY

736 Clinical Surgery
Prereq.: Med. 4th yr. standing.
Total in- and outpatient management of diseases of surgical specialties; anesthesia, ophthalmology, otolaryngology, emergency room, orthopedics, neurosurgery, thoracic surgery, plastic surgery, and urology.

781 Internship in Surgery
12 months full time, beginning July 1.
Prereq.: Appointment as Intern, University Hospital.
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.

782 Residency in Surgery
12 months full time, beginning July 1.
Prereq.: Appointment as Resident, University Hospital.
Repeatable to a maximum of 360 cr. hrs.
Rotation through general surgery and surgical sub-specialties; rounds, conferences.

900 Seminar in Surgery
Attendance at Grand Rounds and weekly X-ray and pathological conference is required. Students are responsible for the material presented.

950 Research in Surgery
Research for thesis purposes only.

Survey Courses in Arts and Sciences

401 Orientation to the College of Arts and Sciences
Su, A, W, Sp. 1 cl. every other week.
Prereq.: 1st qtr. freshmen.
Conferences for orientation of new students in the University and the College of Arts and Sciences.

489 Essentials of a Liberal Education
W. 1 cl.
Prereq.: By invitation to qualified freshmen.
Problems of belief and of the individual’s personal and social responsibilities in the present age. Discussions are led by faculty members or outside speakers.

490 Methods of Inquiry
Sp. 1 cl.
Prereq.: Permission of instructor.
A critical examination of the modes of inquiry in the natural sciences, social sciences and humanities. Seminar discussion of selected readings.

605 Foundations of Contemporary Civilization
Su, 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 Development of Modern Science
Sp. 5 cl.
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.

750 Arts-Graduate Course
Prereq.: Senior standing and approval by the Honors Committee of the College of Arts and Sciences and the Graduate School.
A program of study will be given at the end of each quarter. At the conclusion of the program, course credits and final grades will be assigned.
Registration in this course constitutes full-time enrollment, unless otherwise specified.
A program leading to the simultaneous award of the Bachelor of Arts and Master of Arts degree.

Survey Courses in Agriculture

401 Survey of Agriculture
Prereq.: 1st qtr. standing in all curricula in the College of Agriculture except Home Ec.
A development of objectives and an exploration of curricula, opportunities, student services, study skills and resident instruction, research and extension. Ritchie, Vastine.

501 Survey of Agriculture
A, W., 1 cl.
Problems of employment in agriculture, business and industry; interviews; selection and application for positions. Beder.

502 Agricultural Honors Colloquium
W., 2 cl.
Prereq.: Enrollment in Agricultural Honors Program or permission of instructor.
The relationships of technology, science, and economics in agriculture to society. Discussions are led by faculty members or outside speakers. Ritchie.
Survey Courses in Commerce

401  Commerce College Orientation  U  O
Su, A, W.  Arr.
Prereq.: Admission to College of Commerce and Administration with less than 45 quarter hours credit.

402  Business and Society  U  3-5
A, W, Sp.  3 to 5 cl.
Prereq.: Participation in the College of Commerce Junior Division Honors Program. Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

798  College Seminar  U  2-5
A, W, Sp.  2 to 5 cl.
Prereq.: Permission of instructor.
Repeatable to a maximum of 15 cr. hrs.

Survey Courses in Social Work

401  Survey of Social Work  U  1
A, Sp.  1 cl.
Prereq.: Soc. Work 1st yr. standing or transfer students with less than 90 academic cr. hrs.
Function of social welfare services. Philosophy, vocational opportunities and qualifications for practice. Orientation to college life; study methods; time budgeting, scheduling and counseling. Placement services. Zupancic.

Veterinary Anatomy

Office: 102-A Sisson Hall, 1000 Coffee Road.
PROFESSORS IVENZKE (Chairman) and DIESEM; ASSISTANT PROFESSOR ANDRES; INSTRUCTORS HOROWITZ and LATSHAW.

451  Veterinary Anatomy  U  5
A.  5 cl.
Not open to Veterinary Medical Students.
Lectures and demonstration on specimens from the various anatomical systems of domestic animals. Horowitz.

610  Anatomy of Domestic Animals  P  7
A.  4 cl, 8 lab hrs.
Prereq.: Vet Med. 1st yr. standing.
The morphology of the cow, sheep, and goat. Diesem, Venske, Horowitz.

611  Anatomy of Domestic Animals  P  7
W.  4 cl, 8 lab hrs.
Prereq.: Vet Med. 1st yr. standing and 610.
The morphology of the horse, pig, and fowl. Diesem, Venske, Horowitz.

616  Veterinary Histology  P  4
W.  2 cl, 4 lab hrs.
Prereq.: Vet Med. 1st yr. standing.
The microscopic structure of the cell and fundamental tissues. Andres, Latshaw.

617  Veterinary Histology  P  4
Sp.  3 cl, 4 lab hrs.
Prereq.: Vet Med. 1st yr standing and 616.
The microscopic structure of organs. Andres, Venske, Latshaw.

618  Veterinary Embryology  P  4
A.  3 cl, 4 lab hrs.
Prereq.: Vet Med. 1st yr. standing.
The developmental anatomy of the chick, pig, cat, and dog. Venske, Andres, Latshaw.
COURSES OF INSTRUCTION

VETERINARY ANATOMY

620 Surgical Anatomy P 5
Sp. 2 cl., 6 lab. hrs.
Prereq.: Vet. Med. 2nd yr. standing.
A thorough dissection of the dog and lecture-demonstrations on areas of special surgical significance in other animals. Diesem, Horwitz, Venzke.

701 Minor Problems P C 2-5
Prereq.: 617, 618.
Training in laboratory investigation of special problems. Venzke, Diesem, Andres.

751 Anatomical Techniques P G 2-5
Prereq.: 611, 617 or equiv. and permission of the 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, Venzke, Andres.

755 Veterinary Endocrinology P G 3-5
Su, A, W, Sp. 3 cl., 4 lab. hrs.
Prereq.: Vet. Physiol. 610, 611 or Physiol. 601.
Special consideration is given to the correlation of the endocrine control of cellular metabolism. Venzke.

950 Research in Veterinary Anatomy G Arr.
Research for thesis or dissertation purposes only.
For participation in Clinical Instruction, see courses offered under Veterinary Clinics.

723 Veterinary Clinics P 3
Sp. 7 2-hr. lab.
Prereq.: 722.
Not open to students with credit for 733.

724 Veterinary Clinics P 6
Su. 7 24-hr. lab. duty, 1 cl.
Prereq.: 723.
Not open to students with credit for 740.
Intense training in clinical work for one term.

725 Veterinary Clinics P 15
A, W, Sp. 7 24-hr. lab duty, 1 cl.
Prereq.: Vet. Med. 4th yr. standing.
2 quarters required.
Not open to students who have credit for 741.

Veterinary Medicine

Office: 115 Veterinary Clinic Building, 1981 Neil Avenue.
Professors: Jerrill (Dean), JTharp (Chairman), Jhen-Thorne, and Jvenzke; Associate Professors: Donham, Donovan, Weary, and Whiteus; Assistant Professors: Murdock and Rainier; Instructors: Gardner, Martin, Murdock, Grubes and Wyman.

620 Physical Diagnosis P 2
Sp. 1 cl., 1 2-hr. lab.
Prereq.: Vet. Med. 2nd yr. standing.
To acquaint the student with the principles, techniques, and instrumentation required to conduct a thorough physical examination of all the domestic animals. Weary, Murdock, Donovan, Martin, Wyman.

701 Minor Problems P G 2-8
Prereq.: Vet. Med. 4th yr. standing. Adequate clinical training and permission of instructor.
Special problems in veterinary medicine. Weary, Donovan, Tharp, Murdock, Whiteus.

719 Veterinary Practice P 1
W. 2 cl.
Prereq.: Vet. Med. 4th yr standing.
To acquaint the student with veterinary laws, business practices, opportunities and responsibilities that will be thrust upon him at graduation. Whiteus.

720 Veterinary Practice P 1
Sp. 2 cl.
Prereq.: 719.
Continuation of 719.
730 Diseases of Small Animals   P 3
    A. 3 cl.
    Prereq.: 620.
    A study of the diseases of small animals with emphasis on the diagnosis and treatment. Donovon, Martin, Wyman.

731 Diseases of Small Animals   P 3
    W. 3 cl.
    Prereq.: 730.
    Continuation of 730.

732 Diseases of Small Animals   P 3
    Sp. 3 cl.
    Prereq.: 731.
    Continuation of 731.

735 Diseases of Large Animals   P 4
    A. 4 cl.
    Prereq.: 620.
    A study of the diseases of large animals with emphasis on diagnosis and treatment. Wearsly, Donaham, Gardner, Rainier.

736 Diseases of Large Animals   P 3
    W. 3 cl.
    Prereq.: 735, 740.
    Continuation of 735 and 740.

738 Obstetrics and Genital Diseases   P 5
    Sp. 5 cl.
    Prereq.: Vet. Med. 3rd yr. standing.
    Lectures and demonstrations in obstetrics, diseases associated with reproduction and artificial insemination of domestic animals. Tharp, Murdock.

740 Diseases of Large Animals   P 4
    A. 4 cl.
    Prereq.: 620.
    A study of the diseases of large animals with emphasis on diagnosis and treatment. Wearsly, Murdock.

750 Ophthalmology   P C 3
    A study of the eye of domestic animals with emphasis upon diagnosis of the eye and the relation of this organ to general diseases. Donovon, Wyman.

950 Research in Veterinary Medicine   G Arr.
    Research for thesis or dissertation purposes only.
    For participation in Clinical Instruction, see courses offered under Veterinary Clinics.

Veterinary Parasitology

Office: 304 Sisson Hall, 1900 Coffey Road.
PROFESSORS KOUTZ (Chairman); ASSOCIATE PROFESSOR GROVES; ASSISTANT PROFESSOR SCOTHORN.
Open only to Students Registered in the College of Veterinary Medicine

623 Advanced Veterinary Parasitology   P G 2-5
    Prereq.: 621, 622, or equiv., and permission of chairman.
    Repeatable to a maximum of 15 hrs.

640 Veterinary Parasitology   P 4
    Sp. 4 cl., 1 1-hr. lab.
    Prereq.: Vet. Med. 1st yr. standing.
    Lectures and demonstrations on the classification, structure, reproduction, habitat, life history, control and treatment of the nematode, cestode and trematode parasites found in domestic animals. Kouts, Groves.

642 Veterinary Parasitology   P 3
    A. 3 cl., 1 2-hr. lab.
    Prereq.: Vet. Med. 1st yr. standing.
    Lectures and demonstrations on the classification, structure, reproduction, habitat, life history, control and treatment of the anthropods found in domestic animals. Kouts, Groves.

646 Veterinary Parasitology   P 3
    W. 3 cl., 1 1-hr. lab.
    Prereq.: Vet. Med. 1st yr. standing.
    Lecture and demonstrations on the structure, reproduction, habitat, life history, control and treatment of the protozoal parasites found in domestic animals. Kouts, Groves.

701 Minor Problems   P G 2-8
    Kouts, Groves.

827 Seminar in Veterinary Parasitology   G 1

950 Research in Veterinary Parasitology   G Arr.
    Research for thesis or dissertation purposes only.
    For participation in Clinical Instruction, see courses offered under Veterinary Clinics.
Veterinary Pathology

Office: 207 Veterinary Pathology Bldg., 1925 Coffey Road.

PROFESSORS J. COLE (Chairman), J. FARRELL, H. GRIESEMER, and J. KOESTNER; ASSOCIATE PROFESSOR MASH; ASSISTANT PROFESSORS EASDA, J. LOEB, and McKISSICK; INSTRUCTORS CAFEN, STORTS, and WOLF.

610 Pathology Technic. P G 2-10
Prereq.: 621 or equiv. and permission of instructor.

621 General Pathology P 6
A. 4 cl., 4 lab. hrs.
Prereq.: Vet. Med. 2nd yr. standing.
The principles of pathology, including etiology, reaction to injury, course and termination of disease. Emphasis on functional, chemical and morphological alterations in disease. Koestner, Wolf, Capen.

622 Systemic Pathology P 6
W. 4 cl., 4 lab. hrs.
Prereq.: 621.
Diseases of the nervous, endocrine, cardiovascular, biliary and lymphatic, digestive, respiratory, urinary, genital musculo-skeletal and integumentary systems, and organs of special senses. Griesemer, Koestner, Storts, McKissick.

701 Minor Problems P G 1-10
Prereq.: 621 or equiv. and permission of instructor.

732 Avian Pathology P 3
W. 3 cl.
Prereq.: 721.
Diseases of chickens, turkeys, caged birds, game birds, and water fowl. Marsh, Wolf.

733 Veterinary Clinical and Systemic Pathology P 6
Sp. 4 cl., 4 lab. hrs.
Prereq.: 622.
Correlation of functional, morphological and chemical abnormalities in diseases of domestic and laboratory animals caused by toxic and radioactive materials, nutritional and metabolic disturbances, and infectious agents. Griesemer, Loeb, Farrell.

776 Advanced Systemic Pathology P G 2-10
Prereq.: 610, 622, 701 or equiv., and permission of instructor.
An advanced study of animal diseases as they affect all organ systems of the body. Farrell, Koestner, Griesemer.

778 Veterinary Surgical Pathology P G 2-10
Sp.
Prereq.: 776, and permission of instructor.
Biopsy methods and diagnosis. Surgical specimens are studied, and emphasis is placed upon the correlation of lesions and functional pathology. Koestner.

A-242

786 Animal Oncology P G 2-10
A.
Prereq.: 776 or equiv. and permission of instructor.
A study of neoplasms occurring in animals, including identification, epidemiology, experimental production, cell culture, transplantation and biological behavior. Cole, Griesemer.

807 Seminar in Veterinary Pathology G 1
Repeatable.

950 Research in Veterinary Pathology G Arr.
Research for thesis or dissertation purposes only. For participation in Clinical Instruction, see courses offered under Veterinary Clinics.

Veterinary Physiology and Pharmacology

Office: 351 Sisson Hall, 1900 Coffey Road.

PROFESSORS J. SMITH (Chairman), J. MARRS, J. REDDING, and J. FOUNDEN; ASSOCIATE PROFESSORS J. POWERS, ASSISTANT PROFESSORS RAY and T. HAMLIN.

516 Animal Physiology U 5
Sp. 4 cl., 1 3-hr. lab.
Prereq.: Chem. 408 or Chem. 412.
Not open to students with credit for Vet. Physiol. 610 and 612.
Concepts and principles involved in the function of various body systems and principles of growth and ageing will be considered. C. B. Smith and Staff.

517 Animal Physiology U 5
W. 4 cl., 1 3-hr. lab.
Prereq.: Chem. 408 or Chem. 412.
Not open to students with credit for Vet. Physiol. 612.
Comparative study of physiological concepts and principles involved in reproduction and metabolism in various species of domestic animals. C. B. Smith and Staff.

610 Physiology of Domestic Animals P 5
Sp. 4 cl., 3 lab. hrs.
Prereq.: Vet. Med. 1st yr. standing.
Physiology of peripheral nerve, central nervous system, sense organs, blood lymph, and special fluid systems of body. Redding.

611 Physiology of Domestic Animals P 5
A. 4 cl., 3 lab. hrs.
Prereq.: 910.
Physiology of the cardiovascular and respiratory systems, digestion in the simple stomach and rumen. Smith, Hamlin, Ray.
VETERINARY PREVENTIVE MEDICINE

622 Physiology of Domestic Animals P 5
W. 4 cl., 3 lab. hrs.
Prereq.: 632.
Physiology of digestion, metabolism; renal physiology, reproduction, and endocrinology. Powers, Ray.

630 Veterinary Pharmacology P 5
A. 5 cl.
Pharmaceutical standards and preparations, metrology, posology, prescription writing, basic principles of pharmacodynamics, drugs acting on the neuromuscular systems, skin and mucous membranes and digestive tract of domestic animals. Redding, Powers, Ray.

632 Veterinary Pharmacology P 4
W. 4 cl.
Anti-infective drugs. Hormones used as drugs, drugs affecting fluid and electrolyte balance and drugs acting on the cardiovascular system of domestic animals. Powers, Ray, Smith, Redding.

701 Minor Problems P G 3-15
Prereq.: 629 or equiv. and permission of instructor.
Smith, Redding, Founden, Powers, Hamilton.

950 Research in Veterinary Physiology G Arr.
Research for thesis or dissertation purposes only.
For participation in Clinical Instruction, see courses offered under Veterinary Clinics.

Veterinary Preventive Medicine

Office: 253 Sisson Hall, 1600 College Road.
PROFESSORS HELWIG (Chairman), JONES, STYNIK, and 4BOHL; INSTRUCTORS BULLER, LINERODE, and LIBBY; LECTURERS ADAMS, BENDER, KRAMER, WITTICH, GOLDSTEIN and RUSSELL.

452 Basic Animal Hygiene U 3
A. 3 cl.
Prereq.: 2nd yr. standing.
Causes of disease and the relationship of these causes to the animal's environment. Helwig, Jones, Buller, Linerode.

453 Applied Animal Hygiene U 3
W. 3 cl.
Prereq.: 452 or equiv.
Various common diseases responsible for losses to the livestock industry, with emphasis on control. Helwig, Jones, Buller, Linerode.

620 Hygiene and Environmental Sanitation P 3
A. 3 cl.
Prereq.: Vet. Med. 3rd yr. standing.
A disease prevention study of the environmental factors which have a direct influence on animal and human health. An introduction to epidemiology and biostatistics. Helwig, Jones, Buller, Linerode.

701 Minor Problems P G 2-5
Prereq.: 629, and permission of instructor.
Helwig, Jones.

730 Biological Research Techniques P G 3
A, W, Sp. 2-3 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. Staff.

740 Applied Preventive Medicine P 15
A, W, Sp. Full time off-campus cl. and lab.
Intensive practical training: Public Health and Food Hygiene, meat inspection, Federal and State Disease Control Programs, and Hard Disease Management. Department Staff and Cooperating Governmental Agencies.

742 Food Hygiene and Public Health P 4
Sp. 3 cl., 2 2-hr. lab.
Prereq.: Vet. Med. 3rd yr. standing or permission of instructor.
Principles and practices of food sanitation with emphasis on the veterinarian's role in protecting the public food supply. Staff.

745 Prevention and Control of Communicable P 3
Diseases W. 3 cl.
Prereq.: Vet. Med. 3rd yr. standing or permission of instructor.
The prevention of animal communicable diseases based on contemporary medical knowledge is correlated with administrative control and public health. Helwig and Staff.

750 Germfree and Gnotobiotic Animals P G 5
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. Henthorne and Staff.

800 Seminar in Veterinary Preventive Medicine G 1

810 Veterinary Public Health G 3-8
Su, A, W.
Helwig, Jones, Russell.

950 Research in Veterinary Preventive G Arr.
Research for thesis or dissertation purposes only.
For participation in Clinical Instruction, see courses offered under Veterinary Clinics.
Veterinary Surgery and Radiology
Office: 111 Veterinary Clinic, 1101 West 19th Avenue.
PROFESSORS: RUDY (Chairman), GUARD (Emeritus), and JOHNSON; ASSOCIATE PROFESSORS: GABEL, ROENIGK, and WILSON; INSTRUCTORS: HEATH and PENNOCK.

623 General Surgery P 5
Sp. 4 cl., 2 2-hr. lab.
Prereq.: Vet. Med. 2nd yr. standing.
Lectures, recitations and demonstrations of surgery. Rudy, Gabel.

701 Minor Problems P C 1-5
Prereq.: Vet. Med. 4th yr. standing.
Advanced work in surgery and radiology. Rudy, Johnson, Roenigk, Gabel.

731 Veterinary Radiology P 2
A. 2 cl., 3-hr. lab.
Prereq.: Vet. Med. 3rd yr. standing.
Presentation of the principles of diagnostic and therapeutic radiology, including nuclear medicine. Laboratory demonstrations include interpretation of radiographs and radiological technique and protection. Roenigk, Pennock.

732 Special Surgery P 6
W. 6 cl.
Prereq.: 623, 731.

733 Special Surgery P 6
Sp. 6 cl.
Prereq.: 732.
Continuation of 732. Johnson, Gabel, Heath.

741 Surgical Operations P 1
A, W, Sp. 1 4-hr. lab.
Prereq.: 733.
Surgical exercises.

950 Research in Veterinary Surgery or Veterinary Radiology C Arr.
Research for thesis or dissertation purposes only.
For participation in Clinical Instruction, see courses offered under Veterinary Clinics.

Welding Engineering
PROFESSORS: MCAULEY (Chairman), G. GREEN, and H. MCKEE; ASSOCIATE PROFESSOR: J. JACKSON; and INSTRUCTOR.

415 Forging, Heat Treating, and Welding U 3
A, W, Sp. 3 cl., 3 1-hr. lab.
Not open to students with credit for 418.
Safety glasses must be worn in the 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.

449 Practical Experience in a Welding Organization U 6
A. Ten weeks during the Su. Qtr.
Prereq.: Weld E. 3rd yr. standing.
Experience in an engineering organization and the preparation of an acceptable report on the organization and the work done before beginning the 4th yr.

610 Applied Engineering Analysis U 4
W. 3 cl., 1 3-hr. lab.
Prereq.: Physics 533 and Math. 544.
The analysis of engineering systems by the application of fundamental principles of conservation of matter and energy, and operational techniques. McMaster.

640 Welding Engineering Inspection Trip U 2
Sp. One week between the W. and Sp. Qtrrs.
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.

646 Welding Science and Its Application U 3
W. 3 cl.
Prereq.: Engr. 3rd yr standing and Engr. Mech. 602.
A study of the engineering fundamentals of welding. Design, materials, and processes are considered as related to the welding field. Green.

649 Practical Experience in Welding Industry U 6
A. Ten weeks during the Su. Qtr.
Prereq.: Weld E. 4th yr. standing.
Experience in an engineering organization and the preparation of an acceptable report on the organization and the work done before beginning 5th yr.

701 Physics of Welding U 4
A. 3 cl., 1 2-hr. lab.
Safety glasses must be worn in the laboratory.
The application of basic principles in the welding processes. McCauley.

702 Principles of Resistance Welding U 4
A. 3 cl., 3 1-hr. lab.
Prereq.: 610 and Elec. E. 644
Safety glasses must be worn in the laboratory.
Theory and operation of resistance welding equipment, power supplies, electronic controls, welding codes and schedules, and process controls. McMaster.
703 Nondestructive Testing U G 4
A. 3 cl., 1 3-hr. lab.

Prereq.: Elec. E. 643, Meth. 543.

Safety glasses must be worn in the laboratory.

The principles, equipment, techniques, and interpretation of nondestructive test with X-rays, radioscopes, magnetic fields, penetrometers, eddy currents, and other probing media, with materials serviceability, evaluation. McMaster.

739 Principles of Welding U G 4
Sp. 3 cl., 1 3-hr. lab.


Safety glasses must be worn in the 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. McMaster.

740 Welding Engineering Inspection Trip U 2
Sp. One week between the W. and Sp. Qtrs.

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.

741 Theory of Welding U G 5
W. 4 cl., 1 3-hr. lab.


Safety glasses must be worn in the 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. McCauley.

742 Application of Welding Engineering U G 4
Sp. 3 cl., 1 3-hr. lab.

Prereq.: 741.

Safety glasses must be worn in the laboratory.

The principles by which manufacturing procedures for materials may be developed. An analysis of processing methods; material, physical and mechanical properties, inspection, performance and service testing. McCauley.

743 Welding Design U G 5
A. 3 cl., 2 3-hr. lab.

Prereq.: Civil E. 741.

The analysis and design of statistically determinate and indeterminate members and structures. A study of welding procedures for shop fabrication and field erection. Green.

744 Welding Design U G 5
W. 3 cl., 2 3-hr. lab.

Prereq.: 742, Mech. E. 736.

The analysis and design of machine elements and frames to a given set of shop conditions and facilities. Emphasis is placed on cost factor considerations. Green.

745 Welding Design U G 5
Sp. 3 cl., 2 3-hr. lab.

Prereq.: 702 and 744.

The design of resistance welded products. A selection of process and equipment and a study of tooling used in high production work. Green.

748 Special Problems in Welding Engineering U 3-15

Prereq.: 741.

Special studies not offered in the fixed curriculum in the areas related to courses 701, 702, 703, 739, 741, and 742. This work may be taken in more than one area.

ZOOLOGY

754 Thesis U 3-12
A, W, Sp. 6 lab. hrs.

841 Advanced Problems in Welding Engineering U 3-12

Prereq.: Permission of instructor.

Repeatable to a maximum of 54 or 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.

950 Research in Welding Engineering G Arr.

Research for thesis or dissertation purposes only.

Zoology


PROFESSORS: WHARTON (Chairman), DAMBACH, HAUÉ, KOSTIB (Emeritus), LANNOIS, D. F. MILLER (Emeritus), J. A. MILLER (Emeritus), ST. MILLER, MYSEER, PETERLE, BONCE, BUNNAM, BJOIN, BIVON, BANNARD, ASSOCIATE PROFESSORS: BRITTY, BERRIES, GILTZ, GOOD, HOUSE, JOHNSON, PADDOCK, PLAN, and REESE. ASSISTANT PROFESSORS: BRECKWAY, BURNS, KLESSLER, FARMER, and STANSBERRY. LECTURER: TRAUTMAN; and ASSISTANTS.

For related courses see Biology.

401 General Zoology U 5
W, Sp. 2 cl., 3 3-hr. lab.

Prereq.: 600 or Biol. 402.

A study of the fundamental principles of animal physiology and their applications to man. Presented by means of laboratory exercises, demonstrations, and class discussion.

402 General Zoology U 5
Su, Sp. 3 cl., 2 2-hr. labs.

Prereq.: 401 or Bot. 501 or equivo. or concurs with permission of instructor.

A survey of the animal kingdom with emphasis on classification, function and biology.

Introduction to Ecology (See Biology 405)

404 General Zoology U 5
W, Sp. 2 cl., 3 1-hr. lab.

Prereq.: 400 or Biol. 402.

Not open to students with credit for 401 or 402.

A study of the variety of animals with emphasis on organ systems and their functions, the interrelationships with each other, space and time. Staff and Assistants.

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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
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</thead>
<tbody>
<tr>
<td>508</td>
<td>Ornithology</td>
<td>U</td>
<td>5</td>
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<tr>
<td></td>
<td>Sp. 2 cl., 1 2-hr. lab. Prereq.: 404 or 20 cr. hrs. of Biol. Sc. Not open to students with credit for 408. A study of the general biology and classification of birds, with emphasis on field identification of local species. Field trip each Saturday. Reese.</td>
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<tr>
<td>605</td>
<td>Animal Behavior</td>
<td>U</td>
<td>G 5</td>
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<tr>
<td>607</td>
<td>Management of Fisheries</td>
<td>U</td>
<td>G 5</td>
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<td>Sp. 5 cl., field trips. Prereq.: 404 or equiv. An appraisal of the capacities of environment to meet the needs of fish and a review of programs directed towards the improvement of fishing. Morrison.</td>
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<tr>
<td>610</td>
<td>Animal Parasites</td>
<td>U</td>
<td>G 5</td>
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<tr>
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<td>W. Sp. 2 cl., 2 2-hr. labs. Prereq.: 404 or equiv. and 10 additional cr. hrs. of Biol. Sci. 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. J. N. Miller.</td>
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<tr>
<td>620</td>
<td>Advanced Zoology of Vertebrates</td>
<td>U</td>
<td>G 5</td>
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<td>A. Sp. 3 cl., 2 2-hr. labs. Prereq.: 404 or equiv. and 10 additional cr. hrs. of Biol. Sci. 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. J. N. Miller.</td>
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<td>623</td>
<td>Fish Ecology</td>
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<td>G 4</td>
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<td>Su. (2nd term). 3 all day classes per week. Prereq.: 404 or equiv. and permission of instructor. Studies of life histories and inter-specific relationships of fishes and of the various factors influencing their abundance. Price.</td>
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<td>624</td>
<td>Ichthyology</td>
<td>U</td>
<td>G 4</td>
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<td>Su. (1st term). 3 all day classes per week. Prereq.: 404 or equiv. 15 additional cr. hrs. of Biol. Sci. or equiv. and permission of instructor. Given only at the Franz Theodore Stone Laboratory. A field and laboratory study of the distribution and classification of fishes, which includes methods of identification, collection, and preservation.</td>
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<td>629</td>
<td>Mammalogy</td>
<td>U</td>
<td>G 3</td>
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<td>W. 3 2-hr. cl. Prereq.: 620 or 640 or equiv. The comparative morphology, taxonomy, life histories, distribution, and importance of the mammals. Good.</td>
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<td>631</td>
<td>Animal Parasitology</td>
<td>U</td>
<td>G 4</td>
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<td>Su. 3 all day classes per week. Prereq.: 404 or equiv. and 10 additional cr. hrs. of Biol. Sci. Given only at the Franz Theodore Stone Laboratory. A course emphasizing the parasites infesting freshwater vertebrates, including field and laboratory experiences, host examination, and techniques dealing with staining, fixing, and mounting of specimens.</td>
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<tr>
<td>632</td>
<td>Comparative Embryology</td>
<td>U</td>
<td>G 5</td>
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<td>W. 3 cl., 2 2-hr. labs. Prereq.: 404 or equiv. and 10 additional cr. hrs. of Biol. Sci. A survey of various modes of embryonic development, illustrated with both invertebrate and vertebrate type material with emphasis on fundamental aspects and processes. Price.</td>
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<td>633</td>
<td>Invertebrate Zoology</td>
<td>U</td>
<td>G 4</td>
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<td></td>
<td>Su. (2nd term). 3 all day classes per week. Prereq.: 20 cr. hrs. of Biol. Sci. including 404, or equiv. Given only at the Franz Theodore Stone Laboratory. The collection and identification of invertebrate animals, development of methods of classification and use of keys.</td>
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<tr>
<td>634</td>
<td>Biology of Birds</td>
<td>U</td>
<td>G 3</td>
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<td>W. 2 cl., 1 2-hr. lab. Prereq.: 508 or equiv. and 10 additional cr. hrs. of Biol. Sci. The aspects of anatomy, physiology, taxonomy, and behavior which are pertinent to the study of birds. Putnam.</td>
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<tr>
<td>636</td>
<td>Principles of Animal Ecology</td>
<td>U</td>
<td>G 5</td>
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<tr>
<td>637</td>
<td>* Ecological Physiology of Aquatic Animals</td>
<td>U</td>
<td>G 4</td>
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<td>Su. (2nd term). 3 all day classes per week. Prereq.: 404 or equiv. and permission of instructor. Given only at the Franz Theodore Stone Laboratory. Study of the aquatic habitat including physical and chemical adjustment, tolerance, and acclimation to environment of vertebrates and invertebrates.</td>
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<tr>
<td>640</td>
<td>Wildlife Conservation</td>
<td>U</td>
<td>G 5</td>
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<td>A. 3 cl., 2 2-hr. labs. Prereq.: 20 cr. hrs. of Biol. Sci. An introductory course in the conservation and management of wildlife resources. Particular attention will be given to Ohio problems. Good.</td>
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<tr>
<td>641</td>
<td>Methods and Techniques in Wildlife Management</td>
<td>U</td>
<td>G 5</td>
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<td></td>
<td>W. 3 cl., 2 2-hr. labs. Prereq.: 20 cr. hrs. of Biol. Sci. A study of research and management techniques employed in the field of wildlife management. This course is especially designed for majors in wildlife conservation. Good.</td>
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<tr>
<td>642</td>
<td>Field Zoology</td>
<td>U</td>
<td>G 4</td>
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<td>Su. (1st term). 3 all day classes per week. Prereq.: 20 cr. hrs. of Biol. Sci. including 404 or equiv. Given only at the Franz Theodore Stone Laboratory. 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.</td>
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<tr>
<td>652</td>
<td>Limnology</td>
<td>U</td>
<td>G 4</td>
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<td>Su. (1st term). 3 all day classes per week. Prereq.: 404 or equiv. 15 additional cr. hrs. in Biol., 10 cr. hrs. in Chem. and 10 cr. hrs. in Physics. Not open to students with credit for 850. Given only at the Franz Theodore Stone Laboratory. 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.</td>
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654 Advanced Ornithology  U G 4
Su. (1st term), 3 all day classes per week.
Prereq.: 404 or equiv. and 10 additional cr. hrs. in Biol. Sc.
Not open to students with credit for 655.
Given only at the Franz Theodore Stone Laboratory.
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.

656* Herpetology  U G 4
Su. (2nd term), 3 all day classes per week.
Prereq.: 404 or equiv. and 10 additional cr. hrs. of Biol. Sc. 620 and Anat. 613 recommended.
Given only at the Franz Theodore Stone Laboratory.
Local species of reptiles and amphibians, their habits, life histories, ecology, and classification. Britt.

657 Basic Concepts and Recent Advances in Zoology  U G 5
A. 3 2-hr. cl.
Prereq.: High School teacher status and 404, Bot. 401, 402, or equiv.
Animal functions and genetic and environmental interrelationships in time and space as illustrated by selected animal types. Tidd.

Topics in Biological Sciences
(See Biology 696.)

658 Invertebrate Zoology  U G 5
W. 3 cl., 2 2-hr. labs.
Prereq.: 404 or equiv. and 10 additional cr. hrs. of Biol. Sc.
Not open to students with credit for 626, 637.
A survey of the invertebrates with emphasis on morphology and relationships of representative types. Broad.

701 Special Problems  U G 2-5
Prereq.: Permission of instructor.
Individual work in the field of the chosen problem.

k. Wildlife Management
Peterle, Good.
l. General Limnology
Britt, Monot, Coliveau.
m. Comparative Physiology
Brockway.

o. Electron Microscopy
Parrish.

p. Invertebrate Pathology
Parrish.

801 Special Problems  G 1-5
Research or special instruction at the graduate level not related to the thesis.

832* Advanced Zoology of Invertebrates  G 5
Sp. 3 cl. 2 2-hr. labs. Field trips including a one week week optional trip to a marine laboratory.
Prereq.: 404 or equiv. and 15 cr. hrs. of Biol. Sc. at the 500 or higher levels, and permission of instructor.
Not open to students with credit for 626.
A study of the morphology, physiology, life histories, and classification of the coelomate pseudocoelomate invertebrates and the annelid worms. Crites.

833* Advanced Zoology of Invertebrates  G 5
Sp. 3 cl., 2 2-hr. labs. Field trips including a one week optional trip to a marine laboratory.
Prereq.: 404 or equiv. and 15 cr. hrs. of Biol. Sc. at the 500 or higher levels, and permission of instructor.
Not open to students with credit for 627.
A study of the morphology, physiology, life histories, and classification of the coelomate invertebrates exclusive of annelid worms. Crites.

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

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

900 Seminar  G 1 or 2
A. (1 or 2 cr. hrs.), W. Sp. (1 cr. hr.)
Prereq.: Selection by the staff.
Repeatable to a maximum of 7 cr. hrs.

950 Research in Zoology  G Arr.
Research for thesis and dissertation purposes only.
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